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INTERNATIONAL INTERNSHIPS: A DIGITAL GAME-BASED ASSESSMENT APPROACH TO MEASURING THE TRANSFORMATION OF EMPLOYABILITY SKILLS INTO BEHAVIORS

Tesi di dottorato di: Dolly Predovic
Matricola: 4713197
Anno Accademico: 2019-2020

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Coordinatore: Prof.ssa Antonella Marchetti

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Doctoral Supervisors:
Emerita Professor Elspeth Jones
Professor John L. Dennis

Tesi di dottorato di: Dolly Predovic

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Abstract (English)

There is a large and widespread consensus suggesting that internships, as one form of experiential learning, can be an effective instrument for the development of students' technical and transferable skills and therefore as enhancing graduate employability. Separately, studies have found that international experiences can develop the skills most valued by employers. This research addresses a gap at the intersection of these two fields of study.

Most studies analyze international experiences with a distinctive focus on the international and not on the different types of experiences, e.g. study abroad versus internships.

The question this study aims to answer is whether an internship and an international context combine to extend the learning experience beyond that developed through a domestic internship alone.

When the design of this study was initially planned, much effort was put into identifying a tool to measure employability in the most objective way possible. Digital game-based assessments were identified as the most appropriate tool to do this objectively. Insights into behaviors in this study result in over 30 quantitative descriptors of employability, which converge with the lists of transferable skills that have been identified as those demanded by the labor market and extensively analyzed in the employability literature.

The data for this study was collected over three years 2017-19, and a total of 1315 Italian students were involved. Exploratory factor analysis examined the structure underlying the employability descriptors generated by the digital game-based assessments.

The findings reveal several significant themes that further contribute to our current knowledge and understanding of what influences graduates' employability.

The first finding answers the research question. When an internship takes place in a country different from that of the student's home, there is additional experiential learning from the international context, which contributes further to the experiential and transformative learning already developed through the internship.

It also appears that this additional element is associated with employability behaviors predicted by *Cognitive* and not *Social* factors. This contrasts with earlier studies on the impact of international experiences, which generally find that social and interpersonal skills are developed.

This study also finds that when there appears to be a gender bias toward male students in employability behaviors predicted by cognitive abilities, this bias disappears when associated with international internships.

Abstract (Italian)

Vi è un ampio e diffuso consenso che suggerisce che il tirocinio (internship), come forma di apprendimento esperienziale, può essere uno strumento efficace per lo sviluppo delle competenze tecniche e trasferibili degli studenti e quindi come strumento di rafforzamento dell'occupabilità (employabiltiy) dei laureati. Numerosi studi hanno anche scoperto che le esperienze internazionali possono sviluppare le competenze più apprezzate dai datori di lavoro.

Questa ricerca affronta una lacuna all'intersezione di questi due campi di studio. La maggior parte degli studi analizza le esperienze internazionali con un focus distintivo sull'aspetto internazionale e non sui diversi tipi di esperienze, ad es. studiare all'estero rispetto a fare un tirocinio (internship) all'estero. La domanda a cui questo studio si propone di rispondere è se il tirocinio (internship) e il contesto internazionale abbinati estendono l'esperienza di apprendimento oltre a quella sviluppata attraverso un tirocinio domestico da solo.

Quando la progettazione di questo studio è stata inizialmente pianificata, è stato fatto un grande sforzo per identificare uno strumento per misurare l'occupabilità (employability) nel modo più obiettivo possibile. Le misurazioni basate sull'utilizzo di giochi digitali (digital game-based assessments) sono state identificate come lo strumento più appropriato per farlo in modo obiettivo. In questo studio i comportamenti che definiscono l'occupabilita' (employability) degli studenti risultato in oltre 30 indicatori quantitativi. Questi indicatori convergono con le competenze trasferibili che sono state identificate come quelle richieste dal mercato del lavoro e ampiamente analizzate nella letteratura sull'occupabilità (employability).

I dati per questo studio sono stati raccolti nel triennio 2017-19 e sono stati coinvolti un totale di 1315 studenti italiani. L'analisi fattoriale esplorativa ha esaminato la struttura alla base degli indicatori di occupabilità (employability) generati dalle valutazioni basate sul gioco digitale (digital game-based assessments).

I risultati rivelano diversi temi significativi che contribuiscono ulteriormente alla conoscenza e comprensione di ciò che influenza l'occupabilità (employability) dei laureati.

Il primo risultato che emerge dalle analisi di questo studio risponde alla domanda di ricerca. Quando un tirocinio (internship) si svolge all'estero, c'è un apprendimento esperienziale aggiuntivo dato dal contesto internazionale, che contribuisce ulteriormente all'apprendimento esperienziale e trasformativo già sviluppato attraverso un tirocinio (internship) domestico.

Inoltre, risulta anche che questo elemento aggiuntivo sia associato a comportamenti di occupabilità (employability) legati a fattori cognitivi e non sociali. Ciò contrasta con gli studi precedenti sull'impatto delle esperienze internazionali, che generalmente associano questo tipo di esperienze allo sviluppo di competenze di tipo sociale e interpersonale.

Questo studio rileva infine che quando sembra esserci una superiorità degli studenti maschi nei comportamenti di occupabilità (employability) legati dalle capacità cognitive, questa superiorità scompare quando associata a stage internazionali.

Acknowledgments

Brescia, March 2017, I walked into my first CHEI PhD seminar. I was met there by Dr. Fiona Hunter who welcomed me with a smile. After the first five minutes of the seminar, I knew that this PhD journey was exactly what I wanted, but I never could have imagined that during this journey I would have learned so much and at the same time enjoyed it so much. Student experience within the broad topic of higher education internationalization is what I am interested in and what has always been part of my academic and professional experience. Everybody at the seminar told me that if these were my interests, I had to talk to Prof. Elspeth Jones, who was joining the seminar after two days. The day Elspeth arrived, before even talking to her, I had to give a brief presentation on what the research idea was at the time. I am quite a confident presenter; I took the stage and gave my short speech about the research idea feeling quite excited about it. Very kindly, Fiona and Elspeth gave me feedback on the research idea, my presentation, and on whether the research idea was worth pursuing as a PhD. I have never had such an intense learning experience in such a short time in my whole life. In just a few minutes I understood that I had no idea of what I was talking about, how, and what doctoral research is all about. This experience made me laugh about myself and realize how much I had to learn and how intensely I wanted to continue doing so and working with the amazing CHEI community researchers. This is how it all started.

I owe my gratitude to so many people for making this fantastic PhD journey possible.

My journey would not have been possible and this dissertation could not have taken shape and form without the constant support, encouragement, professional supervision, and personal encouragement of my doctoral supervisors, Emerita Professor Elspeth Jones, and Professor John L. Dennis. The research process has been very challenging for me, but they were always there and offered me immediate, constructive, and empowering support, turning this process into a meaningful and rewarding one. I have truly learned a lot from them, both academically and personally.

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Chapter 1 : Introduction

1.1 Research Interest and Choice of Topic

For many years I have been helping Italian and international students both with their internship choices and, upon graduation, with the transition into the world of work. Three aspects of the work with my students have always fascinated me and made me want to understand more. First the huge change I generally observe in the determination and focus of the students after an internship experience. Second the effect that an international experience has on their way of thinking about their future life and career paths. Third the fact that very often the best performing students academically are not necessarily the ones who are able to secure and keep the best jobs after graduation. It is from these observations based on the work I do with my students daily, that I started cultivating the research interest in this field. Employability is the concept that links the three observations and is the common denominator in the questions I have been asking myself. How do internships affect employability? How do international experiences affect employability? What defines employability?

To try and find answers and clear my thoughts, I started not only to read more on the topic but also to talk extensively with students, career center professionals at universities, and employers. I talked with these different groups of people out of curiosity, to better understand what employability means for each one of them and to try and find an answer to my questions. Instead of clarifying, this became more confusing the more people I talked with. It also seemed that what people told me was mainly what they thought made them look smart, literate, and professional and what they thought I wanted to hear. Students were all very ‘happy’ with their experiences, they all learned a lot from their internships and became more ‘adaptable’ and culturally aware by being abroad. Career center professionals were extremely focused on the KPIs requested to prove they are doing a great job; their answers were therefore focused on proving how much the internships or international experiences had done in terms of skills’ acquisition for the students and most of all on showing employment statistics. Employers, while being very different from one another, in terms of industry, academic background and function covered within the company, what they all seemed to have in common was that their answers were always very much biased by their own personal experiences, career progression and aspirations.

After having talked with these different groups of people my thoughts were still confused and my questions still unanswered. I later regretted that the talks were not part of a formal research project, but at that time the research on these topics had not yet begun, I was just trying to know more. So there was a need to dig deeper into these topics and start some real research.

To start though, the topic needed to be defined more carefully. What helped me in this task was a thorough literature review. I started reading about four main topics: internships and employability, international experiences, definitions of employability and employability assessments.

To be honest, at the beginning it still again just raised more questions. By examining the literature on internships, the only clear and convergent finding is that internships enhance employability. The same is true of the literature on international experiences, even though in this field a first interesting gap started to emerge. Almost all the papers talked in general about international experiences and the benefits on transferable skills of these experiences. At the beginning of my literature review, I struggled to find papers that differentiated between internships and other experience. However, during this initial literature review, the most confusing part was to understand what exactly employability is. Many papers talked indistinctly about employability and employment assuming they are the same thing, while other papers asserted the opposite. Understanding what exactly defines employability needed to be the first step, to take one step further and try to find an appropriate way to measure it in students. Only when I managed to slightly clarify these two steps, defining, and assessing employability, did the research interest begin to focus and the topic of this study begin to narrow.

One of my first findings in the literature review is that there is a large and widespread consensus suggesting that internship can be a very effective instrument for the development of students' technical and transferable skills and therefore for enhancing graduate employability (Crebert *, Bates, Bell, Patrick, & Cragnolini, 2004)(Jaaffar, 2016; D. Jackson, 2015; Rowe & Zegwaard, 2017; Stack & Fede, 2017). A range of studies from Australia (Green, King, & Gallagher, 2020; Potts, 2019), the US (Farrugia & Sanger, 2017; Hart Research Associates, 2015; M. Johnson & Anderson, 2020), Japan (Ota & Shimmi, 2020), and Europe (European Commission, 2019) found that the skills most valued by employers are also those developed, in part, by international experiences. The research addresses a gap at the intersection of these two fields of study.

The benefits in terms of employability of both internships and international experiences have been discussed globally, thoroughly analyzed from different perspectives, and confirmed consistently by a large body of knowledge. Most studies analyze international experiences with a distinctive focus on the international element of the experience and do not differentiate between the different types of experiences, i.e., study abroad versus internships.

Recently three studies have investigated international internships and the results are contradictory. Van Mol (2017) found that 25% of European employers value graduates with international internships, while slightly more than 20% of them value graduates with study abroad. Wright, Jones and Welland (2018) instead surveyed both students who had done internships abroad and students who hadn't. They found that the level of perceived employability did not differ between the two groups and concluded that skills and abilities linked to employability tend to be developed by all graduates. Pinto and Pereira (2019), through an experimental research design, compared perceived employability of people who included domestic versus international internships on their resumes. To do this the researchers created six fictitious resumes: two with international internships, two with domestic internships, and two with no internship and recruiters were then asked to rate the resumes. The absence of an internship decreased perceived employability, but international internships did not seem to offer any advantage over domestic ones for perceived employability or increase the chances of a job interview.

The above studies base their analysis and conclusions on perceptions of different stakeholders, employers, and students. While perceived employability is very extensively used as a proxy of employability in the research literature, when reading these studies, I felt the desire to find a different way to assess employability. My previous experiences of talking with the different stakeholders, students, career center professionals and employers meant that I did not want to go through that kind of analysis again and to consider the reasons that lead different stakeholders to have different perceptions. The search for a methodology that tried to assess employability more objectively continued.

In the beginning my investigation was based on Yorke's (2005) definition of employability, given that it is one of the mostly extensively referenced definitions. Yorke defines employability as

> *"a set of achievements – skills, understandings, and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy"* (Yorke, 2005, p. 8).

The difficulty was to find an assessment methodology that could measure most of the aspects highlighted by Yorke's definition.

I found the assumption of human capital theory (Becker, 1964) very interesting. Human capital theory seems to assume that what students learn in an academic setting is embodied in the ability to perform in the workplace and therefore to generate economic value. But the development of "transferable skills" or "generic skills" within formal or informal curricula does not guarantee that graduates will be able to automatically transfer these skills from an educational setting to the workplace (D. Jackson, 2016a). Leveson (2000) argues that, in general, the focus in academia is on teaching a set of skills to students, but employers might not be interested in the possession of that skill set; what they are interested in instead are the results and performances achieved by the graduates when they use that skill set in the workplace. According to Bradshaw (1992) employers '*do not detach competences from the circumstances of their use; they measure them only by the results they produce*' (Bradshaw, 1992, p.44).

When the design of this study was initially planned, much effort was put into identifying a tool to measure employability. The challenge was to identify a way to measure employability which needed to be at the same time objective, reliable, and that focuses on graduates being able "*to gain employment and be successful in their chosen occupations"* (Yorke, 2005, p.8). It is therefore the ability of transferring to the workplace the skills learned, both in formal academic setting and through life, that seems to define employability more closely. A tool that tries to measure employability objectively and reliably should focus on predicted workplace behaviors, rather than the simply on the perceived possession of skills.

When working with students transitioning from the university to the workplace I am in constant contact with recruiters. I witness every day recruiters struggling to find assessment methodologies which can be good predictors of workplace behaviors. The right assessment methodology is crucial for recruiters for two main reasons: it enables them to select the graduates that best fit the job they are recruiting for and therefore reduce expensive employee turnover.

At the beginning of this research a very innovative tool was starting to be used by recruiters to predict work place behaviors. It seemed that trying to predict workplace behaviors was the best proxy for objectively measuring employability. Using the power of behavioral science, artificial intelligence, and smart video games, a new generation of psychometric tests informed by neuroscience had been developed, digital game-based assessments (Clapper, 2017; Galloway, Lippman, Burke, Diener, & Gates, 2017).

Through such assessments, psychometric tests gather up to 12,000 data points on each individual's strength and potential. Tasks are developed from experiments founded on psychological, cognitive neuroscience, and computational neuroscience principles of human behavior. These experiments have been replicated in app-like interfaces, ensuring they maintain scientific rigor. Research has shown that behavioral variations among individuals completing these tasks map to 'real-world' observable differences in personality traits and cognitive ability, which reflect workplace behaviors and are highly predictive of job performance (Galloway et al., 2017).

Digital game-based assessments appeared to be a good solution to the issue that had been so elusive up to this point to measure employability as objectively as possible. These tools have been developed to help employers find the right employee fit by assessing the underlying processes that guide behavior, thoughts, and emotions, and mapping that performance onto well-known, well-tested, and scientifically sound measures (Galloway, T, Lippman, L., Burke, H., Diener, O., and Gates, 2017). Employers in many fields are using these tools to identify and select potential candidates as matches for specific employment opportunities (Georgiou, Gouras, & Nikolaou, 2019; Povah, Riley, & Routledge, 2017). This suggested, therefore, that a game-based research study would not only provide an objective measure but it would also fit with real-world experiences graduates would later encounter when seeking employment.

In the digital game-based assessments chosen for this study, insights into behaviors result in over 30 quantitative descriptors of employability; these descriptors converge with the list of transferable skills that have been identified as those demanded by the labor market and extensively analyzed in employability literature (Archer & Davison, 2008; Deardorff & Jones, 2012; Dearing Report, 1997; Farenga & Quinlan, 2016; D. Jackson, 2013c; E.Jones, 2013)

It became clear that, to research my dual interest in international internships and the translation of employability skills into workplace behaviors, this type of assessment was the most suitable. To my knowledge, this is the first study to measure the effect of an international experience on employability based on workplace behaviors as predicted through a digital game-based assessment.

1.2 Purpose of the Study and Research Question

The purpose of this study is to examine employability in students who have done an international internship and those who have done a domestic internship. NACE's definition of internship has been used to clearly frame the experiences the research is based on.

An internship is a form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development in a *professional setting. Internships give students the opportunity to gain valuable applied experience and make connections in professional fields they are considering for career paths; and give employers the opportunity to guide and evaluate talent.* (National Association of Colleges and Employers (NACE), n.d.)

Importantly, this definition highlights the key association of the work experience with the field of academic study. As will be seen, the relevance of this association turned out to be one central aspect of the findings.

In the study, employability is measured with digital game-based assessments. This approach is based on the analysis of predicted students' behaviors in terms of cognitive abilities, social skills, and personality traits – for example, quick thinking, learning agility, resourcefulness, managing ambiguity, and perseverance.

As will be demonstrated in the literature review, there is evidence that the experiential learning offered by internships can be transformative. The study, therefore, investigates whether there is differential evidence of behaviors that define employability following international internship compared with an internship in the home country.

The research question this study aims to answer is:

Do higher education student internships in an international context differentially influence employability behaviors compared to a domestic internship alone?

The quantitative analysis performed to find the answer to the research question, analyzes the effect of an

- *independent variable* – having done an international or a domestic internship – on the
- *dependent variable* – employability, measured for each student with digital game-based assessment tools.

1.3 Structure of the Dissertation

Following this introduction, Chapter 2 reviews the relevant literature for the present study and is divided into further sections. Section 2.2 introduces the concept of employability, its evolving definitions, and how it can be developed and measured. Sections 2.3 and 2.4 explore the links between employability and international experiences and between employability and internships.

Chapter 3 deals with the theoretical framework of the study. In Section 3.2.i experiential learning theory, in Section 3.2.ii transformative learning theory, and in Section 3.2.iii Bourdieu's cultural and social capital theory are presented. Section 3.3 explains how these theories are the foundation for this study on why an internship or an international experience can affect employability.

Chapter 4 discusses the research design and methodology, i.e., the tools used in this research, the data collection process, the participant pool as well as the methods used for analyzing the data.

Chapter 5 presents the results of quantitative data analysis divided by year.

Chapter 6 first ‘translates’ the quantitative results that emerge from the statistical analyses presented in chapter 5 into ‘qualitative’ findings. The implications of the findings in the context of the existing literature and the contribution they make to the theories within which the research has been developed are then discussed.

Chapter 7 based on the findings of the study, suggests practical recommendations for those working in the field.

Chapter 8 discusses the limitations of the study and the suggestions for further research.

Chapter 9 presents the conclusions.

Chapter 2 : Literature Review

2.1 Introduction

As established in Chapter 1, this study examines international internships and how they are associated with employability. This chapter provides an overview of existing literature in the fields directly related to the research.

In developing this overview, two guidelines were followed. First, to clearly and critically review the definitions of the basic concepts needed (i.e.: employability, employability assessment, international experiences, and internships) and related them to the context of this study. Second, to focus on the literature on employability gains from international and domestic internships and how employability is measured.

This chapter is organized into three main sections. Section 2.2 introduces employability in the context of higher education and highlights related research on employability development and assessment. Sections 2.3 and 2.4 review the literature on international experiences and internships where research findings based on the views of different stakeholders on the benefits of international experiences and internships in terms of employability are presented.

2.2 Employability

Section 2.2 on employability will cover several themes that inform the research. Initially, in Sub-Section 2.2.i, the context surrounding the question of how, when, and why employability has become a key topic when talking about the purpose of higher education will be analyzed. Different meanings, concepts, and perspectives used to define employability will then be presented in Sub-Section 2.2.ii. To relate to the research question about the outcome in terms of employability following international internships, Section 2.2.iii will be devoted to presenting different methodologies used to assess employability.

2.2.i Employability and Higher Education

Employability of graduates has become a key issue for higher education institutions (Sarkar, Overton, Thompson, & Rayner, 2016). When, how, and why the purpose of higher education has shifted from Humboldt's idea of the pursuit of impartial truth through research and teaching to new economic imperatives, has been the subject of debate for some time (Anderson, 2004).

In the 19th century, in part due to Humboldt's model of "Bildung" (education), the orientation and functioning of the early university model moved away from pure Aristotelian argumentation towards scientific discovery, knowledge production, and transmission (Anderson, 2004). This transition generated the development of research universities, where students should become autonomous individuals and world citizens by developing their reasoning powers.

> *The concept of Bildung brings together the aspirations of all those who acknowledge – or hope – that education is more than the simple acquisition of knowledge and skills, that it is more than simply getting things "right," but that it also has to do with nurturing the human person, that it has to do with individuality, subjectivity, in short, with "becoming and being somebody."* (Biesta, 2002, p.343)

With the Bologna Declaration in June 1999, employability became a key objective in the agenda of higher education institutions (Sin & Neave, 2016). It highlighted a change that had already occurred in the previous decades, between higher education and the labor market (Tomlinson, 2012). Barnett (2004) argues that these changes posed a basic philosophical question about whether higher education can still offer a liberal education, where *liberal* stands for objective knowledge, critical thought, and autonomous institutions.

According to Sin, Tavares, and Amaral (2019), the rise of neoliberalism contributed to the shift in the purpose of higher education. *"Neoliberal states reoriented the task of higher education towards developing citizens' knowledge and skills and re-labeled it as 'employability'"* (Sin & Neave, 2016, p. 1448).

Boden and Nedeva (2010) argue that changes in government policy agendas have brought on the massification of higher education, with all its consequences. "*A policy agenda of achieving a 50% participation rate changes in the educational task from educating elites for leadership to training the masses for employment*" (Boden & Nedeva, 2010, p.49). Boden and Nedeva (2010) argue that governments cannot afford to pay for 50% of its citizens to have an elite education with a higher education system that develops critical thinking and intellectual ability. Mass education, therefore, must train a workforce that fits employers' needs.

McCowan (2015) argues that employability is a valid aim for universities as far as it is consistent with the central purpose of knowledge, inquiry, and understanding. Knowledge can be given intrinsic or instrumental value. Employability is seen as an instrumental value of higher education in the sense that it is external to the value of knowledge and understanding. *"The point is not that universities should focus their efforts away from work, but that attention is needed to the nature of the preparation for work that universities provide……Instrumental aims are then valid in addition to intrinsic aims … while it is undoubtedly desirable for universities to be responsive to society, there are limits to the demands that can and should be answered"* (McCowan, 2015, p.270 and p.277).

The terms "employability agenda" and "skills gap" are often used when referring to the debate on the purpose of higher education institutions. The former refers to the discussion of whether and how HE academic curricula should be revised to better prepare graduates for the job market (T. Moore & Morton, 2017; Speight, Lackovic, & Cooker, 2013).

The employability agenda lays the foundation for the concept of competence-based learning (CBL) (Burke, 1990). CBL can be described through the relationship between knowledge – competence – performance. *Knowledge* is a personal resource and mastering knowledge is essential to develop *competency* (Everwijn, Bomers, & Knubben, 1993). *"Competency represents the way individuals manage their cognitive and social resources in action resulting in a certain level of performance"* (Charland, Cronan, Leger, & Robert, 2015). Competency is latent, while performance is observable (Kurz & Bartram, 2002).

The "skills gap" refers instead to the "disparity of industry needs and higher education provision" (Jackson, 2013). At one extreme of the discussion are those who advocate the need for universities to develop and embed initiatives for enhancing graduate employability by teaching the skills valued by employers. The European Modes project specifically works on *"university curricula reform to tailor them with the requests coming from the labor market … integrate a common European program on soft skills in the academic curricula"* (MODES, n.d.). At the other extreme are the dissenting voices of those who consider the "skills agenda" as narrowly conceived and argue that it focuses on vocational outcomes which contrasts with the intrinsic purpose of higher education institutions (Yorke & Knight, 2006), while Koc even suggests that in the US the skills gap does not exist (Koc, 2018).

2.2.ii Definitions of Employability

Graduate employability is a complex concept and there is an ongoing debate in academia on what it comprises and its definition.

In this study, employability is defined as the set of transferable cognitive and interpersonal skills and personality traits and how these skills and traits translate into behaviors. The behaviors determined by these skills and traits are what will be used as a proxy of employability throughout this study.

The above concept of employability is based on Bennett's definition as *"the ability to find, create and sustain meaningful work across the career lifespan"* (Bennett, 2018a, p. iv). It is an individualistic definition in the sense that it is based on individual behaviors and skills. It is also a narrow definition because it does not bring to the discourse either societal, political, or labor market factors, rather it involves the possession of transferable skills. For a graduate to be employable and to be able to keep a "*meaningful*" job across *"the career lifespan,"* the possession of these transferable skills must be transferred into workplace behaviors that lead to measurable performance.

This biggest challenge faced in the employability literature is the need to combine in a holistic way different concepts such as the different forms of capital possessed by an individual, what this capital signals to others, the individual's identity, career management skills, and the labor market demands (S. Williams, Dodd, Steele, & Randall, 2016).

According to Sin and Neave (2016, p. 1452), *"[e]mployability may be viewed as a continuum ranging from its construction as an individual responsibility to a broader definition bringing in societal and political factors"*. The Bologna Process assigned priority status to employability but did not endow it with a clear definition. This resulted in different stakeholders, policymakers, employers, students, and higher education institutions giving different interpretations to employability. Sin and Neave (2016) analyze the range of interpretations that different stakeholders give to employability. The views of policymakers, employers, students, and higher education institutions are found to be often in conflict contending and interpreted in the light of each interest group's concerns. Furthermore, they find that policymakers, especially lately with the economic downturn, see the discourse on employability as a remedy for unemployment. This entails a shift in responsibility to the individual and is evident also from how ministers focus on definitions of employability based almost exclusively on the possession of skills and competencies which determine the individual's success in the labor market. Sin and Neave (2016) go on to say that employers share this view and offload the responsibility for employability onto individuals and the critical role assigned to higher education institutions. This view though seems to transfer not only the responsibility but also the costs linked to the development of employability, especially those related to skills and competencies. Students claim that the low level of employability is not under their control and blame on one side employers and on the other higher education institutions Sin and Neave (2016) . They note also that students find employers have never really accepted the Bologna reform, that the bachelor degree (i.e., the three-year degree) is not perceived as a "true exit point" to the labor market and higher education institutions have never re-designed curricula thinking about employability. Higher education institutions are the only ones among the stakeholders in Sin and Neave's study (2016) who hold a comprehensive view of employability as depending both on individual skills and dispositions, but also on economic and labor market conditions.

2.2.iii The confusion between Employability and Employment

As noted in Chapter 1, a quite common confusion arises between the terms *employability* and *employment*. Graduates' first-destination employment status a few months after graduation is often used as the primary graduate employability performance indicator – especially by funding bodies. It is important therefore to clarify this.

In scholarly work, a narrow and broad approach coexists. The narrow, supply-side approach, is based exclusively on the possession of employability skills and attributes of graduates (Cranmer, 2006; T. Moore & Morton, 2017). The broader approach instead refers to employment and incorporates factors such as job search and labor market demand conditions (McQuaid, Green, & Danson, 2005; Morrison, 2014) and students' actual employment x weeks/months after graduation and their compensation (Gault, Leach, & Duey, 2010; Pavlin & Svetlik, 2014). There is a distinction between employment and employability, but even in literature the two concepts are quite often confused and even used as synonyms. McQuaid's and Lindsay's comprehensive article "The Concept of Employability" (McQuaid & Lindsay, 2005) lays the groundwork for further research on the concept and definitions of employability.

2.2.iv Employability Definitions in Practice

Maybe the most widely referenced employability definition is Yorke's: *"a set of achievements – skills, understandings, and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy"* (Yorke, 2005, p. 8). Yorke's definition clearly states the importance of generic, transferable skills. But it also highlights that the mere possession of these skills is not sufficient for gaining and maintaining employment. Employability refers to a wider range of capacities, reflective abilities, and achievements necessary to make a graduate employable.

> *If we are to educate for employability rather than employment, for life rather than for a job, our concern should move beyond graduate employment to focus on the development of graduates who are prepared to meet the demands of life and work well*

beyond their discipline. Employability must focus on ability, must form the centre of the curriculum, must embrace diversity, and must integrate the metacognitive capacities with which higher education graduates are not only ready for work, but ready to learn (Bennett, 2018b, p. 52)

Bennett's comprehensive definition resonates with one of the first comprehensive employability definitions by Hillage and Pollard:

employability is about being capable of getting and keeping fulfilling work. More comprehensively employability is the capability to move self-sufficiently within the labour market to realise potential through sustainable employment. For the individual, employability depends on the knowledge, skills and attitudes they possess, the way they use those assets and present them to employers and the context (e.g. personal circumstances and labour market environment) within which they seek work. (Hillage & Pollard, 1998, p.1)

Hillage and Pollard's definition lays the groundwork and has already all the elements that lead to Holmes' (2013a) clear categorization of employability into three categories: possession, position, and process. The possession perspective is based on simply possessing certain skills and attributes. The position perspective is closely related to social capital (see Section 3.2.iii) and refers more to evidence of employment rather than employability. The processual perspective focuses on the concept of graduate identity.

2.2.v The influence of Holmes' categories on the employability debate

Holmes' categorization is described in more detail here as a basis for analyzing the body of literature on employability. Beginning with his seminal work in 2001, Holmes (2001) began to challenge the individualistic-possessive approach to employability, based on notions of skills, and started to build the graduate identity approach, based on behaviors and performance. Holmes considers the skills and attributes approach to employability to be severely flawed for several reasons. The first relates to how the lists of relevant skills and attributes are created. Holmes argues that the lists are not created through research but investigative surveys and that they are based on "expressed perceptions' and not on an objective measure. A second reason is that a key assumption made by all these surveys is that the meaning of the words and phrases used to describe the skills are understood in the same way both by all respondents and across different surveys. Finally, he argues, the lists of relevant skills assume that the students become or should become "proprietors" of the skills and attributes, with no mention of how they can or will be used. Instead, he makes the point that the various skills will need to be used in jobs and that what employers value and look for are candidates with behaviors that forecast how they will perform in the workplace.

The "skill gap" discourse was mentioned in Section 2.2.v. This focuses on the possession view of employability and on understanding the skills required for graduates. Starting in the '80s, researchers have talked about "skills" or "attributes" that have to be developed in graduates to enhance their employability (Roizen & Jepson, 1985). For simplicity, we can divide these skills into two main groups: *technical/hard* and *transferable/employability* skills. Employability skills complement hard skills which are the technical requirements of a job (Suneela, 2014). Many interchangeable terms are used to refer to the same set of non-technical/hard skills: employability, transferable, generic, soft, core, (Deardorff & Jones, 2012; Deardorff, de Wit, Heyl, & Adams, 2012; E. Jones, 2013; Odağ, Wallin, & Kedzior, 2016), transversal (Erasmus, 2014; Van Mol, 2017; de Wit, Hunter, Howard, & Egron-Polak, 2015, p. 46), 21st century (Bellotti, Maria Bottino, Fernández-Manjón, & Nadolski, 2014; Romero, Usart, & Ott, 2015).

There is also a significant amount of debate about whether the generic skills learned in a specific context can be transferred to another (Clanchy & Ballard, 1995). However, if students have the opportunity to use these skills outside of a classroom, for example during an internship, it is argued that the students will be able to effectively transfer the skills also to other settings (Crebert et al., 2004). Following Crebert's et al (2004) line of thought on the transferability of the skills in different context, throughout this dissertation the term ***transferable skills*** will be used. The term ***transferable skills*** seems to be appropriate to this study because in this research the focus is on behaviors that define employability. What the research investigates is based on how well a student is able to transfer into the workplace behaviors determined by skills.

In the "skill gap" debate, most research has been either on assessing the degree of matching/mismatching between university taught competencies and labor market demands (Teijeiro, Rungo, & Freire, 2013) or on creating lists of employability skills (e.g., teamwork, decision-making, critical thinking, willingness to learn, self-management, self-awareness, networking, negotiation, self-confidence, the capacity to cope with uncertainty, etc.). Institutions and scholars have produced numerous and long lists of relevant skills (Accenture, 2017; Dearing Report, 1997; Drew, 1998; Gallup Flash Eurobarometer, 2010; Haselberger, Oberhuemer, Perez, Cinque, & Capasso, 2012; PCRN (Perkins Collaborative Resource Network), 2016; Vivian et al., 2016). Other studies are based on surveys of different stakeholders: employers (Archer & Davison, 2008; Finch, Hamilton, Baldwin, & Zehner, 2013; Ipsos Public Affairs & Booz Allen Hamilton, 2013; Lowden, 2009; T. Moore & Morton, 2017), sciences graduates and employers (Sarkar et al., 2016), employers in the innovation industry (Collet, Hine, & du Plessis, 2015), in business (McMurray, Dutton, McQuaid, & Richard, 2016), from students (Tymon, 2013), all of the stakeholders involved (students/graduates, higher education institutions and employers) (Cinque, 2014; Haselberger et al., 2012).

From the extensive literature on relevant skills for employability, we can generalize that transferable skills are a set of cognitive abilities, personality traits, emotional and social abilities, mindsets, and aptitudes (Gray, Jerde, Prabhakaran, & Carroll, 2016). According to Jackson and Chapman (2012), the results of a survey with UK and Australian academics shows that transferable skills are homogeneous across culturally similar countries.

Jones (2013) confirms that *"while the skills listed may differ slightly from another, it is clear that they are relatively similar and that they go beyond subject-specific knowledge or capabilities. Leggott and Stapleford* (2007) *reviewed lists of generic employability skills in a range of countries and claim that 'employers' requirements seem to be broadly consistent internationally' (p. 124).....(and)... the research also identifies a degree of consistency in the generic transferable requirements of graduates by employers"* (Jones, 2013, pp. 99-100)

The second employability category discussed by Holmes (2006) is a relational perspective linked with societal positioning. According to Bourdieu's sociological theory (Bourdieu, 1986), which is presented in Section 3.2.iii, higher levels of *cultural capital* determined by *habitus* have an advantage in securing employment. For Bourdieu, *habitus* relates to dispositions, the way an individual behaves, acts, and thinks, and it is attained unconsciously through socialization, family, school, etc. (Maton, 2014). By looking into the background circumstances that constitute *habitus* we understand that it is linked not only to the family but also to education and social status. Position, in Holmes' terms, refers therefore to both social and cultural capital. Social capital relates to the value of networks. Networks of social connection that can be used to gain access to employment often originate from family, friends, and ties built at universities. Cultural capital refers to the skills, knowledge, titles, and sensibilities possessed by a person someone. According to the positional perspective, employability appears to be related to the social and cultural capital of the individual. The positional element of employability is the one more closely linked to employment and the best graduate employment opportunities are often taken by those who have stronger social networks i.e., higher cultural capital.

Recently a growing number of studies have focused on analyzing employability also from a social perspective. Farenga and Quinlan (2016) investigate how three UK universities offer career service and employability development activities to students based on their needs. Some students come to university with networks already well established, other students need more support from university career services. Farenga and Quinlan (2016) find that even if universities give students the same opportunities to develop their social capital, this does not change the social inequalities that exist in the workplace, nor the tendency of recruiters to look at university rankings as selection criteria. These tendencies are confirmed by Morrison (2014) who finds among graduates a strong perception and a wide sensitivity to the nature of class in the labor market in the UK.

Social capital appears therefore to be a significant factor in how universities prepare graduates for the job market as well as how the job market selects graduates for employment. Saito and Pham (2019) compare the strategic tendencies of graduates entering the labor market in Australia, Japan, and Vietnam. In Australia, graduates tend to collate knowledge, experience, and university education to demonstrate their ability to create a nexus between theoretical and practical knowledge. In Japan, graduates use their university education to demonstrate not only their academic knowledge but also personal skills and attributes. In Vietnam, networks are fundamental and university education merely consists of showing that graduates have the credibility to be considered in the hiring process.

This resonates with findings from the OECD PISA 2019 Dream Jobs report and developed in Predovic and Dennis (2020), which analyzes how the relative importance of the position factor in employability is stronger in some southern European countries than further north.

Tomlinson, in his comprehensive empirical and conceptual literature review, concludes his analysis by saying that graduate employability maps onto significant concerns determined by structural changes in the interplay between universities, governments, and the labor market. He argues that these changes have *"potentially reinforced positional differences and differential backgrounds"* (Tomlinson, 2012, p. 427). Tomlinson acknowledges the processual view framed by Holmes and yet Tomlinson argues that *"graduates' employability is intimately related to personal identities and frames of reference [and] reflects the socially constructed nature of employability more generally: it entails a negotiated ordering between the graduate and the wider social and economic structures through which they are navigating"* (Tomlinson, 2012, p. 428)

In the processual perspective, the focus is on *graduate identity* (Holmes, 2013a). To be employable and gain employment, it is not enough for graduates to have developed skills and attributes. Graduates have to also *"develop ways of presenting your [their] claim on the identity (of being a graduate worthy of employment) in such a way that it stands a good chance of being affirmed by those who make the selection decision on job applications you [they] make"*. (Holmes, 2013, p. 551)

Hinchliffe and Jolly (2011) adopted Holmes' *graduate identity* approach to employability and surveyed 100 UK employers on their expectations of graduate performance within the organization after one and after three years. The results show that employers value more generic skills at employment and believe that more technical skills can be developed on the job within one year. Holmes (2013b) strongly rejects Hinchliffe and Jolly's conceptual approach to what he considers *graduate identity*. He argues that graduate identity is a transitional identity, one that stems from a relational approach and is the negotiated outcome between the two parties involved: the graduate and the person who is hiring. Holmes claims that surveying employers instead is a more realistic approach, aiming to determine once again if graduates do possess a certain set of skills and attributes, based on the assumption that these skills and attributes have been identified and do objectively exist.

A significant body of scholarly work insists on employability as defined by Holmes's "processual" perspective. Employability is something to be achieved accounting for the social, political, and personal context of all stakeholders (Reid, 2016). The "Key to Employability" model: the key continuous process of evaluation and reflection on career skills, experiences, subject knowledge, generic skills, and emotional intelligence will result in a higher level of self-efficacy, self-confidence, and self-esteem, crucial links to employability (Pool & Sewell, 2007). The concept of pre-professional identity - PPI (D. Jackson, 2016b), connected to Holmes' *graduate identity* concept: PPI can be developed during university years when a "student makes sense of his/her intended profession through multiple memberships and differing levels of engagement with various communities". Similarly, the integrated dynamic capabilities view of employability (Finch, Peacock, Levallet, & Foster, 2016) contends that graduates with intellectual, personality, meta-skills, and job-specific resources must develop the ability to combine these resources to achieve a competitive advantage and employability. Holmes' framework has been tested by measuring the effects on objective (i.e. job offers, employment status) and subjective (i.e. perceived) employability of possession (human capital), position (based on the social background), and process (career self-management) (Okay-Somerville & Scholarios, 2017) and the findings highlight the importance of incorporating the process view into the graduate employability debate, by suggesting that proactive career behaviors significantly explain objective and subjective employability, while there is no evidence of the impact of social background on employability.

2.2.vi Developing Employability

Numerous ways are discussed in the literature and applied by practitioners when thinking about how to develop graduate employability. In this study employability development strategies have been grouped into three main categories: higher education curricula re-design, employability development experiences, and career development initiatives.

2.2.vi.a Higher Education Curricula Re-Design

Re-designing higher education curricula, in this case, means an attempt to enhance employability within the program; this approach can range from, at one extreme, totally "embedding" transferable skill development within the academic degree course, to the other extreme, in which transferable skill development modules are simply "bolted-on" to the curriculum (Cranmer, 2006). Both approaches have flaws: in the total embedding approach, students may not even be aware that they are developing skills, but a reflection on skills acquisition, as described also in the CareerEDGE and EDP model (Pool, 2017; Pool, Qualter, & Sewell, 2014; Pool & Sewell, 2007), is crucial for employability to be effectively developed (Pool & Sewell, 2007). In the "bolt-on" approach instead, the learning of skills ends up being isolated from the main academic focus of the program, which often results in a very low motivation for students to engage in these modules. Tymon's (2013) findings suggest that especially first and second-year undergraduate students lack engagement with employability-related development activities.

Speight, Lackovic, and Cooker (2013) explore the understanding of different stakeholders (students, academics, employers) on how to progress significant curriculum developments towards employability. They find that all stakeholders perceive "embedding" learning for employability in the curriculum as a threat to academic and disciplinary learning. Indeed some academics feel the employability discourse runs counter to the true purpose of higher education which is much more than a route to employment (Collini, 2012).

2.2.vi.b Employability Development Experiences

Concerning employability development experiences, Kinash, Crane, Judd, and Knight (2016) surveyed Australian students, career development professionals working in higher education institutions, and employers about their perspectives on different strategies. Work placements and internships were regarded as a very effective experience for developing employability among most stakeholders, with 87% of employers, 74% of students, but only 40% of career development professionals considering it as the most relevant one. In contrast international experiences are considered relevant by more higher education professionals (30%), than by employers, (23%), and the least by students (16%).

Hart Research Associates (2015) found similar results in the US, with 94% and 95% of employers and students respectively valuing work placements and internships the most for employability development. In the US the value given to study abroad experiences is relatively higher compared to Australia, with 51% of employers and 71% of students considering it as relevant in hiring decisions.

Sections 2.4 and 2.5 will expand the analysis of the literature on how international experiences and internships are experiences which develop employability.

2.2.vi.c Career Development Initiatives

The main objective of career development initiatives within higher education institutions is to prepare graduates for transition to the world of work. The initiatives undertaken are varied but their focus is shaped by what Holmes (2013a) defined as *graduate identity*. The concept of perceived employability is therefore at the center of all these activities, where *"we define perceived employability as the individual's perception of his or her possibilities of obtaining and maintaining employment"* (Vanhercke, De Cuyper, Peeters, & De Witte, 2014, p. 594).

The influence of perceived employability on the behavior of graduates when seeking employment is therefore very significant, "a key concern for HEIs is … nurturing heightened PE [perceived employability] and therefore self-assurance among future graduates that they will survive in an increasingly competitive job market" (Jackson & Wilton, 2017a). *Employability* comes from the words *employment* and *ability*. Defining the concept of *perceived employability* within the psychological literature framework is fundamental to its understanding and interpretation. In the perceived employability approach, individuals evaluate their labor market position; in the competence-based approach, they evaluate their employability abilities; in the dispositional approach, they evaluate motivational attitudes towards employability. Only by integrating these three approaches can researchers have a better understanding of employability (Vanhercke et al., 2014).

The influence of self-belief on perceived employability (Turner, 2014), of psychological capital (Ayala Calvo & Manzano García, 2021; Bakari & Khoso, 2017), self-awareness (Qenani, Macdougall, & Sexton, 2014), emotional self-efficacy (Dacre Pool & Qualter, 2013), career decision self-efficacy (Lam & Santos, 2018), and networking behavior (Batistic Sasa, 2017) have all been extensively analyzed. From all these findings it emerges clearly how developing perceived employability contributes to the shaping of *graduate identity* that in turn influences employability.

2.2.vii Measuring Employability

"Operationalisation is the process of going from a theoretical concept to a measurable index" (Harvey, 2001, p.99). Operationalizing employability and finding adequate assessment tools has always been a big challenge both for higher education and for companies. Scholars have approached employability assessment from several different angles. Harvey (2001) makes a distinction between institutional and individual employability. Institutional employability is based on rankings and institutions are classified on the basis of employment rates of their graduates (Pavlin & Svetlik, 2014). Individual employability instead is what was discussed and defined in Sections 2.2.iii and 2.2.iv and is the focus of this research.

Clinkard (2018) and Jorre de St Jorre and Oliver (2018) offer a holistic approach to measuring employability. They both suggest that students should become aware of the capabilities they develop during their program to be able to better claim and present their employability. Assessments for employability should therefore be spread out across courses. According to Kinash, McGillivray, and Crane (2018), though, there is no consensus among stakeholders on the value of assessments for employability. While for educators, assessments emerge as a dominant theme, students and employers infrequently use the term *assessment* when discussing practices to enhance employability.

Generally speaking employability skills assessments fall into three main categories: self-assessment, quizzes, and serious games (Employment Ontario, 2015). Self-assessment and quizzes focus on assessing the possession of employability skills in graduates. Serious games attempt to measure graduates' hidden employability potential, by predicting workplace behaviors.

Many methodologies have been proposed to improve self-assessment accuracy such as co-assessments by the students and either teachers or peers (de Grez, Valcke, & Roozen, 2012; Deeley, 2014; Dochy, Segers, & Sluijsmans, 1999) and the use of rubrics (Riebe & Jackson, 2014). The accuracy of students' self-assessment has been extensively analyzed with rather conflicting results. Some studies find that men seem to rate themselves more highly than women (González-Betancor, Bolívar-Cruz, & Verano-Tacoronte, 2017), whereas others find no significant variations for gender, age, or degree type (D. Jackson, 2014a). Academically higher achieving students are found to rate themselves more accurately than students receiving lower marks from professors (González-Betancor et al., 2017; D. Jackson, 2014a); on the other hand, Leach (2012) finds that higher-achieving students tend to underrate and lower achievers to overrate. In studies on how individuals behave concerning sustainability goals and environmental issues, their behavior can be easily assessed objectively, e.g. do they recycle or not. Kormos finds that 79% of the variance in the association between self-reported and objective behavior remains unexplained (Kormos & Gifford, 2014). This result confirms the strong bias that self-assessments can lead to.

Recently Jackson and Bridgstock (2018) have shifted the focus to the measurement of student success relating to the world of work. They move away from the idea of operationalizing the concept of employability but focus instead on conceptualizing and measuring career success. They argue that the use of objective employment measures should be integrated by a range of subjective dimensions, such as social and economic value, career satisfaction, and well-being.

The second category of employability skills assessments is based on quizzes that allow judgement of the quiz-taker's ability to demonstrate the skills being analyzed (Darling-Hammond, 2014). Online there are many such quizzes (including mettl.com, centraltest.com, testofy.com) but very often they are simply poorly disguised self-assessment questionnaires (Employment Ontario, 2015).

The third approach, serious gaming, is receiving increasing attention from educational researchers. Gamification has been defined as "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled, & Nacke, 2011). In recent years, there has been an increased interest in the use of digital and non-digital games for learning and assessment. The European Modes project (Haselberger et al., 2012) has among its goals the development of a serious game for the development of employability skills.

This doctoral study focuses on the value of serious gaming as an assessment tool for employability. Recruiters are increasingly using digital game-based assessment in graduate selection (Chamorro-Premuzic, Akhtar, Winsborough, & Sherman, 2017; Georgiou et al., 2019; Sanchez & Langer, 2020). However, to my knowledge, this is the first study to use them in relation to international internships.

Employability in this study is defined as:

the set of transferable cognitive and interpersonal skills and personality traits and how these skills and traits translate into behaviors. The behaviors determined by these skills and traits are what will be used as a proxy of employability throughout this study. Game-based assessments are used to measure employability as above defined.

2.3 Links Between International Experiences and Employability

The link between employability and international experiences has been researched from a multitude of perspectives. In section 2.3.i, the literature that refers to links between employability and international experiences from the perspective of different stakeholders will be presented: students/graduates, employers, academics and higher education professionals. This first section is more closely linked to the definition of employability I have adopted for my research, but all the research reviewed in this section is based on the use of surveys or self-assessments and this results in subjective impact evaluations. Section 2.3.ii reviews the literature on selectivity issues related with students participating in international experiences. The selectivity of students participating in international experiences is of major relevance when drawing conclusions on the impact of such experiences on employability.

2.3.i Stakeholders' Perspectives

Crossman and Clarke (2010) through interviews with multiple stakeholders in Australia (employers, students, and academics) find that all stakeholders identify a clear connection between international experiences and employability. The main perceived benefits are: *"the potential for networking, the opportunity for experiential learning, additional language acquisition, and finally the development of soft skills"* (Crossman & Clarke, 2010, p.607). They also conclude, however, that it appears that students who have had international experiences have an advantage when looking for their first job, but this advantage does not seem to translate into long-term career outcomes.

The Erasmus (+) 2014 Impact Study (European Commission, 2014) also gathered the responses of employers, students, and higher education institutions about the effects of the Erasmus program on employability. The study finds that 90% of the students who go abroad do so to form new relationships and develop skills such as adaptability. In this study, employers were asked which skills they consider important when hiring graduates, and openness and curiosity to new challenges were considered important by over 90% of the employers and these are also the skills most developed by Erasmus students during their study abroad experience. In fact, the alignment of transferable skills most valued by employers and those developed through international experiences is confirmed by numerous studies (Archer & Davison, 2008; Hart Research Associates, 2015; Hubbard, Rexeisen, & Watson, 2018; Jones, 2013; McMurray et al., 2016).

Discrepant perspectives on the value of international experiences among students, career development professionals within higher education institutions, and employers are found by Kinash, Crane, Judd, and Knight (2016a). While only 16% of students think going abroad is an employability enhancing strategy, 30% of career professionals and 23% of employers think so.

Trooboff, Vande Berg, and Rayman (2008) find that in the US, human resource professionals and non-senior management, contrary to common belief, place significant value on studying abroad. The main reason is that over 15% of the professionals and managers involved in the research have studied abroad themselves and, by virtue of their own experience, are positively disposed. Their research aligns with the Erasmus (+) 2014 Impact Study (European Commission, 2014) on the skills most valued by employers and confirms among the top skills, *"listening and observing well, adapting well to change, working well under pressure ... and working effectively outside one's comfort zone"* (Trooboff et al., 2008, p.29), even if employers are not strongly convinced that study abroad enhances these skills. Furthermore, among the different types of study abroad analyzed in Trooboff et al.'s research, studies show that employers have a strong preference for internships over other international experiences.

The preference of US employers for international internship versus study abroad results also from Albers-Miller, Sigerstad, and Straughan's (1999) research. They find evidence of the fact that students who have studied abroad are more likely to be hired than those who have not; the advantage is even bigger if the study abroad period extended for a semester or more versus short programs of just a few weeks.

Malerich (2009) argues that the

> *real value of international internships is limited by both the lack of understanding on the part of American employers regarding internships as skill and quality building platforms, as well as by a lack of understanding and skill on the part of recent graduates in effectively communicating their gained competencies.* (Malerich, 2009, p.2)

Archer and Davison (2008) confirm the findings also for the UK where only one-third of employers valued a study abroad experience versus 65% who considered an international professional work experience as valuable. However, Jones argues that the benefits of internationalization on employability either through graduate mobility or through the internationalization of the curriculum at home are still not entirely understood by universities, employers, and even students (Jones, 2014).

Recently the employer's perspective on international study versus internships in 31 European countries has been analyzed by Van Mol (2017) who found that 25% of employers seems to value internship abroad, while 20% value study abroad. In general international experiences are rated as important only by a minority of European employers, even if this finding varies among different countries and *"learning mobility is principally valued in Southern Europe, Austria, Finland, Latvia, Luxembourg and Turkey"* (Van Mol, 2017, p.58).

Petzold's (2017) field experiment on German employers finds that studying abroad may principally serve as a sorting criterion in the recruitment process, particularly by international employers. In a more recent survey experiment, Petzold's (2020) results show that, among the international student mobility experiences, German employers reward internships more than studies abroad. Van Mol, Caarls, and Souto-Otero (2020) confirm that in the Netherlands international internships are associated with a positive effect on employment. Students who have done an international internship are likely to experience a shorter education to work transition than those who have done an internship in the Netherlands, but this effect does not translate into benefits in terms of increased wages. The same signaling effect is found by Petzold (2017, 2020) among German employers and Van Mol et al (2020) among Dutch employers and is consistently found to be a common driver for students towards gaining an international experience.

Brooks, Waters, and Pimlott-Wilson (2012) point out that, for UK students the "pursuit of distinction" within the labor market is one of the main drivers for international education. Tran and Soejatminah (2017) confirm also that for most international students in Australia symbolic capital is very important. International work-integrated learning experiences differentiate graduates in highly competitive markets such as those many international students in Australia come from.

A large body of literature consistently finds that the main driver for students globally to consider an international experience is the positive impact that this experience can have on their employability (for example, Deakin, 2014; Dwyer, 2004; Nilsson & Ripmeester, 2016; Norris & Gillespie, 2009). In Australia, Potts (2015, 2019) finds that even through short-term study abroad programs, 83% of graduates who had participated in mobility experiences said they developed skills which support their professional role, 63% said that it had a positive impact on their long-term career prospects and 53% (in the 2019 study), 66% (in the 2015 study) said that it helped in obtaining their first job.

Green, King, and Gallagher (2020) interviewed, in Australia, graduates who had had international experiences and were then working, and also employers who had hired graduates with international experiences. Again, a discrepant view between graduates and employers was found; graduates agree on the benefits in terms of personal development gained through an international experience, especially referred to as skills such as adaptability. Employers from multinational or globally oriented companies value more international experiences, while other employers have a less positive view and state that an international experience does not automatically make a student more employable. Instead, they emphasized the importance of locally derived work experience. Both graduates and employers in Green's et al. study agree that longer experiences are more beneficial than shorter ones. Short study tours are often regarded more like a vacation then an educational experience. The destination of the mobility experiences was found important only for some disciplines such as engineering and medicine, while not relevant for others such as law, marketing, or journalism.

Farrugia and Sanger (2017) find that in the US, study abroad participants report positive skills gains, especially within the interpersonal and cognitive domains. More than half believe that the skills gained through study abroad have a long-term impact on their career progression and promotion. Short-term programs affect mostly the development of teamwork skills, while longer-term programs have a higher impact on all other skills and job offers, which confirms Albers-Miller, Sigerstad, and Straughan's (1999) early findings and is also in line with the recent research by Johnson and Anderson (2020). The destination choice instead is reported as not having a significant impact either on the ability to develop or improve skills or on the likelihood of a job offer.

Consistent with findings from Australia and the US, Ota, and Shimmi (2020) find that also in Japan graduates who have gained international experiences during their studies as well as employers agree that benefits from longer-term programs significantly exceed those from short term programs especially at the time of recruitment.

Similar findings as those for Australia and the US are reported by the Erasmus (+) 2019 Impact Study (European Commission, 2019). Students who have participated in the Erasmus (+) program reported a perceived gain between 70% and 90% in the transferable skills demanded in today's labor market, which marks a higher perceived gain in skills than the one reported in the Erasmus (+) 2014 Impact Study (European Commission, 2014). 72% of the participants also stated that Erasmus (+) traineeship had been beneficial in finding their first job.

Wright, Jones, and Welland (2018) surveyed different groups of UK students, comparing those who studied abroad, with those who had international work experiences and a group of students who had no international experience. *"Those who undertook international work experience returned with the most increase in confidence and the highest perceived increases in both life skills and employability, compared to those who study internationally"* (Wright et al., 2018, p. 255). This is consistent with most of the findings mentioned until now from employers' perspectives, but what is a unique result from this research is,

> *that the gains from international experience represent enhancements to the skills and abilities, which tend to be developed by all graduates rather than being part of a unique set of attributes gained through concentrated engagement with another culture and society* (Wright et al., 2018, p. 256).

Among the students surveyed in the research, those with no international experience reported high levels of perceived competencies as well. This finding supports a growing body of thought that recognizes the potential for *"transferable skills development in a domestic intercultural setting"* (Jones, 2016, p. 113).

2.3.ii Mobile Students and Self-Selection

There are quite consistent findings from the research which analyzes possible bias in the self-selection of students who decide to undertake an international experience during their studies. To correctly assess the impact on the future employability of mobile students these further elements should always be considered.

A significant body of literature investigates the socio-economic background of mobile students and finds that they represent a highly selective group (Blanck & Börjesson, 2008; Murphy-Lejeune, 2003; Wiers-Jenssen, 2013). Both Otero (2008) and the most recent Erasmus+ Impact Study (European Commission, 2019) report finds that even if the number of Erasmus students has increased in the last decade, the majority of these students still come from privileged backgrounds. Gerhards and Hans (2013) analyze German mobile students by investigating the economic and cultural capital of their families and find that it significantly affects the outcome of mobility experiences for students. Di Pietro (2015) comes to similar conclusions based on Italian students.

The impact of the Erasmus mobility program in Europe with regard to the different fields of studies has been analyzed by Janson, Schomburg, & Teichler (2009), who state that,

"Unanimously, the main impact of an ERASMUS stay is seen in the personal development of the students. The students ..... gain in competences often summarised as soft or key skills..... socio-communicative skills, intercultural awareness, adaptability, flexibility, innovativeness, productivity, motivation, endurance, problem-solving abilities, and being able to work productively in a team"(Janson et al., 2009, p.117).

The most affected and developed skills by mobile students are related to the social sphere. On the other hand, the mobility experience had the lowest impact on field specific knowledge in disciplines such as natural sciences and engineering while had a more significant impact in the social sciences, such as sociology and business (Janson et al., 2009).

Finally, the impact of personality traits on self-selectivity was investigated by Richter, Zimmermann, Neyer, & Kandler (2020). In the study the Big Five personality test was used on a sample of German students to analyze personality changes of mobile students both in the short and the long term. The study finds that only slightly significant personality changes in sojourners are found in the short term. Interestingly enough the reverse effect seems to appear for openness and agreeablness in the long term.

This study focuses on only one kind of international experience and specifically international internships. Self-selection bias for students who decide to participate in an international internship might be even stronger with respect to some of the elements investigated in the literature presented. Understanding that there is the possibility of self-selection in students who decide to undertake an international internship is an important context for the findings of this study.

2.4 Links Between Internships and Employability

The integration of theoretical knowledge and practical work experience to enhance students' employability is at the foundation of this study. The term internship is used throughout this dissertation. Therefore, first a definition of internships will be given, which as noted in Section 1.2, follows the one set by NACE, and next clarify the relationships with other terms used to refer to work-based learning experiences.

In this study the definition of internship follows the one set by NACE:

An internship is a form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development in a *professional setting. Internships give students the opportunity to gain valuable applied experience and make connections in professional fields they are considering for career paths; and give employers the opportunity to guide and evaluate talent.*

To ensure that an experience—whether it is a traditional internship or one conducted remotely or virtually—is educational, and thus eligible to be considered a legitimate internship by the NACE definition, all the following criteria must be met:

- *The experience must be an extension of the classroom: a learning experience that provides for applying the knowledge gained in the classroom. It must not be simply to advance the operations of the employer or be the work that a regular employee would routinely perform.*
- *The skills or knowledge learned must be transferable to other employment settings.*
- *The experience has a defined beginning and end, and a job description with desired qualifications.*
- *There are clearly defined learning objectives/goals related to the professional goals of the student's academic coursework.*
- *There is supervision by a professional with expertise and educational and/or professional background in the field of the experience.*
- *There is routine feedback by the experienced supervisor.*
- *There are resources, equipment, and facilities provided by the host employer that support learning objectives/goals.* (National Association of Colleges and Employers (NACE), n.d.) [emphasis in the original]

Work-based learning is a term used commonly in the UK and Europe; the equivalent term in Australia, New Zealand, and most Asian Pacific countries is *work-integrated learning*, while *cooperative education* is more frequent in the US and Canada (Tran & Soejatminah, 2017).

Work-based learning can take many different forms: internships, practicum, work placements, and service-learning. Internships have already been defined.

The following definitions refer instead to the other forms of work-based experiences (UCL Careers, 2016; "What is the Difference Between an Internship and a Practicum?," 2016):

- *Practicum* is a field assignment that allows students to observe/shadow and document how professionals perform their job, students are assigned a limited number of tasks that are performed under supervision.

- *Placement* refers to an extended period of internship during a university degree that has been specifically designed to accommodate a semester/year in industry. Also referred to as sandwich (UK) or co-op (US) education.
- *Work experience* is traditionally associated with a short period in a company, one or two weeks; also used for high school students. Recently the term has become an all-embracing title for any form of participation in the working environment, and could also include volunteering/service-learning.
- *Service-learning* combines service to the community with curriculum-based learning. It is often confused with volunteering or community service. While both activities are defined as forms of service within a community, they do not necessarily include a structured educational connection for participants, which is instead a foundation of all service-learning projects.

There is substantial agreement in the literature that experiential learning theory is at the foundation of the design for a valuable internship. Internship programs should be experiences structured to cover the four stages of the experiential learning cycle to foster learning.

Writing a reflection paper, a work diary, and having individual meetings with the supervisors is how Bailey, Barber, and Nelson (2017) found that psychology internships are structured adhering to the current experiential learning best practices. Malacarne (2018) highlights the importance of learning situated in social interaction areas and critical reflective thinking as two pillars that need to be accounted for in the design of internships. Overemphasizing the practical aspects at the expense of linking theory to practice is what Stirling, A., Kerr, G., MacPherson, E., Banwell, J., Bandealy, A., & Battaglia (2017) find being common in internships programs in Canada.

According to Wurdinger & Allison (2017), “experiential learning is a cognitive process and the place where learning occurs is less significant than the actual process itself, which includes a combination of active thinking and experimentation”. Experiential learning, according to this view, can therefore be incorporated into the academic courses in higher education curricula in different disciplines and does not necessarily involve a work placement (Healey & Jenkins, 2000; Wurdinger & Allison, 2017).

Substantially different is Moore’s approach, who argues that there are three widespread forms of experiential learning (Moore, 2010): internships, service learning, and cooperative education. For Moore internships are very broadly defined and are any freestanding activity not connected to a classroom, it can also refer to the out of classroom part of service-learning or cooperative education, and it can involve students working on projects or simply shadowing employers. Service-learning for Moore is out-of-classroom community service activity combined with the study of academic concepts and theories, while cooperative education is a way of combining the school-based transmission of technical expertise with the traditional benefits of first-hand experience in the field.

Doherty and Stephens (2020) and Ferrandez-Berrueco, Kekale, and Devins (2016) explore how to develop curricula for better-integrated work-based learning. Jackson (2015) found that to assist students in effectively enhancing their skills during a placement, employers and academic supervisors must plan with attention information exchange, reflective practices, and performance review. Franco, Silva, and Rodrigues (2019) surveyed students in Portugal. They found that collaboration among stakeholders in the implementation of the internship is what determines its success or failure, in terms of introducing students to the labor market.

There is a large and widespread consensus suggesting that internship can be a very effective instrument for the development of students' technical and transferable skills and therefore for enhancing graduate employability (Jaaffar, 2016; D. Jackson, 2015; Rowe & Zegwaard, 2017; Stack & Fede, 2017).

In the same way as has already been observed with the links between international experiences and employability, also the links between internships and employability have been analyzed from different perspectives. Again, different stakeholders' perspectives form the basis of the following review.

Students perceptions on the benefits of work placements have been investigated with pre- and post-experience interviews (Mahmood, Slabu, Moura, & Hopthrow, 2014) and questionnaires (Edwards, 2014); the results find that after an internship students increase their perceived employability (D. Jackson & Wilton, 2017b; Qenani et al., 2014), develop self-efficacy, the ability to clearly identify their skills and overall enhance their employability (Drysdale, McBeath, Johansson, Dressler, & Zaitseva, 2016; Helyer & Lee, 2014). The improvement in the perceived ability of Australian students to perform on their transferable skills following an internship was also found by Jackson (2013c). Brooks and Youngson (2016) confirm that also in the UK students who have done an internship are more confident regarding their transferable skills and their academic performance improves after the internship.

The benefits of work placements on academic performance are confirmed by Jones, Green and Higson's study (2017), which was based on student record data from a UK and an

Irish university and not on students' self-reported data. This found that students who go on an internship improve their final year performance by more than 3%.

Research on employers' perspectives regarding the gain in students' employability skills after a work placement (Jaaffar, 2016) confirms the results of the research done with students. The main learning from the placement is about graduate self-confidence and personal effectiveness in a teamworking environment (Hall, Higson, & Bullivant, 2010).

Sauder et al (2019) survey in the US all three stakeholder groups involved in an internship: students, employers, and faculty. They find significant discrepancies in perceptions among the three groups. In general students have the highest expectations on what internships should provide them with. Employers', students', and faculty's perceptions diverge also on how intensive the internship experience should be: faculty and students prefer part-time, employers full-time.

Silvia et al (2016) based their analysis on secondary data on internship programs in Portuguese universities and graduate unemployment, which in their paper is used as a measure of employability and they found that internships are negatively correlated with unemployment levels.

Wilton (2011) found that female undergraduate students report greater skills development following an internship, while according to Qenani et al (2014) male students are more confident in finding a full-time job after graduation than their female counterparts.

A final element that is crucial in determining the success of an internship is the assessment of the students' performance in the workplace. Von Treuer, Sturre, Keele and Mcleod (2010) developed an evaluation method which by triangulating students, company supervisor, and university supervisors, was most effective in aligning the internship's learning objective with learning outcomes.

Human capital theory (Becker, 1964) assumes that what students learn in an academic setting can automatically be transferred to the workplace. This assumed automatic transfer is what then determines the positive return on the investment in education for the individual (Weiss, 1995) and contributes to the increased competitiveness of national economies (Becker, 1964).

Leveson (2000) argues that part of the confusion arises because of the use of terms such as *transferable skills* or *generic skills*. According to Leveson (2000) though simply by using these terms, does not guarantee that graduates will be able to automatically transfer these skills from an educational setting to the workplace. Findings of Leveson's paper (Leveson, 2000) suggest that while academics are more concentrated on teaching transferable skills to students, employers are not interested in the possession of the skills, but focus exclusively on the results these skills produce once they are used in the workplace, along with the students' power to learn (Rospigliosi, Greener, & Bourner, 2011).

Oliveira (2015) advances a conceptual framework of learning transfer which incorporates Leveson's (2000) findings, with Holmes' (2013b) views on employability and Bourdieu's (Thomson, 2014) concept of a field as a social context. By combing all of the above she offers the following definition of learning transfer: *"a consequential and developmental process of transformation experienced by individuals which regard their knowledge, their interactions and their identities, as they occur in the transition between contexts"* (Oliveira, 2015, p. 126).

A variety of factors have been found to influence the transfer of learning. Holton, Chen, and Naquin (2003) identify the type of organization and the support given to the graduate as relevant in transfer effectiveness. The role of the mentor/supervisor in triggering reflection and enabling the transfer of learning is found to be crucial by Sawatsky, Nordhues, Merry, Bashir, and Hafferty (2018).

Internships are among the factors that seem to impact learning transfer most significantly. This is especially true if we embrace the more contemporary theories of transfer (Jackson, 2016a). Here the emphasis is less on what is transferred out but rather the extent to which the transfer occurs; in particular *"the better graduates are able to interpret and relate to information in their new context (the workplace), the better they will transfer their acquired skills and knowledge"* (Jackson, 2013a, p.782). Understanding what influences the transfer of acquired skills and knowledge into workplace behaviors which are valued by employers is a crucial concept for two main reasons.

First, it allows higher education professionals, academics, and non-academics, to better understand which curricular and extra-curricular activities are more effective in teaching students how to transfer what they have learned through life and education and thus help them in enhancing their employability.

Second, it informs higher education professionals about the characteristics needed of an appropriate tool to assess students' employability. An effective employability assessment tools should always try to measure how well students are able to perform certain tasks and predict their fit for a specific job.

In this study, digital game-based assessments were chosen to measure employability, because they rely on talent analytics to better infer predicted workplace behaviors.

2.5 Summary

This chapter critically reviewed the relevant literature to inform the concepts used in this study. First the different interpretations and definitions of employability were analyzed. The next section considered the characteristics of a valid methodology used to assess employability. The various employability assessment methodologies used in research and practice were then reviewed.

The final sections reflect on what is really at the center of the research question, specifically the literature on the effects of international experiences and internships on employability.

The next chapter will analyze the theories that lay the foundation for understanding why an international internship affects employability. These are experiential and transformative learning theories and social and cultural capital theory and they will be used to seek an explanation for the way that learning which occurs during an international internship experience translates into employability enhancing behaviors. What are the reasons behind the transformation that occurs in students when they take part in an international internship experience? Both the learning and the transformation experienced by students affect their cultural and social capital and this can determine modifications in the behaviors that define employability.

Chapter 3 : Theoretical Frameworks

3.1 Introduction

Multiple factors can affect the development of employability in graduates (Pool & Sewell, 2007; Tomlinson & Holmes, 2017). This research investigates international experiences and internships.

Specific to this research, there are two questions which need to be answered:

- why should an internship affect employability?
- why should an international experience affect employability?

Three main theoretical frameworks have been used as the foundation for giving a comprehensive answer to these two questions: experiential learning theory, transformative learning theory, and cultural and social capital theory.

Experiential and transformative learning theories lay the groundwork for the conceptual framework within which the research investigates why the experiences linked to international and domestic internships contribute to the development of employability in students. Cultural and social capital theory help in understanding the foundation and the mechanisms based on which international and domestic internships interact with transformative and experiential learning in developing employability.

Section 3.2.i explores the basic concepts of experiential learning theory and explains when and why experiences such as international sojourns and internships are learning experiences and how this links to developing employability.

In Section 3.2.ii the basic concepts of transformative learning theory are analyzed to understand why international sojourns and internships can be transformative experiences and thus trigger learning, and influence employability.

In Section 3.2.iii the basic concepts of cultural and social capital theory are presented. By analyzing the ways by which cultural and social capital can be acquired, the influence on employability of transformative experiences such as international sojourns and internship will be better understood.

Section 3.3 closes the chapter by creating a link among the theories presented.

3.2 Theoretical Framework

This section presents separately the three theories which are at the foundation of the research: experiential learning theory, transformative learning theory, and cultural and social capital theory.

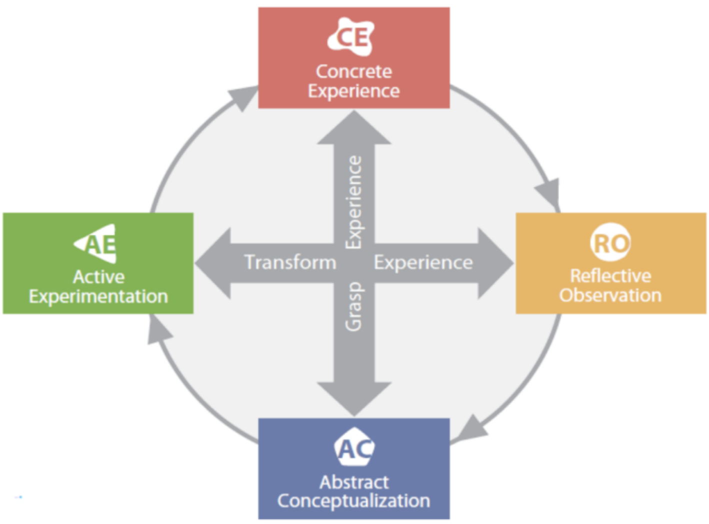
3.2.i Experiential Learning Theory

Dewey and Kolb are key authors for experiential learning (Dewey, 1938; D. A. Kolb, 1984). In their seminal works, they both draw from the principle that you can learn from experience, but for the learning to occur alongside the experience there must be reflection and experimentation.

Experiential learning is described as, *"the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience."* (Kolb, 1984, p. 41)

Experiential learning is a cycle defined by four bases, as shown in Figure 3.1: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Learning is a recursive process; concrete experiences are the basis for observation and reflection. These observations are then assimilated and transformed into abstract concepts from which implications for action can be drawn. These implications are then tested in actions, which serve as guides in new experiences.

Figure 3.1
Experiential Learning Cycle



Source: A. Y. Kolb & Kolb (2013) p.8

Two steps define the learning process in individuals and two primary axes lie behind the cycle. The two steps/axes refer to first, how we perceive or grasp new information through experience, and second, how we then process and transform what we perceive (Smith & Kolb, 1996). We can perceive or grasp new information from experience either by simply immersing ourselves with senses and feeling in a "concrete" way in the experience – CE or by thinking about it abstractly using logic and reason - AC (Healey & Jenkins, 2000). In order then to understand and transform the information, individuals differ and some prefer to do (active experimentation – AE) while others prefer to watch (reflective observation - RO) (Fielding, 1994). If we then plot the two axes at the right angles (Figure 3.2) we can identify four clusters which can describe what Kolb (1984) has identified as preferred learning styles of students. Each learning style is associated with a different way of facing and solving problems. These are described as:

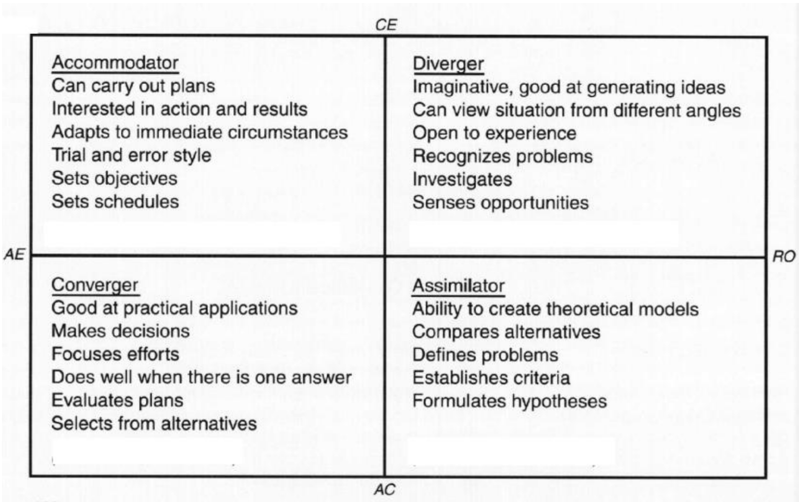
Divergers. The dominant learning abilities are CE and RO. Students with this learning style perform better when the generation of ideas is needed, in brainstorming sessions, they have broad cultural interests, prefer to work in groups, and like to gather information.

Assimilators. The dominant learning abilities are AC and RO. Students with this learning style *"are best at understanding a wide range of information and putting it in a concise, logical form"* (Kolb, Boyatzis, & Mainemelis, 2014, p. 230). They are interested in ideas and abstract concepts. For them, the important thing about a theory is that it has logical soundness rather than practical value, they prefer readings, lectures, and time to think things through.

Convergers. The dominant learning abilities are AC and AE. Students with this learning style are best at applying theories to practical uses, they can solve problems and find solutions, they prefer technical tasks rather than dealing with social or interpersonal issues, they prefer simulations and laboratory assignments.

Accommodators. The dominant learning abilities are CE and AE. Students with this learning style can learn from "hands-on" experiences, they act on "gut" feeling and rely on people for information more than on logical or technical analysis, they prefer to work with others to get things done and to do fieldwork.

Figure 3.2
Preferred Learning Styles



Source: Adapted from Healey & Jenkins (2000) p.188

According to Kolb, students prefer learning in a certain way, which translates into entering the learning cycle at a preferred stage. What is crucial for the learning to be optimal though is that students need to develop the abilities represented by all the stages (Evans, Forney, Guido, Patton, & Renn, 2010), because each stage provides the basis for the subsequent learning stage.

> *In experiential learning theory, learning is a cycle and follows a spiral: When a concrete experience is enriched by reflection, given meaning by thinking and transformed by action, the new experience created becomes richer, broader, and deeper. Further iterations of the cycle continue the exploration and transfer to experiences in other contexts. In this process learning is integrated with other knowledge and generalized to other contexts leading to higher levels of adult development.* (A. Y. Kolb & Kolb, 2013, p. 24)

Higher education institutions should be able to equip all their students with the same knowledge and skills. Students' learning styles though are different. Higher education curricula should therefore be designed to accommodate the learning preferences of all students. Divergers and assimilators benefit most from traditional classroom settings, they prefer to learn first and then practice through experience, convergers and accommodators instead benefit most from doing things first and then conceptualizing their experiences.

Experiential learning theory provides therefore a very solid framework for understanding how and why both international experiences and internships are relevant for the educational paths of students and help enhance employability. Whatever students' preferred learning style is and in whatever stage they enter the experiential learning cycle, it is this research's contention that through international experiences and internships, students develop technical and transferable skills and learn how to translate them into workplace behaviors and performances valued by employers.

But *"experience alone is not enough; proximity to culture does not make one culturally aware. Experience needs to be integrated into formal learning, intentionally and systematically, to enhance academic study."* (Woolf, 2018, p. 85) It is therefore not enough to simply go abroad or have a work experience to trigger learning.

Internship is very relevant for this study, first because it aligns the work experience with the field of study, and second it tends to be associated with having a tutor/supervisor. Both factors support more powerful learning experiences. The role of the tutor/supervisor during an internship is fundamental in assisting student reflection, in effectively enhancing their skills during the internship, and understanding how to translate them into workplace behaviors valued by employers (see Section 2.4).

3.2.ii Transformative Learning

According to Mezirow (2006, p.24), transformative learning is a process *"that enables us to recognize and reassess the structure of assumptions and expectations which frame our thinking, feeling and acting"*. Through our frames of references, influenced by culture and language, we give meaning to our experiences; the frames of reference shape our perception and feelings, which determine our intentions, beliefs, expectations and therefore set our "line of action". Frames of reference encompass both cognitive and affective components and can be within or outside awareness.

Frames of reference have two dimensions: a habit of mind and resulting points of view. Habits of mind are abstract, broad, habitual ways of thinking, feeling, and acting influenced by assumptions. Habits of mind determine points of view, which are sets of beliefs, memories, judgments, and feelings that shape how we interpret things. Mezirow (2018) himself uses ethnocentrism as a good example. Ethnocentrism is a habit of mind by which our point of view is the set of negative beliefs, judgments, feelings that we may have regarding groups or individuals whose characteristics differ from our own. If we have a positive experience with one of these groups or individuals, this might change our point of view about the specific group or individual; this does not necessarily impact our ethnocentric habit of mind regarding other groups.

Mezirow defines the event that triggers the questioning of frames of references and leads to perspective transformation as a disorienting dilemma. The disorienting dilemma is the first step of the transformative learning experience.

Following Taylor's (1994, p.158) statement according to which "a disorienting dilemma seems similar in nature to culture shock", a wide range of scholarly work contributed to strengthening the theoretical knowledge of international experiences as powerful disorienting dilemmas.

Laros (2017) argues that the discomfort a person experiences in a different cultural environment might be the trigger to the disorienting dilemma. Immersion in a different cultural environment can occur locally, for example through service-learning experiences (Coyer, Gebregiorgis, Patton, Gheleva, & Bikos, 2019). Chwialkowska (2020) investigates instead immersion in different cultural environments through study abroad experiences. She finds that for students who engage in study abroad programs, *"all strategies aiming at maximizing cross-cultural immersion ... are negatively related to students' feeling of comfort at the early stages of the program"* (Chwialkowska, 2020, p.15) and positively related to students' acquisition of cross-cultural skills, which is consistent with the postulates of transformative learning theory. Nada, Montgomery, and Araújo (2018) suggest that even if the contact between international and local students is poor the international experience leads to positive learning outcomes and add that most of the learning occurs in informal settings.

Considering an international experience as a disorienting dilemma for students is even more fitting within the theoretical framework of transformative learning after Mezirow's revised conceptual development to the original theory. Initially, he had argued that transformative learning usually involves self-reflection, but as *"many transformative experiences occur outside of awareness, I have suggested that, in these situations, intuition substitutes for critical self-reflection"* (Mezirow, 2006, p. 95).

3.2.iii Cultural and Social Capital Theory

Bourdieu's sociological concepts of capital, field, and habitus have been extensively investigated and used as theoretical frameworks in research in a variety of disciplines among which education.

Bourdieu (1986) identifies three main forms of capital: economic, social, and cultural. Economic capital is immediately convertible into money and refers to material and financial resources. Social capital refers to the actual or potential resources linked to a network of relationships. Cultural capital refers to the skills, knowledge, titles, and sensibilities possessed by an individual.

Cultural capital can exist in three forms: embodied, objectified, and institutionalized.

- *Embodied cultural capital* is what we commonly refer to as culture, it implies assimilation, it takes time and is embodied, in the literal sense of linked to the body, of the person who possesses it. This form of capital cannot be transmitted, purchased, or exchanged. The link between economic and embodied cultural capital depends on the time needed for its acquisition.
- *Objectified cultural capital* refers to cultural goods in which this form of capital can be incorporated such as books, writing, paintings, monuments, instruments, machines. Objectified cultural capital can be easily transmitted. But what is transmitted is the legal ownership of the assets, not the way to understand/use/consume the assets. A grand piano can be bought, but to play it as a virtuoso, a person needs embodied cultural capital accumulated through years of study and practice.
- *Institutionalized cultural capital* is a different form of objectification of cultural capital. It refers to the academic qualifications obtained by an individual. These academic qualifications confer a legally guaranteed value to what is otherwise only embodied knowledge and culture, a sort of *"certificate of cultural competence"* (Bourdieu, 1986, p. 248). The academic qualification, which is an institutional recognition of embodied cultural capital, creates a link between cultural and economic capital. It becomes possible to try and establish a conversion rate between the two forms of capital, thus guaranteeing the monetary return which is usually related to having academic capital.

Social capital is the network of connections a person has. These connections can be derived by membership in a group such as family, school, university, club, party, etc. The volume of social capital depends not only on the direct connections possessed by an individual, but also on the amount of capital, economic, social, and cultural, possessed by each of their connections. The initial network is represented by the family group, but the broadening of the network is always the product of investment strategies. This can occur at an individual (join clubs, attend a university, work in a company) or collective level (career fairs for students, trade fairs for companies, conferences). Creating a network of connections takes time and energy and translates directly into spending economic capital. The investment in accumulating and maintaining social capital becomes the more profitable, the higher the economic, cultural, or social capital already possessed by the person.

Putnam (2000) elaborates on the ways a person can develop social capital, by making a distinction between *bonding* and *bridging*. Bonding social capital is created by simply being part of a group, family, ethnic group, or college. It can offer trust, loyalty, and mutual benefits. Bridging instead refers to making connections with outsiders; it is more inclusive and connects people across different networks. This distinction is particularly relevant in the context of college students: bonding social capital is available to them simply for being part of their institution's community while bridging social capital gives them access to additional resources.

Often overlooked is the fact that Bourdieu clearly states that:

> *economic capital is at the root of all the other types of capital ... different types of capital can be derived from economic capital, but only at the cost of a more or less great effort of transformation, which is needed to produce the type of power effective in the field in question* (Bourdieu, 1986, p.252).

Two other concepts shaping Bourdieu's sociological approach are important for the current research – i.e., habitus and field.

For Bourdieu *habitus* is a disposition,

> *our ways of acting, feeling, thinking, and being. It captures how we carry within us our history, how we bring this history into our present circumstances, and how we then make choices to act in certain ways and not others* (Maton, 2014 p. 51).

Field is the social space in which interactions, transactions, and events occur (Thomson, 2014). The relationship between habitus and field is an evolving process of continuously influencing and shaping one another. In a specific field, people initially understand situations, act, and behave according to their habitus. At the same time though by living experiences, acting, and making choices in a specific field, it is the field that structures and shapes the habitus (Bourdieu & Wacquant, 1992).

Krarup and Munk (2016) emphasized the importance of Bourdieu's field theory in cultural capital research in education. Field theory focuses on the relational and structural aspects of cultural capital theory and not on single isolated individual resources or variables. Capital is a conceptual instrument that can help understand the effects of individuals' life trajectories in different social fields. In social science and particularly when using Bourdieu's conceptual framework, it can be misleading to assume that the effects on a specific dependent variable are produced by changes in other – independent – variables. A specific form of objectified cultural capital such as having books in the home or going to museums (in this example, taken from Krarup and Munk (2016), these are the independent variables) does not necessarily have the same effect on the educational attainment (in this example the dependent variable) of different students. Based on Bourdieu's conceptual framework, whether having books in one's home or going to museums (objectified cultural capital) affects the educational attainment (institutionalized cultural capital) has to be defined by relational and structural aspects.

Bourdieu (1984) states

> *the particular relations between a dependent variable and so-called independent variables such as sex, age and religion, tend to dissimulate the complete system of relations that make up the true principle of the force and form specific to the effects recorded in such and such particular correlation*. (Bourdieu, 1984, p.103)

Field theory gives the context to analyze the relationships between different forms of capital. Field theory relates phenomena that are structurally embedded in different fields, such as education, to the interaction between capital, field and habitus.

> *The principle of capital ..... lies in the complicity ... between the history objectified in the form of structures and mechanisms (those of the social space or of the fields) and the history incarnated in bodies in the form of habitus…* (Bourdieu, 2000, p.150f).

In her recent research, Tran analyzes, using Bourdieu's thinking tools of capital, habitus, and field – the work experiences of international students in Australia (Tran, 2016; Tran & Soejatminah, 2016, 2017). Tran and Soejatminah (2017) focus on how the interaction of different social fields, the institutional, the workplace, and the students' personal social field, combine in shaping international students' habitus. Their findings inform institutions on how to enhance access and improve the quality of international students' work experiences. By applying Bourdieu's theoretical framework to the field of international work experiences they conclude that work experience is an *"avenue for learning about particular habitus in the workplace ... and .. provides opportunity to enhance employability entailing economic capital gain and enables learners to develop knowledge and skills reflecting cultural capital development"* (Tran & Soejatminah, 2016, pp. 350-351).

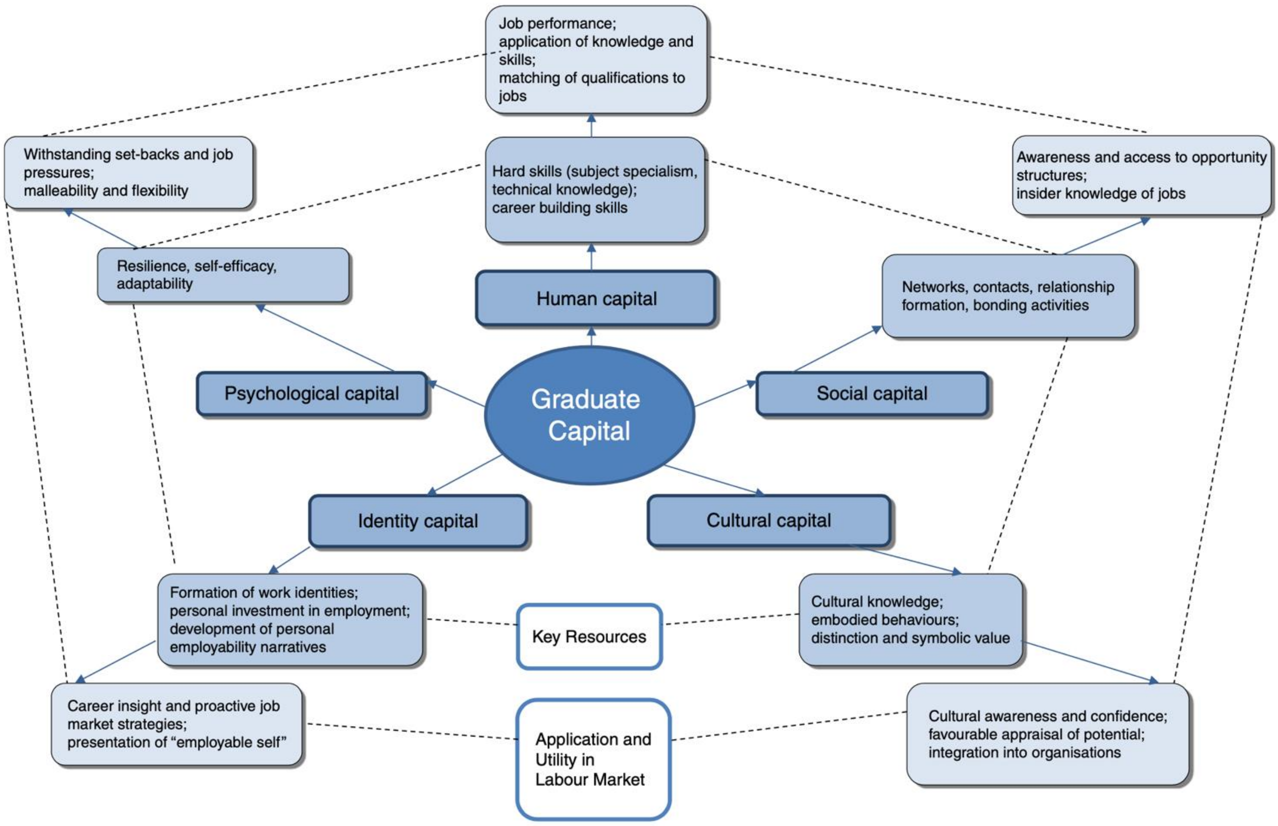
Bourdieu's theoretical framework informs an increasing number of studies. Investigating graduate employability, international experiences, and internships through the lens of Bourdieu's theory allows researchers to expand their understanding. Different forms of capital, the intersection among a variety of social fields where students operate and the resulting shifts in their habitus are used by several researchers to better frame and develop a more comprehensive understanding of graduate employability and internships.

In 2003, Murphy-Lejeune (2003) introduces mobility capital as a *"sub-component of human capital, enabling individuals to enhance their skills because of the richness of the international experience gained by living abroad"* (Murphy-Lejeune, 2003, p.51). Mobility capital *"is composed of four main elements ... family and personal history, previous experiences of mobility including language competence, the first experience of adaptation ... and ... personality feature"* (Murphy-Lejeune, 2003, p.52). There is a clear link between the concept of mobility capital, international internships, and employability if analyzed through Bourdieu's theoretical framework. Family and personal history and previous mobility experiences, as well as language competence, are all linked to cultural capital. Murphy-Lejeune's (2003) concept of 'first experience of adaptation' is similar to the idea of acquiring new habitus when entering a novel social field.

Tomlinson (2017) conceptualizes graduate employability with a graduate capital model. He *"departs from dominant skills approaches to employability and instead conceptualizes employability as constituting a range of dynamic, interactive forms of capital which are acquired through graduates' lived experiences"* (Tomlinson, 2017, p. 340).

Graduate capital is the result of the interaction of five different forms of capital as illustrated in Figure 3.3.

Figure 3.3
Graduate Capital



Note: adapted from Tomlinson (2017) p.340

Tomlinson (2017) integrates into one comprehensive model several different approaches, starting from Bourdieu's cultural and social capital, traditional human capital theory (Becker, 1964), Holmes' graduate identity approach (Holmes, 2013b), and the personal traits that define every single graduate.

The different forms of capital conceptualized by Tomlinson, can be acquired on a continuing basis by students both through education and their life experiences. The overall graduate capital of students can thus be constantly increased by cumulating the different forms of capital developed through life. The accumulation of different forms of capital is what, according to Tomlinson (2017), increases their employability and expands their options to find a job when they will transition from education to the world of work.

When graduates transition from education to the workplace and find jobs, the different forms of capital that have accumulated into their graduate capital translate into what Bourdieu defines as economic capital.

Graduates enter higher education coming from different familial and socio-economic backgrounds, but

"One of the main features and strengths of the capitals approach is its emphasis on the significance of multiple resources which are constitutive of employability, which are acquired across various domains and are not simply confined to formal educational provision. Capital formation is also, therefore, processual, and relational in the sense that capitals are acquired and deployed over time and their effects sustained across a range of employment-related contexts. Crucially, different forms of capital feed off, and enrich, other forms."(Tomlinson, 2017, p.349).

Kalfa and Taksa (2015) also question the skills approach to employability dominant in many Australian universities. According to Bourdieu's theory learning is deeply situated in a specific social field. They argue that if transferable skills are embedded in the teaching methods of higher education institutions, this does not necessarily mean that these skills can be neutrally transferred into the workplace. Habitus and capital are transferable across the two different fields of higher education and the workplace. But this does not happen automatically.

Andreas (2018) explores the reasons for the skill gap (Hart Research Associates, 2015) and argues that there is a link between the decline in transferable skills of graduates in the US and the decline in their social capital.

Pöllmann (2013) emphasizes Bourdieu's concept of how class structures are reproduced through the educational system, by expanding it to intercultural education and focuses on intercultural capital in the embodied state. He refers to Bourdieu's work in defining it and makes a clear distinction between embodied intercultural capital and simply intercultural skills and competencies. He states that intercultural capital *"does not solely relate to intercultural proficiencies as such, but also to their relative exchange value and the circumstances under which they are more or less likely to be realized"* (Pöllmann, 2013, p. 2). Intercultural capital has a strong symbolic value in terms of social distinction. Contrary to simple cultural capital it retains or even enhances its value across fields.

Pöllmann suggests the need to operationalize intercultural capital with quantitative measures; these measures could then be used as predictors of transnational employability. Intercultural education (Pöllmann, 2016) is the way to achieve intercultural capital. The biggest problem he highlights though is *"that those who have already realized comparatively high levels of highly valued and widely convertible (officially recognized) intercultural capital are likely to realize even more of it with more ease"* (Pöllmann, 2013, p. 5).

3.3 How the Theoretical Framework Informs Employability in this Study

Seeking an explanation as to why international internships might affect employability differently from a domestic internship, is informed by the interaction of the theoretical frameworks on which this study is based. As noted above the research question in this study is linked to two themes: the effect of internships on employability and of international experiences on employability.

Concerning graduate employability, the dominant political, economic, and educational discourse of transferable skills has become part of the growing debate on the purpose of higher education institutions (see Sections 2.2.i and 2.2.vi.a). As also noted, numerous ways are discussed in the literature and applied by practitioners to develop graduate employability. At the center of this research is the intersection between two such strategies: internships and international experiences. In the development of graduate employability, can these two forms of experiential and transformative learning combine and produce a more powerful result?

Internships and international experiences can be regarded in Bourdieu's frame both as fields in which there are hierarchies (recruiters, academic supervisors, employers' tutor, students), discourses (technical and transferable skills), and actors seeking to position themselves favorably. These actors include students, universities, and employers competing for jobs/graduates/recruits.

Students try to enhance their economic and cultural capital through experiences such as internships and thus accumulate forms of social capital that might convert into market value in the global and home country workplaces.

Bourdieu's concept of habitus refers to cultural dispositions and attributes embedded and developed in individuals through life experience and education. Students come to higher education with habitus, which is the product of their personal histories, familial background, previous education, and their experiences which have already shaped their attitudes, aptitudes, and aspirations, or dispositions. Habitus changes as students navigate through higher education, including taking part in international experiences and/or internships.

These changes in habitus can result in changes in behaviors associated with the definition of employability adopted in this study. This definition is based on both Bennett's and Yorke's definitions:

> *"the ability to find, create and sustain meaningful work across the career lifespan"* (Bennett, 2018a, p. iv)

and

"a set of achievements – skills, understandings, and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy" (Yorke, 2005, p. 8)

What is measured in this study through game-based assessments, is the set of transferable cognitive and interpersonal skills and personality traits and how these skills and traits translate into behaviors.

Transferable cognitive and interpersonal skills as well as personality traits can be affected by the experiential learning of an internship is very clear from NACE's definition of internship (National Association of Colleges and Employers (NACE), n.d.) adopted in this study (see Section 2.4).

The four stages (*concrete experience*, *reflective observation*, *abstract conceptualization,* and *active experimentation*) of the experiential learning cycle (Kolb, 1984) are the foundation of NACE's definition.

An internship is characterized as follows:

1. *Concrete experience*. Defined as "a form of experiential learning that integrates knowledge and theory learned in the classroom with practical application and skills development."
2. *Reflective observation*. "There is routine feedback by the experienced supervisor."
3. *Abstract conceptualization*. "There are clearly defined learning objectives/goals related to the professional goals of the student's academic coursework."
4. *Active experimentation*. "[T]he skills or knowledge learned must be transferable to other employment settings." [emphasis omitted] (National Association of Colleges and Employers (NACE), n.d.)

According to this NACE definition, internship is therefore in line with the experiential learning cycle (Kolb, 1984), and represents a learning experience that affects the development of the skills and behaviors that constitute employability.

Immersion in a professional setting can also be considered a 'disorienting dilemma', which according to Mezirow (1991) presents an opportunity to question our frames of reference and can lead to transformative learning. In this case, the students' experience in the internship workplace is likely to be different from their previous experiences within other social arenas, such as family, friends, or the academic context.

During the internship, students' habitus evolves because they experience a new social field (Maton, 2014). This may mean that students' cultural and social capital increases; their cognitive abilities, interpersonal abilities, and personality traits are all challenged and affected by the experience. This challenging experience therefore links directly to the employability dimensions measured in this research.

3.4 Summary

This chapter has analyzed the theories on which the research is based and which provide the conceptual framework for the study to understand the importance of the findings.

The experience of living abroad and doing an internship are both transformative experiences, which can trigger learning and translate into a change in behaviors. Cultural and social capital theory explain the changes in students' behavior by linking them to changes in students' habitus. The three theories together help to frame an appropriate design for this study.

The next chapter describes the assessment methodology used to measure employability, how the data was collected and stored, and the statistical procedure used to extract the information needed to answer the research question.

Chapter 4 : Methodology

4.1 Introduction

Chapter 4 provides an overview of the research methodology used in this study. The research question, the assessment instruments used to measure the dependent variable, the variables, the sample and, the data collection methods are presented. The reliability and validity of assessment instruments and the related ethical issues are also addressed.

Some sections are reproduced from a jointly-authored article entitled “International internships and employability: A game-based assessment approach” by Predovic, Dennis and Jones (accepted by Higher Education Research and Development and published online on March 22nd, 2021). Reproduced with thanks and permission from my co-authors.

4.2 Research Question and Research Design

As noted in section 1.2 the research question this study aims to answer is:

Do higher education student internships in an international context differentially influence employability behaviors compared to a domestic internship alone?

A postpositivist philosophical worldview offered the most appropriate approach to answering the research question. According to Creswell (2013, p. 6), this refers to the generation of knowledge *“by developing numeric measures of observations and studying the behavior of individuals”*.

Embracing this worldview, it was necessary to find the most objective as possible numeric measure of employability in order to answer the research question. Digital game-based assessments were chosen as the measurement tool as they are believed to be the most appropriate methodology to measure students’ behavior in terms of employability (Georgiou et al., 2019; Povah et al., 2017). This approach is grounded in theories that support the use of gaming methodologies for addressing real problems (Clapper, 2017).

The design and methodology of this study are quantitative since numeric data was collected to answer the research question and a binary response to having done an international or domestic internship was associated with the quantitative measures of employability.

To support and explain the choice of digital game-based assessments as appropriate measures of the variables that they are intended to quantify, it is necessary to briefly explain how gaming can be used in the context of higher education and illustrates the value of digital game-based assessments for measuring graduates' employability potential.

4.3 Gaming

Gaming in the context of education has often been associated with skill development. The following two sections briefly present some evidence of how gaming can be used to develop skills, before moving on to discuss how gaming can be used to assess behaviors. The latter is the focus of this research study, and it is therefore important to understand the main characteristics of digital game-based assessments and the context in which these assessments can be used appropriately.

4.3.i Game-Based Learning (GBL)

Game-based learning (GBL) has been investigated in many contexts: potential for learning, skill development, and conditions for successful learning.

The first step in demonstrating the potential of GBL is through the categorizations of cognitive functions engaged in by the player during gaming (Lumsden, Edwards, Lawrence, Coyle, & Munafò, 2016; Martinovic et al., 2014), the learning potential of games for knowledge acquisition and the development of employability skills (Boyle et al., 2016; Galbis-Córdoba, Martí-Parreño, & Currás-Pérez, 2017; Yi, Hwang, & Chang, 2019). Romero et al., (2015) focus on the game characteristics that could facilitate skill development.

The largest body of literature investigates the impact of serious gaming on the development of employability skills: communication skills (Reinders & Wattana, 2014; Romero et al., 2015), critical thinking (Carolyn Yang & Chang, 2013), problem-solving (Sung, Hwang, & Yen, 2015), conflict resolution (Cristóbal, 2015), decision making (Savard, 2015), cultural skills (Romero et al., 2015), and leadership (De Freitas & Routledge, 2013; Lin & Lin, 2014).

Finally, for GBL to be successful two main conditions must be met. First, at the heart of GBL is motivation; a lot of research benchmarks the learning environment in GBL against the framework of motivation theories. The two theories most frequently referred to in literature are the cognitive theory of multimedia learning (Astleitner & Wiesner, 2004; Mayer, 2009) and the behavioristic view of motivation (Galbis-Córdoba et al., 2017; Keller, 1987).

The cognitive theory of multimedia learning originates from the principle known as the "multimedia principle" which states that *"people learn more deeply from words and* *pictures than from words alone"* (Mayer, 2009, p.4). The theory itself is based on three main assumptions: there are two separate channels (auditory and visual) for processing information; each channel's capacity is limited; and learning is a process of filtering, selecting, organizing, and integrating information.

The behavioristic view of motivation examines how internal drives and external goals interact with learning and result in behavior. Thus, for example, in Keller's ARCS model (Galbis-Córdoba et al., 2017; Keller, 1987) there are four steps for promoting and sustaining motivation in the learning process: Attention, Relevance, Confidence, Satisfaction (ARCS).

Second, the success of GBL strongly depends on the context in which it is used: how it is interwoven within the broader education process, the role of the educator, and the related technologies (Ravenscroft & McAlister, 2006; Shah & Foster, 2014).

4.3.ii Game-Based Assessment (GBA)

Game-based assessment (GBA) can be achieved in three ways: game scoring, or external or embedded assessments (Ifenthaler, Eseryel, & Ge, 2012). Game scoring focuses on the targets achieved during the game and is important for the motivation of the player, which is a critical component of skill development and assessment (Keller, 1987). External assessments are not part of the game environment and are realized through interviews, questionnaires, or essays (Chin, Dukes, & Gamson, 2009). Embedded assessments or stealth assessments are part of the gameplay and do not interrupt the game. Rich data about the player's behavior while playing is the basis for the assessment of the skills.

Implementing assessment features in the digital game-based environment is at an early stage because it is time-consuming in the design process and it needs to be thoroughly tested to be reliable (Chin et al., 2009). According to Chin et al, the biggest challenge in GBA is finding the balance between structure and agency. *Structure* refers to the environment in which the actors/players of the game operate; *agency* refers to the choices they make throughout the game. *"Some of these decisions will be the product of constraints placed on the participants by the design of the game (structure). Some of these decisions will be a function of the participants' individual choices (agency)"* (Chin et al., 2009, p.558). In the design of the digital game assessments, it is therefore very important that the structure is not contaminated by factors other than the characteristics that are assessed.

Sanchez and Langer's findings (Sanchez & Langer, 2020) support the importance of game design, by warning of the potential bias that there can be in some digital game-based assessments for those who are frequent players of video games. They state that

> *there might be unwanted advantages for those who pursue video games as it seems plausible that they can transfer their prior experience with video games and benefit from their attitudes towards games (e.g., enjoyment, self-efficacy) in assessments or trainings in a game context* (Sanchez & Langer, 2020, p.80).

Menezes and Bortolli (2016) categorize three types of evaluation within gaming assessments:

1. Diagnoses, at the beginning of a course, to check if students present the prerequisites necessary for completing the tasks required.
2. Formative, to check whether students are reaching the learning objectives (Ranieri, Raffaghelli, & Bruni, 2018).
3. Summative, usually at the end of a course, after the action or the learning has occurred to check the results.

Menezes and Bortolli (2016) also highlight several issues that must be taken into account when integrating assessments and gamification:

- *Familiarization*: influence on students' performance and motivation can depend on familiarity with the controls in the game.
- *Feedback*: performance can be influenced by the kind of feedback students gather during the game.
- *Re-playing*: for some games, being able to play the game more than once might bring some advantages due to an experience factor. It is therefore important to handle the number of attempts each student/player can play.
- *Interaction*: the environment of the game can determine interactions that are not logical or expected; separating these behaviors from those that will be used as evidence without making the game dull or repetitive is a challenge.
- *Working memory*: high levels of interactivity and engagement might place a high demand on students' working memory and cognitive processing and reduce the quality of the assessment.
- *Accessibility*: *"the use of rich, immersive graphical environments can impose great visual, motor, auditory, and other demands on the player to just be able to interact in the environment"* (Menezes & Bortolli, 2016, p.565).

- *Irrelevance of construct*: when designing interactive games there is the risk of imposing requirements on knowledge and skills that are not part of what the game is meant to assess (Zapata-Rivera & Bauer, 2012).

Tansley, Hafermalz, and Dery (2016) use the term *talent development gamification* to outline the risks of using gamification in talent recruitment. They argue that graduates *"need to first understand what is required of them in the selection assessment process and to be able to demonstrate both current skills/knowledge and potential for future job roles"* (Tansley et al., 2016, p. 491).

According to Chamorro-Premuzic et al. (2017), recruiters should be interested in game-based assessments for several reasons, among which:

- The similarities between playing online role-playing games and real-life situations in the workplace.
- Game-based assessments could improve the job fit by increasing the likelihood that the employees are placed in jobs that are motivating for them.
- People prefer playing games to taking tests.
- These approaches are more data-driven and evidence-based than subjective human intuition.

4.3.iii Gaming and Gender

The topic of gender differences in digital gaming has often been addressed in research. The purpose of this section is to establish if these differences exist and, if they do, to determine how they could impact the outcome of digital game-based assessments.

From Romrell's exhaustive literature review paper (Romrell, 2015) it appears that there are gender differences in how people interact with games, in particular regarding motivation and game style preferences. Men generally prefer more active and competitive games, while women prefer skill training, puzzle and logic games, and especially those where there is social interaction (Hartmann & Klimmt, 2006; Williams, Consalvo, Caplan, & Yee, 2009). Bonanno and Kommers find that, in general, males have a more positive attitude towards games (Bonanno & Kommers, 2008).

Quaiser-Pohl, Geiser, and Lehmann (2006) investigated the relationship between these gender differences in spatial visualization abilities and gender preference for gaming. Their results confirm that also in games, males perform better than females on mental rotation tests (MRT) and that males who play games often, perform better on MRT in comparison with males who do not. The same result was not found for females who play games often i.e., they do not perform better on MRT than females who play games less often. They also found that, in general, males have a preference for digital games and tend to be more competitive compared to females (Quaiser-Pohl et al., 2006).

Male performance over females is confirmed in the manipulation of visual images in working memory (Halpern & Lamay, 2000; Stanmore, Stubbs, Vancampfort, de Bruin, & Firth, 2017), short-term memory in general, and attention switching (Solianik, Brazaitis, & Skurvydas, 2016). Hirnstein, Freund, and Hausmann's (2012) research and Hyde's (2016) meta-analyses of gender stereotypes research confirmed that males, in general, outperform females in spatial tests, while women outperform men on verbal tests (Borgonovi, 2016).

4.3.iv Digital Natives

In this study, employability is defined as the set of transferable cognitive and interpersonal skills and personality traits and how these skills and traits translate into behaviors. The behaviors determined by these skills and traits are what will be used as a proxy of employability throughout this study. Game-based assessments are used to measure employability as above defined.

Prensky's seminal work (Prensky, 2001) describes how 'digital natives' think, learn, and process information, and in talking about educational systems, he states "[t]oday's students are no longer the people our educational system was designed to teach". Digital Natives were born in the new digital era and, based on the research of neuroscientists, their brains are likely physically different as a result of the digital input they received growing up (Dierick, Buisseret, Renson, & Luta, 2020; Firth et al., 2019; Kuhl, Lim, Guerriero, & van Damme, 2019)

Prensky argues how Digital Natives differ from older generations are (Prensky, 2001):

a) *Speed*. Digital Natives can process information faster.

b) *Parallel processing versus linear processing*. Parallel processing involves a diversified form of concentration, possibly less intense or centered on a single aspect.

c) *The text illustrates the image*. In technological media, often the text is complementary it simply expands something already present in visual form.

d) *Connectivity*. They tend to approach problems from a different angle.

e) *Active versus passive*. Let us compare reading and interacting with a computer. Reading requires concentration and usually silence while interacting with a computer is a more active experience. Digital Natives have less tolerance towards passive situations, such as lectures or traditional questionnaires.

f) *Orientation towards problem-solving*. They often approach things in a way similar to a game: perform and revise the action, less planning involved. A great use of "trial and error".

g) *Immediate reward*. Digital Natives tend to want to work with "authentic tasks" to immediately understand the utility of what they are doing.

h) *A positive view of technology*. Unlike previous generations, their attitude towards technology is generally positive and they trust it.

In contrast, throughout their work, Chang & Gomes (for example, 2017, 2021) highlight the risks of considering all young people digital natives. They emphasize that *'one digital size does not fit all'* (Jones, Chang, & Gomes, 2020). They argue that we should not assume that all young people are digital natives, or that they use digital and social media in the same way (Jones et al., 2020).

Both sides of this debate need to be borne in mind when using digital assessment methods, and any potential bias in results carefully considered.

4.4. Instrumentation

In this study a digital game-based assessment design was chosen as the measurement tool for the dependent variable, given that the main purpose of this study is to test how employability is associated with a students' internship experiences (Helyer & Lee, 2014; D. Jackson, 2013c) .

What is valued in terms of graduate employability after gaining technical skills, credentials institutionalized in educational/academic capital, and displaying transferable skills, is what Blackmore and Rahimi (Blackmore & Rahimi, 2019) refer to as "best fit". "Best fit" translates into three main factors:

1. how well a graduate can transfer credentials, technical skills, dispositions, and transferable skills in general, into workplace behaviors/performances;
2. how well a graduate fits into the existing culture of the workplace;
3. how well a graduate gets on socially with team members in the workplace.

The challenge, within the graduate employability discourse, for Higher Education Institutions (HEIs) and employers, has always been translating the above three factors into a reliable, possibly quantitative, measure (see Jackson, 2014a). Digital game-based assessments (Galloway, Lippman, Burke, Diener, & Gates, 2017) are a new generation of psychometric tests informed by neuroscience and have been developed using the power of behavioral science, artificial intelligence, and smart video games.

Through such assessments, psychometric tests gather up to 12,000 data points on each individual's natural areas of strength and potential. Tasks in the assessments are developed from experiments founded on psychological, cognitive neuroscience, and computational neuroscience principles of human behavior. These experiments have been replicated in app-like interfaces, ensuring they maintain scientific rigor. Research has shown that behavioral variations among individuals completing these tasks map to 'real-world' observable differences in personality traits and cognitive ability, which reflect workplace behaviors and are highly predictive of job performance (Galloway, Lippman, Burke, Diener, & Gates, 2017).

In the current study, digital game-based tools were used to measure students' behaviors associated with the possession of transferable skills and to assign each student a numerical measure corresponding to their employability (Clapper, 2017). The digital game-based tools are believed to be an appropriate methodology to measure students' behavior in terms of employability and therefore provide answers to the research questions.

Two digital game-based assessments were used to measure employability: *Knack* (developed by a US company) in 2017 and *Arctic Shores* (developed by a UK company) in 2018 and 2019.

Both the Knack and Arctic shores are embedded game-based assessment tools, administered via smartphone application, where individual behaviors are measured in different situations. Of relevance is not the end score, but the tracking of the user's movement within the gaming interface and timing of gestures, processed at the millisecond level. From this data, behavioral markers are generated that represent, for example, how quickly a player processes information or how efficiently they see and attend to social cues e.g., emotional facial expressions. These markers are then integrated with higher-level psychological constructs such as intelligence or growth mindset which, taken together, are commonly regarded as basic graduate employability skills for securing and maintaining employment (D. Jackson, 2013a).

The *Knack* has been validated using a random subsample of over 1,400 people from more than 24,000 people in over 110 countries who played the game-based assessment tool. Their embedded performance was compared with standard psychological tests, e.g., Big-Five Personality Questionnaire (Goldberg, 1992), Eysenck Impulsiveness Questionnaire (Eysenck, Easton, & Pearson, 1984), Flanker Task (Eriksen & Eriksen, 1974), Frequency Accrual Speed Test (FAST) (Vickers, 1995), Choices Architect® (De Meuse, Dai, & Hallenbeck, 2010), and the Teamwork, Knowledge, Skills, and Ability Test (M. J. Stevens & Campion, 1999).

A large-scale project funded by the United States Agency for International Development evaluated 74 employability assessment tools, from self-report questionnaires, performance evaluations, and game-based assessments. In that project, the *Knack*'s validity was found to be high, as it met or exceeded *r* = .35, while its reliability was, at best, good, *r* = .4 to .82 (Galloway et al, 2017). To give some context, interviews conducted for the recruitment and selection of employees have been found to have lower validity than the *Knack*, *r* = .26 see, for example, O'Meara, & Petzall, (2013) and lower reliability, r = .34 to .67 (Conway, Jako, & Goodman, 1995).

Knack and *Arctic Shores* have been tested extensively and prove to have both very high reliability and validity indicators (Gray et al., 2016; Or, Montefiori, & Close, 2019). Further data on reliability and validity indicators were made available for analysis as part of this doctoral study, but by request of the two companies, it is to be kept confidential. Their willingness to share data for research purposes is acknowledged, with gratitude.

Game-based talent analytic tools were originally developed for personnel selection and recruiting purposes. Employers in many fields are using the Knack to identify and select potential candidates to match with specific employment opportunities (Georgiou et al., 2019; Povah et al., 2017). Game-based talent analytic tools were found to be both highly reliable and substantially valid for predicting workplace performance since they measure a range of cognitive abilities, personality traits, emotional and social abilities, mindsets, and aptitudes (Chamorro-Premuzic et al., 2017).

For the data gathered in this study, in the *Knack*, students played two games: Meta Maze and Dashi Dash In the *Arctic Shores*, the gaming students played only one game, the Skyrise. Figures 4.1 and 4.2 show the interface met by the students when accessing the two apps.

Figure 4.1
Interface of the two games into the Knack app

Note. Interface of *Meta Maze* on the left; interface *Dashi Dash* on the right

Figure 4.2
Interface of the game into the Arctic Shores app, "Skyrise"

Insights into behaviors result in 33 quantitative descriptors for the *Knack* and 30 quantitative descriptors for the *Arctic Shore*. these descriptors align with the list of transferable skills that have been identified as those demanded by the labor market and extensively analyzed in employability literature (Archer & Davison, 2008; Deardorff & Jones, 2012; Dearing Report, 1997; Farenga & Quinlan, 2016; D. Jackson, 2013c; E. Jones, 2013). For this research, the level of employability of an individual student corresponds to the numerical measures of the descriptors of behaviors which result from the assessment tools.

For the *Knack,* the 33 quantitative descriptors were measured on a scale from 1 to 100, while the scale for the 30 *Arctic Shores* descriptors is from 1 to 10 (Table 4.1).

Table 4.1
Characteristics of the game-based apps used for indirectly measuring employability and year of application in the context of this study

Characteristic	**Knack**	**Arctic Shores**
Manufacturer	US company	UK company
Descriptors	33	30
Scale	1 to 100	1 to 10
Year of application	2017	2018/2019

Tables 4.2 and 4.3 present the 33 *Knack* and the 30 *Arctic Shores* predictors grouped into 5 categories. This grouping of the skills measured by the digital game-based assessments has been done by the two companies and do not correspond to any kind of statistical analysis.

Table 4.2
The 33 Knack Predictors

Engagement	***Impact***	***Learning***	***Relationships***	***Thinking***
Diligence	Leadership	Learning agility	Social intelligence	Logical reasoning
Tenacity	Drive	Quick thinking	Teamwork	Number
Self-control	Self-confidence	Growth mindset	Customer focus	Creative problem solving
Open-mindedness	Taking ownership	Coachability		Creative insight
Managing ambiguity	Leadership initiative	Intellectual curiosity		System thinking
Problem-solving	Inspirational leadership	Data fluency		Resourcefulness
Attention to detail	Consensus building			
Action orientation	Executive presence			
Planning execution	Grit			

Table 4.3
The 30 Arctic Shores Predictors

Cognition	***Drive***	***Interpersonal Style***	***Personal Style***	***Thinking Style***
Processing capacity	Resilience	Altruism	Emotional stability	Managing uncertainty
Learning agility	Performance under pressure	Self-Monitoring	Emotional recognition	Innovation potential
Processing speed	Sensitivity to reward	Sociability		Creativity
Executive functioning	Sensitivity to loss	Social dominance		Optimism
Concentration	Ownership and responsibility	Self-Belief		Novelty seeking
	Self-discipline			Need for structure
	Determination			Future orientation
				Impulsive risk
				Rational decision-making style
				Deliberation
				Curiosity

Appendices D.1 and D.2 show examples of the report generated by the *Knack* (Appendix D.1) and the *Arctic Shores* (Appendix D.2) for each student. In each report, there is also the definition associated with the meaning of each of the skills and traits measured.

To my knowledge, no scientific research has yet used digital game-based talent analytics as an instrument to assess employability even though for recruiters it is a widely used employability assessment methodology (Georgiou et al., 2019).

4.5. Data Collection

A digital game-based assessment design was chosen, given that the main purpose of this study is to test how employability is associated with a students' internship experiences.

Behaviors associated with employability were measured through a digital game-based assessment while the resumes of the students were used to collect the other variables considered in the research, including internship experiences, other experiences, gender, age, and major.

As noted in Section 2.2.iv, talent analytics tools, were preferred to self-assessment surveys because they are unrelated to the subject's perception of employability skills and provide insight into people's actual behavior (Gray et al., 2016; Or et al., 2019). Game-based talent analytic tools were originally developed for personnel selection and recruiting purposes, and they were found to be both highly reliable and substantially valid for predicting workplace performance since they measure a range of cognitive abilities, personality traits, emotional and social abilities, mindsets, and aptitudes. According to Chamorro-Premuzic, Akhtar, Winsborough, and Sherman (2017, p. 14), *"significant similarities exist between playing online role-playing games and the situations in the workplace"*.

The data collection was conducted during a project working together with the HR staff of a major multinational consulting company. The project consisted of inviting Italian graduating students for a three-day talent program in the company's headquarters in Milan. The project was not a recruiting process for the consulting company, but a project aimed at identifying what tomorrow's most employable graduates should look like. Over 30 Italian universities were visited each year to present the project to students. The students were asked to submit their resumes and to play the digital game-based assessment. All the students who voluntarily decided to participate in the selection process of the consulting company's talent management program were considered, as far as they had both completed the game-based assessment and submitted their resumes. The digital game-based assessment and data collection process were replicated over three years: in 2017, 2018, and 2019 to confirm the findings over time.

Participants in this research are all at the standard age for graduating students and likely to be close to a population of digital natives, as described in Section 4.3.iv. As noted in that section, Chang & Gomes (2017, 2021) argue that we should not make assumptions about the digital skills of our students. However, for this research, digital game-based assessments have been assumed to be a valid tool to measure employability for the population of students in this study. This assumption has been made for two reasons. First, given their age and the fact that the sample is exclusively Italian students, they might not have the same level of digital ability, but they are quite likely to be accustomed to using a smartphone. Second, the students have voluntarily submitted their resumes and already done the digital games-based assessment as part of a talent management selection program. Again, for this reason it is quite likely that they have a sufficient level of digital literacy for the assessment method chosen.

A confidentiality agreement was signed with the consulting company and, for the analysis, all participant identifiers were removed. The game-based assessment results were downloaded directly through password-protected access to the *Knack* and *Arctic Shores* proprietary platforms. The raw data was stored in password-protected files that were contained only on my personal computer specifically for this research. The files in my possession containing the raw data were destroyed in June 2020. The consulting company still has the raw data used for this research and upon request it can be made available for replicability and verification purposes.

4.6 Population and Sample

Visser, Krosnick, & Lavrakas (2000, p.230) define a population *"as the complete group of elements to which one wishes to generalize findings obtained from a sample"*.

The target population in this study was represented by Italian undergraduate or graduate students (according to the Bologna framework) doing internships, related to their major, either in Italy or abroad. According to AlmaLaurea (2019), 131,000 Italian students took part in an internship in 2019 while enrolled in either their undergraduate or graduate studies. However, no information is given about the percentage of full-time versus part-time internships, or international versus domestic ones.

A portion of the target population was sampled among students who voluntarily applied to the consulting company's selection process. The selection process was aimed at identifying a sub sample of 100 students who would then be invited to attend the previously mentioned three-day talent program in the multinational consulting company's headquarters in Milan. For the purpose of this research all the students who voluntarily decided to participate to the selection process of the consulting company's talent management program were considered, as far as they had both completed the game-based assessment and submitted their resume (414 for 2017, 442 for 2018 and 459 for 2019 for a total of 1315 students, see Table5.1).

Students were sampled separately from 2017 to 2019, therefore representing three sample groups. Every participant gave written informed consent to participate and anonymity was guaranteed before data analysis. The students were consecutively selected, and therefore this sample can be defined as a nonprobability (non-random) sample. Consecutive sampling involves including into the sample all available units satisfying the inclusion criteria until the desired sample size is obtained. Consecutive sampling is sometimes considered the best type of nonprobability selection procedure in controlling sampling bias because it seeks to include all accessible subjects. The risk of over-similarity that can typify consecutive sampling, was solved by extending the digital game-based assessment to 30 academic institutions spread over the whole Italian territory. However, the sampling-based on free participation may not necessarily be representative of the whole population because the included subjects might have a strong interest in the main topic of the project.

The sample was limited to Italian students for two main reasons. First, having students coming from the same country results in a homogeneous group, which can be important in exploratory research. Second, while, as presented in Sections 2.3 and 2.4, there is a robust literature on the effect of both international experience on employability and internships on employability, none provides an analysis trying to isolate the international effect from the experiential learning of an internship.

The sample size calculation was based on the hypothesis that the scores of the game-based tools are interrelated and therefore can be represented through a more compact set of factors that are independent of each other and are not directly observable. Exploratory factor analysis was applied to reduce a large number of predictive starting scores and highlight the possible underlying structure in the variables. The sample size for exploratory factor analysis is very important when constructing repeatable and reliable factors and, in this analysis, it represents the sample size limiting procedure. According to Costello and Osborne (2005), the most common guideline for the ratio of a sample size to the number of variables included (participant to item ratio) should be at least 10 to 1, but some research indicates a minimum ratio of 5 to 1. This means that, for the 33 observed variables in this study, at least 330 subjects are needed for producing reliable results.

Table 4.4 summarizes the steps performed during the sampling selection process.

Table 4.4
Characteristics of the sampling selection process

Component of the sampling process	
Inclusion criteria	- Adults (age ≥ 18 years); - Undergraduate or graduate Italian students doing or not internship related to their major, either in Italy or abroad.
Exclusion criteria	- Not Italian citizenship; - No available information about internships related to the major.
Sampling frame	a) Students voluntarily participating in a three-day talent program in the company's HQ in Milan.
Sampling strategy	b) Consecutive.
Sample size	c) At least 330 subjects.

4.7 Ethical Issues

Research in social sciences usually involves a certain degree of ethical issues, given that the data is usually collected from or about people (Punch, 1998). When this study was planned and the research proposal accepted, the permission for the treatment of personal data of students was requested from both the consulting company alongside which I worked when collecting the data and from the Ethics Committee of Universita' Cattolica del Sacro Cuore (UCSC).

All participants of the multinational consulting company's project gave written informed consent to participate. I signed a Data Protection Agreement compliant with the EU GDPR standards. The General Data Protection Regulation (EU) 2016/679 (GDPR) is a regulation in EU law on data protection and privacy in the European Union (EU). Anonymity was guaranteed before data analysis.

The research methods are quantitative and, although this is my professional field, I had no personal interaction with the students during the data collection. Resumes were received from the consulting company and the results of the digital game-based assessment were downloaded.

A proposal for this research involving human subjects was submitted to UCSC's Ethics Committee for approval on May 24th, 2018. Approval was granted on July 17th, 2018 to use the data collected from students for this doctoral research (Appendix C).

4.8 Data Collection Process and Input Files Generation

The data for this study was collected while working on a talent project with the HR staff of a multinational consulting company. The talent project was presented to target students through three main channels:

1. the HR staff visited every year in the period November through February over 30 Italian universities, equally distributed geographically over the whole Italian territory,
2. a website dedicated to collecting applications from candidates was created every year in November and advertised through social media among target students, and
3. word of mouth through the association created for the "alumni" who had participated in the previous editions of the talent program.

The data for the multinational's talent project were collected for three consecutive years: 2017, 2018, and 2019. The website dedicated to the collection of the talent project applications was activated every year in November (November 2016 for the sample referred to as 2017, November 2017 for the sample referred to as 2018 and November 2018 for the sample referred to as 2019). The call for applications ended by February 25th (February 25th, 2017 for the sample referred to as 2017, February 25th, 2018 for the sample referred to as 2018, and February 25th, 2019 for the sample referred to as 2019) after which the website was deactivated until the following year. The four-month period spanning each year from November through to February of the next year, were also the months during which the multinational company's HR staff traveled and visited the universities.

The students who decided to apply to the program were asked to submit a resume and to play an online digital game-based assessment. Each student had to register on the website created for the program, upload the resume and a motivation letter, and access the game-based assessment app through a given link and a given code. The code allowed the user to play only once to avoid re-play (Menezes & Bortolli, 2016).

Two excel raw data tables for each year were created. The first on students' demographics and past experiences, using information taken from the PDFs of the resumes uploaded by each student. The second excel file was created by downloading each year the game based-assessment data from the game developers' proprietary platforms, by using dedicated access credential made available through the confidentiality agreement with the company.

The first data table on students' demographics and past experiences was created using the information gathered from the resumes. This first excel file had data on gender, age, major and previous experiences for every student in the sample. The previous experiences have been divided into five categories and Table 4.5 explains the meaning of the terms used in the categorization of the experiences: domestic program-related internships, international program-related internships, study abroad, domestic casual internships, and international casual internships. Each of these experiences was considered in a binary way and coded using '1' for "yes, experience done", and '0' for "no experience of the kind".

Table 4.5
Characteristics for categorization of past experiences

Experience Category	Characteristics
Domestic	Refers to internships done in the student's home country, in this case given that the sample is all Italian students, domestic refers to internships in Italy
International	Refers to a country that is not the student's native country, in this study all countries different from Italy
Program-Related Internship	Refers to an internship that is related to the field of study (major) (Zuo, Weng, & Xie, 2019)
Casual Work Experience	Refers to work experience not related to the field of study
Study Abroad	Refers to having studied for at least one term at an institution different from the one granting the academic degree, in a country which is not the student's native country

I alone created all the raw data tables from the single resumes for each year. This data collection from the resumes was done during April and May each year, 2017, 2018, and 2019. In January 2020, the resumes and the raw data tables were checked for a second time. I took both decisions to guarantee coherence in how the experiences were classified throughout the research.

For each internship, the information provided by the resumes was related to the country where the internship took place, the company/institution, the year, and the duration of the internship. A first analysis of the data involved the removal from the sample of students whose resumes provided incomplete internship information. No specific information was instead available about the kind of internships, whether full-time or part-time. Very strict classification criteria were therefore followed when inputting the data, to ensure that the same internship sorting criterion was used throughout the whole research over all the years covered by the study. This resulted in considering as relevant for the analysis only internships which lasted more than eight weeks. The criterion used to choose eight weeks as a minimum period to consider an internship significant is based on the Erasmus+ guidelines (European Commission, n.d.). These guidelines indicate a minimum of two months and a maximum of twelve months as period of traineeship abroad. The minimum period indicated by the guidelines has been chosen for the purpose of this research. Information on the kind of company where the students interned was used only to be able to understand whether the internship was to be considered as related to the student's major or if it was simply a casual work experience.

The second data table for each year was created by downloading the game based-assessment data from the game developers' proprietary platforms. The multinational company running the talent project gave me dedicated access credentials to the proprietary platforms for the sole purpose of this study.

Finally, for each year the two datasets, one with data taken from the resumes and the second with the game-based assessment, were then merged in one. While in the two separate datasets each student was still identified with her/his name, once the data was merged into a single file and ready to be processed, the names were substituted with codes to ensure total anonymity in the analysis.

4.9 Variables in the Study

This section describes which variables were gathered from the above-described sources and how they were interpreted and modeled into the conceptual research design. Variables are defined as the properties or characteristics of statistical units such as subjects, events, or objects.

An *independent variable* (IV) can be controlled by the researcher and whose variation is expected to be related to a positive or negative variation in a *dependent variable* (DV). A *dependent variable* (DV) is presumed to be influenced by one or more independent variables (Johnson & Christensen, 2008).

The independent variable (IV) is also known as the *predictor*, *input,* or *explanatory* variable. The main independent variables used in this study were the binary variables of whether a student has completed an international or a domestic internship. Using the form of a dichotomous variable, it allows the researcher to interpret the potential change in the DV when the IV is either present or absent (Babbie, 2001).

A *dependent variable* (DV) is presumed to be influenced by one or more independent variables (Johnson & Christensen, 2008). Also known as the *outcome* variable, the DV responds to the IV variations and the impact of these variations can be measured by the researcher. The dependent variable of interest in this study was employability, this variable is though measured by the scores of 30 predictors, in the case of *Knack* and the scores of 33 predictors, in the case of *Arctic Shores*.

Further variables can be involved when a phenomenon is being investigated. They can cover different hypothetical roles based on the relationship with the main predictor and the outcome and the direction of the produced effect. Figure 4.3 illustrates the role of each variable potentially involved in a phenomenon. The Predictor is the main independent variable that it is supposed to be causally associated with the outcome; the outcome is the dependent variable under study; the control variables are those that can be associated with predictor and/or outcome and result in a non-causal association between predictor and outcome. The control variables in this research are gender, age, major, study abroad, and casual work experience (domestic or international). These variables were included since previous research (D. Jackson & Chapman, 2012b; Seibert, Crant, & Kraimer, 1999) has demonstrated variation in employability in terms of gender and age, as well as participation in international and domestic extra-curricular work experiences (Camp, 1990; Jaaffar, 2016; D. Jackson, 2015; Lau, Hsu, Acosta, & Hsu, 2014), major (Janson et al., 2009; Wiers-Jenssen, Tillman, & Matherly, 2020) and study abroad (Farrugia & Sanger, 2017; D. Potts, 2019). The resumes contained information on academic performance for only a minority of students, therefore this variable could not be included in the study.

Table 4.6 includes a list of every variable collected, how they were used in the analysis, and their potential role.

Figure 4.3
Schematic illustration of the variables' role in an investigated phenomenon

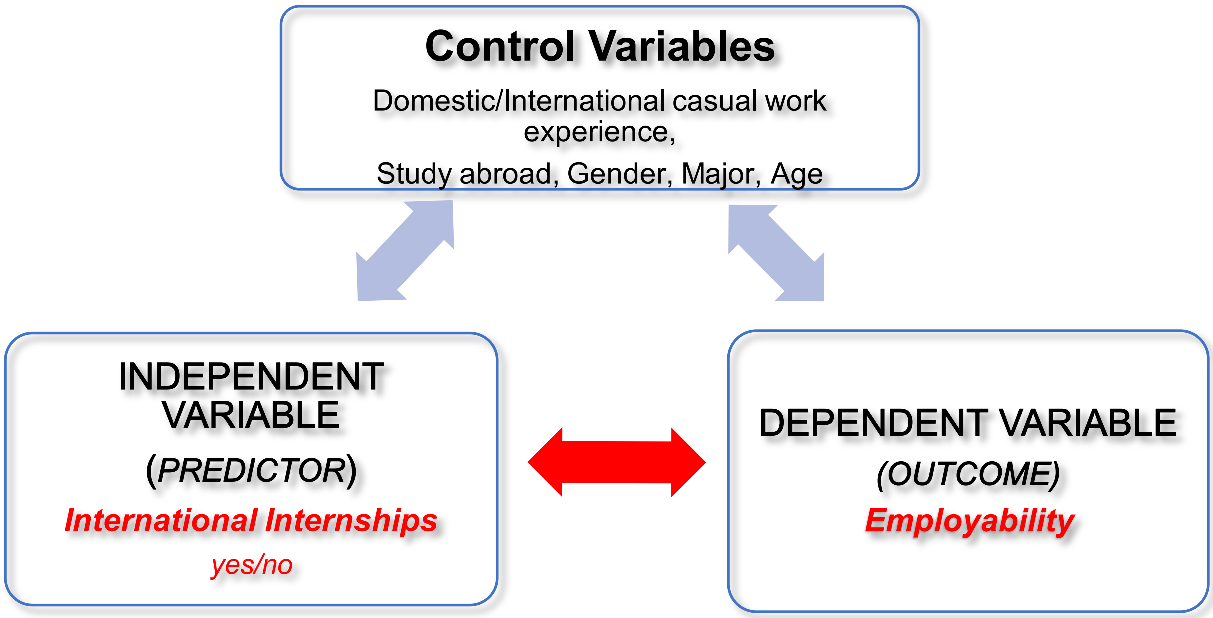


Table 4.6
Hypothetical role of every variable included in this study

Variable	**Role**	**Nature**
Program-related international internship	Independent IV *or* Predictor	Categorical coded as "yes" or "no"
Program-related domestic internship	Independent IV *or* Predictor	Categorical coded as "yes" or "no"
Domestic casual work	Control	Categorical coded as "yes" or "no"
International casual work	Control	Categorical coded as "yes" or "no"
Study abroad	Control	Categorical coded as "yes" or "no"
Gender	Control	Categorical coded as "female" or "male"
Major	Control	Categorical coded as "engineering," "social-humanistic" or "health-scientific"
Year of birth	Control	Continuous (numerical)
Employability	Dependent DV *or* Outcome	Continuous (numerical score)

4.10 Statistical Analysis

The statistical analysis included the following steps:

(a) describe the sample from a socio-demographic point of view;

(b) summarize and compare the gaming scores by grouping the sample based on the previous program-related experiences;

(c) reduce the gaming scores to few composite scores to represent employability through meaningful factors and simplify the complexity of the analysis;

(d) assess the effect of the international and/or domestic program-related experiences on employability adjusting for other relevant socio-demographic factors and control variables. Descriptive and inferential statistics were applied in steps (a) and (b), exploratory factor analysis was performed in step (c), and stepwise linear regression modeling in step (d).

R statistical program for Windows v. 3.6.1 was used to manage the raw data and to perform the quantitative analyses.

4.10.i Preliminary Data Analysis: Descriptive and Inferential Statistics

Descriptive statistics were used to get a first understanding of the data and be able to start making comparisons between groups. Means and standard deviations in case of normal distributions and or medians and quartiles in case non-normal distribution of the data were calculated. Absolute frequencies and percentages were used to describe categorical variables.

Descriptive statistics were used on the data before inferential statistics. If the data follows a normal distribution, then a certain kind of inferential statistics is used; if instead the data follows a non-normal distribution a different approach to the inferential analysis is required.

The second step in the analysis is to move on from descriptive statistics and start to try and make inferences from the data to more general considerations. Further tests are then performed on the data.

In the case of two groups, mean differences in continuous variables were analyzed by the unpaired two-samples t-test or the non-parametric Mann-Whitney U test (Mann & Whitney, 1947) when the data were not normally distributed. One-way analysis of variance (ANOVA) or Kruskal-Wallis non-parametric test (Kruskal & Wallis, 1952) was performed to compare the means of more than two groups. Assumptions of independence, normality, and equal variance of both t-test and ANOVA were verified, to make sure that the tests performed were appropriate. Association between categorical variables were assessed by Chi-squared or Fisher's exact tests (Fisher, 1922) when appropriate.

P-values of less than .05 were considered statistically significant. Statistical analysis of a data set typically involves testing not just a single hypothesis, but rather many. For any test, a pre-set probability α of a type-1 error may be assigned (i.e., a false positive, rejecting the null hypothesis when in fact it is true). The problem is that using a value of $\alpha = .05$ means that roughly one out of every twenty such tests will show a false positive (rejecting the null hypothesis when in fact it is true). Thus, if an analysis involves performing 100 tests, it can be expected that 5 is declared as significant if a value of $\alpha = .05$ is used for each. This is the problem of multiple comparisons, in that the false positive rate needs to be controlled, not just for any single test but also for the entire collection (or family) of tests that make up the experiment (Bender & Lange, 2001).

A different set of techniques have been developed to control multiple testing. In this study, when multiple hypotheses were tested, Bonferroni's multiplicity adjustment (Bland & Altman, 1995) was used to avoid false-positive results. Bonferroni corrections are the standard approach for controlling the analysis-wide false positive value (π) by specifying what α values should be used for each test (i.e., we declare a test to be significant if $p \cdot \alpha$). The probability of not making any type I (false positive) errors in *an* independent test, for each level α, is: $(1 - \alpha)^n$.

Hence, the probability of at least one false positive is just one minus this (1a),

$$\pi = 1 - (1 - \alpha)^n$$

If an experiment-wide false positive rate of π is required (i.e., the probability of one, or more, false positives over the entire set of tests is π), solving for the α value required for each test is (1b)

$$\alpha = 1 - (1 - \pi)^{1/n}$$

This is often called the Dunn-Sìdak method. Noting that

$$(1 - \alpha)^n \simeq 1 - n\alpha,$$

we obtain the Bonferroni method, taking (1c)

$$\alpha = \pi / n$$

Both Equations 1b and 1c are often referred to as Bonferroni corrections. In the literature, π is occasionally referred to as the family-wide error rate (FWER), while α is denoted as the comparison-wise error rate, or CWER.

To summarize, the more shots at a target, the higher the chance of hitting it or in other words, the more a researcher looks at the data, the more statistically significant results will be found even if the characteristic of interest in the target group yields results no different from the control group. The commonly applied Bonferroni's correction declares any comparison significant if its *p*-value is less than .05 divided by the number of tested hypotheses.

4.10.ii Exploratory Factor Analysis

Factor analysis is a data reduction technique. It is a multivariate procedure to identify interrelationships that exist among variables. The factorial analysis is used to represent a set of variables through a more compact set of new ones independent of each other.

Each factor will be made up of groups of variables related to each other, and ideally independent of other sets of variables represented in the other factors. It can be used for exploratory or confirmatory purposes. As an exploratory procedure, factor analysis is used to search for a possible underlying structure in the variables (Yong & Pearce, 2013).

The conditions for EFA application are (a) availability of data on which it is possible to calculate the correlation coefficients r; (b) ratio of about 5 subjects per observed variable (40 variables, at least 200 subjects) and in any case never less than 100; (c) linear relationships between the variables; (d) theoretical knowledge of the investigation domain; (e) the number of variables considered should not be less than 3-5 for each of the constructs expected to be obtained.

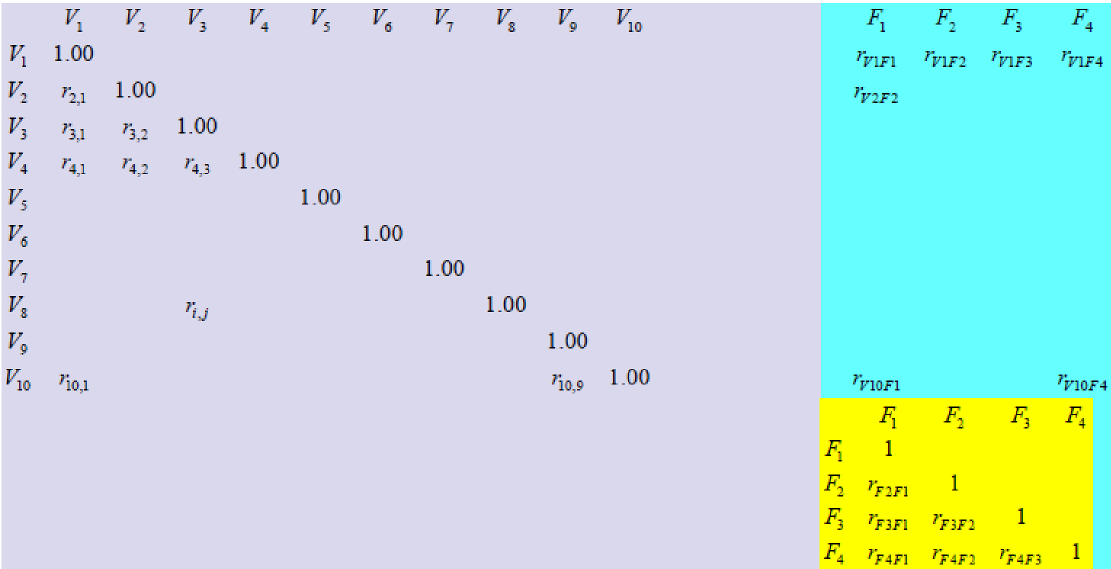
Exploratory factor analysis evaluates the variance shared among the measured variables (common variance) if the correlation between the items descends from some dimensions (factors) that are not directly observable.

Communality is defined as the total variance minus the unique variance ($1 - U^2$) or the part of total variance that is explained by common factors (derived from correlations between variables). The communality is the proportion of each variable's variance that can be explained by the factor. It is used to help determine the reliability of the factor structure. It usually ranges between 0 and 1 and values closer to 1 suggest that extracted factors explain more of the variance of an individual item. However, sometimes communality estimates may exceed the value of 1 and it is commonly referred to as a "Heywood case". In general, it may result because (a) not enough data were sampled from the population to provide stable parameter estimates;

(b) too many factors were extracted in the factor solution; (c) too few factors were extracted in the factor solution; (d) the initial communality estimates are not appropriate; (e) in the studied population, a corresponding variance or correlation parameter is very small or very close to 1 (or -1), respectively, and (f) an FA model is not appropriate for the observed data considered.

The EFA starts with the analysis of the matrix of correlations (R) among the measured variables and produces a final matrix that includes the correlation coefficients between the variables and the latent factors (saturated matrix). The square of the correlation coefficient (R^2) indicates the proportion of variance that is explained by the related factor.

Figure 4.4
Graphic representation of the process for identifying latent factors



Note. The process starts from the correlation matrix of the observed variables and produces a final correlation matrix between variables and factors, and a correlation matrix between factors.

In terms of equations, the relationship between the correlation matrix, $\Sigma = Y'Y$ and the common factor model becomes

$$\Sigma = \Lambda\Psi\Lambda' + \Theta$$

where Σ is a p x p correlation (or covariance) matrix of the observed variables, Λ is a p x q matrix of factor loadings, Ψ is a q x q covariance matrix of the latent factor variables, and Θ is a diagonal matrix of unique factor variances.

The steps conducted in a factor analysis for this study include: (a) generation of the correlation matrix; (b) partition of variance into common and unique components (unique may include random error variable); (c) extraction of initial factor solution; (d) rotation and interpretation; (d) construction of scales or factor scores to use in further analysis.

The variances of the factors are identified through purely mathematical processes according to two rules: maximizing the explained variance and extracting the independent variances (unrelated factors). Then, the factors are rotated. The rotation leads every single variable to be correlated only with one factor and little or nothing with all the others. The rotation allows us to simplify the structure or to obtain few but strong saturation and to remove variables that are saturated by more than one factor.

Since the principal axis factoring method was used to extract factors, the assumption of multivariate normality does not apply. The factorability and multicollinearity assumptions were tested by examining the correlation matrix. To assess the factorability of the data, Pearson correlations were calculated to determine the intercorrelations for each variable. According to Tabachnick and Fidell (2014), correlation coefficients should exceed .30 to justify comprising the data into factors. Although variables should be intercorrelated with one another, variables that are too highly correlated can cause problems in the EFA. To assess multicollinearity, the determinant of the correlation matrix was calculated. A determinant that is ≤ .00001 indicates that multicollinearity exists in the data (Field, 2009).

Parallel analysis was chosen for electing how many factors to retain. For this selection method, uncorrelated normal variables are randomly generated that parallel the data in the number of variables and sample size. Next, the observed eigenvalues are extracted from the correlation matrix with the diagonal of the matrix being replaced by each variable's squared multiple correlations (Ledesma & Valero- Mora, 2007; Montanelli & Humphreys, 1976) to estimate each variable's communality (Distefano, Zhu, & Mîndrilă, 2009; Stewart & Ware, 1992). These observed eigenvalues are then compared to the eigenvalues of the randomly generated variables. Factors are retained if the i^{th} eigenvalue from the actual data is greater than the i^{th} eigenvalue from the random data.

According to Costello and Osborne (2005), examining the communality of each variable, checking for cross-loadings across multiple factors, and inspecting the number of strong loadings for each factor are good ways to analyze the validity of the factor structure. Crossloadings occur when there are loadings (> .32) for a single variable across multiple factors. Costello and Osborne (2005) suggest dropping variables with low communality, cross-loadings, and any variable that is the only significant loading on a factor that may prevent a weak factor structure and alleviate these problems.

The root means square of residuals (RMSR) should be closer to 0. Next, the root mean square error of approximation (MSEA) index in case of good model fit is below 0.05. Finally, the Tucker-Lewis Index (TLI) is an acceptable value when it is over 0.9.

Cronbach's alpha coefficients were evaluated to assess factor's reliability. The guidelines suggested by (George & Mallery, 2016) where > .9 represents excellent, > .8 good, > .7 acceptable, > .6 questionable, > .5 poor, and ≤ .5 unacceptable reliability.

4.10.iii Multiple Regression Analyses

According to Jones (2010) in the social sciences, research typically investigates "cause and effect" relations that are neither necessary (the outcome occurs only if the causal factor has operated) nor sufficient (the action of a factor always produces the outcome). Moreover, inherent variation or "noise" may swamp the "signal" and we need quantitative techniques to uncover the underlying patterns to produce credible evidence of a relation. Statistical modeling provides the following:

1. a quantitative assessment of the size of the effect,
2. a quantitative assessment after taking account of other variables; this conditioning on other variables distinguishes modeling from "testing for differences," and
3. a measure of uncertainty for the size of the effect.

We can use regression modeling in several modes: as a description (what is the average salary for different ethnic groups?), as part of causal inferences (does being black result in a lower salary?), and in predictive mode ("what happens if" questions). The last can be very difficult to achieve, because change may be so systemic that the underlying relations themselves are altered, and past empirical regularities captured by the modeling no longer hold in a period of regime change (Lucas, 1976).

Stepwise linear regression analysis was used for explaining or modeling the relationship between a single variable Y, called the *response*, *output* or *dependent* variable, and one or more *predictor*, *input*, *independent* or *explanatory* variables, $X_1, X_2, ..., X_p$. When $p = 1$, a simple regression is used but when $p > 1$, multiple regression is used. The regression model Y is defined as a function of X and b with e representing the random statistical noise or the part of the response variability that cannot be explained by the predictors:

$$Y = f(X, b) + e$$

The unstandardized beta (b) describes the increase or decrease of the independent variables with the dependent variable. The residual (e) is the difference between the observed value of the dependent variable (y) and the value ($\hat{y}$) predicted through the model.

The R^2 statistic (coefficient of determination or percentage of variance explained) is used to assess how well the regression predicted the dependent variable as it tells how much variance in the dependent variable is explained by the predictor variables. The range is $0 \leq R^2 \leq 1$, with values closer to 1 indicating better fits. For simple linear regression $R^2 = r^2$ where r is the correlation between x and y.

Regression models need to meet many assumptions for the model to be accurate. Therefore, each model that was run in this analysis was assessed for normality, homoscedasticity, independence of residuals, multicollinearity, and tested for the presence of outliers. Below each will be discussed in turn.

Normality refers to the residual's distribution. the residuals should follow a bell-shaped curve and the assumption is met when the q-q plot has the points distributed approximately on the normality line. A q-q plot is a scatterplot that compares the distribution of the residuals with a normal distribution (a theoretical distribution that follows a bell curve).

Homoscedasticity pertains to equals variance of residuals: the assumption is met when the residuals plot has the points randomly distributed (with no pattern), and the distribution line is approximately straight.

Multicollinearity results from two independent variables that are highly correlated. When multicollinearity is present the regression coefficient might become insignificant because of the large size of standard errors. Variance inflation factor (VIF) is a measure of the correlation between two predictors and multicollinearity is suspected for values greater than 10.

Outliers are defined as a data point that is abnormally distant from a set of observations. As multiple regression is very sensitive to outliers, the studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2009; J. P. Stevens, 2009). Studentized residuals are calculated by dividing the model residuals by the estimated residual standard deviation.

Variable selection is intended to select the "best" subset of predictors. In detail:

1. To explain the data in the simplest way redundant predictors should be removed. The principle of Occam's Razor (Thorburn, 1915, 1918) states that among several plausible explanations for a phenomenon, the simplest is best. Applied to regression analysis, this implies that the smallest model that fits the data is best.
2. Unnecessary predictors will add noise to the estimation of other quantities that we are interested in. Degrees of freedom will be wasted.
3. Collinearity is caused by having too many variables trying to do the same job.

4. Cost – if the model is to be used for prediction, we can save time and/or money by not measuring redundant predictors.

The evaluation of the control variables included in a model can follow automatic procedures. In this study, backward selection was used. This is the simplest of all variable selection procedures and can be easily implemented without special software. In situations where there is a complex hierarchy, backward elimination can be run manually while taking account of what variables are eligible for removal. This technique involves starting with all candidate covariates, testing the deletion of each variable using a certain model fit criterion, and repeating this process until no further variables can be deleted without a statistically insignificant loss of fit. Criteria for comparing various candidate subsets are based on the lack of fit of a model and its complexity. The most common criterion that is useful in multiple linear regression and many other problems where the model comparison is at issue is the Akaike Information Criterion or AIC (Sakamoto, Ishiguro, & Kitagawa, 1986). Small values of AIC are preferred, so better candidate sets will have a smaller amount of variance that is not explained by the regression model and a smaller number of covariates.

On the other hand, the confounding effect was investigated without the use of statistical testing. The procedure involves determining whether the estimated effect of the main predictor meaningfully changes (e.g., by more than 10%) when potential control variables are dropped from the model. Removing non-control variables should lead to a gain in precision from examining confidence intervals.

Figure 4.5 illustrates how the collected variables will be modeled to assess whether international internships affect students' employability and to investigate the role of additional and concomitant factors such as demographic or educational features.

Figure 4.5
The model used in this study to assess the relationship between employability and program-related experiences considering additional socio-demographic factors

4.11 Summary

This chapter has presented the methodology used for the research. The research question and the purpose of this study were re-stated. This was followed by a detailed explanation of how the data was collected and stored, followed by further information on the employability assessments tools used in the study. The two different assessment tools used were explained. In each case, details about how the data is collected through the gameplay were given. Figures showing the visual interface the students are met with when playing the game supported discussion of the methodology. Lists of behavior predictors generated by the assessments and used to measure employability clarified the nature of skills and behaviors being studied. Finally, the statistical methods used to analyze the quantitative data were explained.

In the next chapter the outputs generated using these statistical methods are presented, along with the results of the analysis.

Chapter 5 : Results

5.1 Introduction

This research covers three years, 2017, 2018 and 2019. To be able to retrieve the information needed to answer the research question the first step was to analyze the data and the characteristics of students in the datasets.

As described in Chapter 4, the study has only one predictor/independent variable: if the student has or has not done an international internship. The dependent variables, used to assess the level of employability of the students, are the more than 30 predictors of behaviors obtained through the digital game-based assessments used to measure employability.

To improve the quality of the analysis, several control variables were added. In social sciences research it can be very difficult to isolate the effects of one single variable on human behavior (Wilson, 1997). Yet that is exactly what this study is trying to do, it seeks to isolate the effect of having done an international internship on the behaviors that predict employability. Adding control variables and analyzing the combined effect of the IV and these control variables on the DV, was an attempt to better understand the potential influence of these other factors (age, gender, major, study abroad, casual work experience) on the DV, employability.

This chapter therefore presents the steps in data analysis before moving on to the test and models applied to the data to get the results that would allow for the answering the research question.

Section 5.2 presents the descriptive statistics of the demographic variables, followed by the inferential procedures as well as the reliabilities of any composite scores (Sections 5.3, 5.4, and 5.5). The analyses presented in this chapter focus on addressing the research question by performing the statistical methods presented in Chapter 4. The relevant statistical outputs are summarized using tables and figures. The results of the statistical analysis are presented separately for each year covered by the study. The last Section of this chapter (5.6) displays a summary of the most important results.

Appendices A1., A.2, and A.3 lay out the study's data, analyses, and results in detail for year 2019 only. Including the data from 2019 in the appendices should allow the reader to understand exactly the process followed in analyzing the data and to make this research replicable. Given the purpose of the appendices, adding the same information for years 2017 and 2018 would have been redundant.

The statistical terms used in this chapter are defined in Appendix B.

5.2 Datasets and Cohort Characteristics

The main characteristics of the three analyzed datasets are summarized in Table 5.1. More than 400 students per year were part of the analysis. Between November 2017 - February 2018 employability was assessed using the *Knack* digital game-based tool while between November 2017/2018 - February 2018/2019, employability was assessed using the *Arctic Shores* digital game-based tool. These tools were used in agreement with the consulting company which supported this study by providing a range of data (see Section 4.5). Two different tools, *Knack* and *Arctic Shores,* were chosen because they are the tools most frequently used by recruiters in industry. Both tools measure employability predictive behaviors and both have performed very positively on validity and reliability tests (Gray et al., 2016; Or et al., 2019) and these tools were chosen for this research for the same reason. Both *Knack* and *Arctic Shores* have been tested and found reliable, but their predictive power is not questioned or investigated in this study.

Digital game-based analytics is a very innovative methodology for assessing employability predictive behaviors. While it is now frequently used by corporate recruiters when hiring, there is still no significant academic research in higher education involving the use of these assessments. Not wanting to base the analysis on the use of only one such tool, it was therefore a conscious decision to use both tools developed by the two major competitors in the market, to try and prevent possible bias related with the use of one game versus another. Based on the findings (see Chapter 6), now ex post, this seems to have been a wise choice as the results are consistent over the three years of analysis, despite the assessment tools being different.

Table 5.1

Characteristics of the data included in the datasets per each year (November-February 2016/2017, 2017/2018, 2018/2019)

Characteristic	**2017**	**2018**	**2019**
Sample size	414	442	459
Digital game-based tool	Knack	Arctic Shores	Arctic Shores
Descriptors	33	30	30
Scale	1 to 100	1 to 10	1 to 10

Tables 5.2, 5.3, and 5.4 show, per year of data collection, the main student socio-demographic characteristics and relevant domestic or international experiences. The data shown here was collected from the resumes of the students.

Overall, the number of participants over the three years was comparable. Social Sciences / Humanities were the most frequent major studied by the students in the sample (67.6% in 2017, 75.6% in 2018 and 76.0% in 2019) while Health / Science were the least frequent majors (2,7% in 2017, 2.5% in 2018 and to 2.4% in 2019), respectively.

Gender distribution slightly differed among the years with a female to male ratio of 1:2 in 2017 compared to 2018 and 2019 where the ratio was 1:1 ($\chi^2 = 10.202$, $df = 2$, $p = .006$).

In 2018 and 2019, the prevalence of engineering majors in the total cohort was lower (21.6% and 21.9%, respectively) than in 2017 (29.7%) ($\chi^2 = 9.791$, $df = 4$, $p = .008$). The number of students who studied abroad was higher in 2018 and 2019 (93.9% and 71.7%, respectively) than in 2017 (59.4%) ($\chi^2 = 141.45$, $df = 2$, $p < .0001$). Also, the number of students who had an international program-related internship was higher in 2018 and 2019 (40.0% and 40.5%, respectively) than in 2017 (22.7%) ($\chi^2 = 38.699$, $df = 4$, $p < .0001$). To correctly assess the relationship between program -related internship and experiential learning, the variables *gender*, *major*, *studying abroad,* and *casual work* were investigated as potential control variables. Most of the students in the datasets had more than one experience. The importance of considering the control variables is linked precisely to the need to try and isolate the impact of an international internship from those of other experiences or demographic/personal characteristics.

Table 5.2
Socio-demographic features of students enrolled in November-February 2016/2017, stratified by gender

Variable	Females ($N = 151$)	Males ($N = 263$)	All sample ($N = 414$)
Education, *%(N)*			
Major, area			
Engineering	29.8% (45)	29.7% (78)	29.7% (123)
Health and Science	1.3% (2)	3.0% (8)	2.7% (10)
Social Sciences and Humanities	68.9% (104)	67.3% (177)	67.6% (281)

Study abroad, *yes %(N)*	55.6% (84)	61.6% (162)	59.4% (246)
Previous experience			
Program-related Internship, *%(N)*			
International Internship only	8.0% (12)	5.3% (14)	6.3% (26)
Domestic Internship only	73.5% (111)	79.5% (209)	77.3% (320)
International and Domestic	18.5% (28)	15.2% (40)	16.4% (68)
Casual work, *%(N)*			
International only	1.3% (2)	4.2% (11)	2.9% (13)
Domestic only	38.4% (58)	22.8% (60)	28.2% (118)
International and Domestic	3.3% (5)	3.0% (8)	3.4% (13)
No casual work	57.0% (86)	70.0% (184)	65.5% (270)

Note. These students used the *Knack* digital game-based tool.

Table 5.3
Socio-demographic features of students enrolled in November-February 2017/2018, stratified by gender

Variable	Females (N = 201)	Males (N = 241)	All sample (N = 442)
Education, *%(N)*			
Major, area			
Engineering	15.9% (32)	27.0% (65)	21.9% (97)
Health and Scientific	2.0% (4)	2.9% (7)	2.5% (11)
Social Sciences and Humanities	82.1% (165)	70.1% (169)	75.6% (334)
Study abroad, *yes %(N)*	93.0% (187)	94.6% (228)	93.9% (415)
Previous experience			
Program-related Internship, *%(N)*			
International Internship only	1.5% (3)	3.3% (8)	2.5% (11)
Domestic Internship only	59.2% (119)	60.6% (146)	60.0% (265)
International and Domestic	39.3% (79)	36.1% (87)	37.5% (166)
Casual work, *%(N)*			
International only	3.5% (7)	4.2% (10)	38.5% (17)
Domestic only	51.2% (103)	39.4% (95)	44.8% (198)

International and Domestic	4.5% (9)	5.0% (12)	4.8% (21)
No casual work	44.8% (90)	48.1% (116)	46.6% (206)

Note. These students used the *Arctic Shores* digital game-based tool.

Table 5.4
Socio-demographic features of students enrolled in November-February 2018/2019, stratified by gender

Variable	Females ($N = 212$)	Males ($N = 247$)	All sample ($N = 459$)
Education, *%(N)*			
Major, area			
Engineering	22.1% (47)	21.1% (52)	21.6% (99)
Health and Scientific	2.4% (5)	2.4% (6)	2.4% (11)
Social Sciences and Humanities	75.5% (160)	76.5% (189)	76.0% (349)
Study abroad, *yes %(N)*	70.8% (150)	72.5% (179)	71.7% (329)
Previous experience			
Program-related Internship, *%(N)*			
International Internship only	4.7% (10)	5.3% (13)	5.0% (23)
Domestic Internship only	66.0% (140)	53.8% (133)	59.5% (273)
International and Domestic	29.3% (62)	40.9% (101)	35.5% (163)
Casual work, *%(N)*			
International only	4.7% (10)	6.1% (15)	5.5% (25)
Domestic only	26.4% (56)	23.1% (57)	24.6% (113)
International and Domestic	5.2% (11)	2.4% (6)	3.7% (17)
No casual work	63.7% (135)	68.4% (169)	66.2% (304)

Note. These students used the *Arctic Shores* digital game-based tool.

5.3 Analysis of the 2017 Dataset

5.3.i Score Distribution using the Knack Digital Game-Based Tool

As noted in Section 4.7, in the methodology Chapter 4, the first phase of the analysis was to explore the relationships among the variables. This was a useful first step, i.e., to build the regression model aimed at assessing whether there is a difference between the scores for those who had completed an international internship compared with a domestic internship. This could then lead to an analysis of resulting behavior in terms of graduate employability measured through any of the *Knack* scores. This would then feed into the next stage of analysis in seeking to establish whether additional skills and behaviors would be associated with an international internship, compared to one which took place in a domestic setting.

Only students with, as a minimum, domestic internship experience or both domestic and international internships were considered. The values of the *Knack* scores were estimated and compared between two groups (Table 5.5): (a) students who undertook both program-related international and domestic internships, and (b) students who exclusively completed a program-related domestic internship. The median *Knack* score for the 68 students with both an international and a domestic program-related internships was 72 (*Knack* scores can vary from 0 to 100) with the first and third quartile scores respectively 59.3 and 82. The median *Knack* score for the 320 students with only a domestic internship was 68.5 with the first and third quartile scores respectively 54 and 81.3 This difference in median is though not significant.

Given the multiple comparisons required by this analysis it was necessary to use a technique developed to control multiple testing. Bonferroni's multiplicity adjustment (Bland & Altman, 1995) was used to avoid false-positive results. Bonferroni multiplicity adjustment defines statistical significance as $p < .0015$ (= .05/34), where the denominator, 34 is number of tested hypotheses. 34 tested hypotheses are referred to the 33 *Knack* predictors plus the average *Knack* score. All the p values are above .0015 therefore no statistically significant differences in scores emerged among the students based on their experiences for none of the predictors.

Table 5.5
Scores of Knack *tool stratified by program-related internship*

Variable	Program-related Int. and Dom. Internship ($N = 68$)	Program-related Dom. Internship only ($N = 320$)	*p*
Knack score	72.0 [59.3; 82.0]	68.5 [54.0; 81.3]	0.204
Engagement			
Diligence	60.5 [41.5; 75.8]	63.0 [44.0; 77.0]	0.654
Tenacity	55.0 [35.0; 69.8]	53.0 [38.0; 71.0]	0.803
Self-control	32.0 [14.0; 59.0]	43.0 [16.8; 66.0]	0.104
Open mindedness	43.5 [26.0; 62.8]	39.0 [20.0; 64.0]	0.733
Managing ambiguity	42.5 [30.0; 59.8]	43.5 [28.8; 60.3]	0.971

Problem solving	67.0 [52.3; 84.8]	65.0 [50.8; 79.3]	0.235
Attention to detail	58.0 [40.0; 69.0]	57.0 [42.0; 72.0]	0.674
Action orientation	60.0 [43.5; 81.0]	63.0 [41.8; 79.0]	0.744
Planning execution	71.0 [57.0; 82.0]	73.0 [55.0; 85.0]	0.800
Impact			
Leadership	63.5 [48.5; 77.8]	62.0 [46.8; 79.0]	0.785
Drive	61.5 [39.3; 76.0]	60.5 [40.0; 77.3]	0.890
Self confidence	61.5 [45.0; 73.3]	55.0 [43.0; 72.0]	0.321
Taking ownership	59.5 [43.0; 74.0]	59.0 [45.0; 74.0]	0.751
Leadership initiative	59.0 [43.0; 74.8]	58.0 [42.0; 74.0]	0.855
Inspirational leadership	48.0 [28.0; 65.8]	44.0 [28.0; 62.0]	0.471
Consensus building	40.5 [21.5; 66.0]	43.0 [18.0; 68.5]	0.888
Executive presence	61.5 [52.3; 72.8]	63.0 [48.0; 75.0]	0.970
Grit	49.0 [32.0; 71.5]	47.0 [32.8; 67.0]	0.723
Learning			
Learning agility	59.0 [46.3; 70.8]	55.0 [40.0; 70.0]	0.061
Quick thinking	71.5 [54.5; 85.0]	62.0 [44.0; 81.0]	0.011
Growth mindset	61.0 [47.0; 76.0]	66.0 [47.0; 82.0]	0.271
Coachability	45.0 [30.3; 59.8]	42.0 [25.0; 57.0]	0.438
Intellectual curiosity	52.0 [33.3; 65.8]	46.5 [26.0; 69.0]	0.493
Data fluency	72.0 [61.3; 86.0]	69.0 [55.0; 84.0]	0.045
Relationship			
Social intelligence	62.5 [44.0; 72.0]	63.0 [49.0; 75.0]	0.175
Teamwork	69.0 [54.3; 80.0]	71.0 [55.0; 84.0]	0.293
Customer focus	67.5 [55.0; 75.0]	65.0 [50.0; 79.0]	0.738
Thinking			
Logical reasoning	69.5 [52.0; 83.0]	69.0 [53.8; 80.0]	0.680
Number	71.0 [54.0; 87.0]	66.0 [47.0; 82.0]	0.031
Creative problem solving	62.0 [44.0; 79.0]	56.0 [40.0; 74.0]	0.067
Creative insight	65.5 [38.3; 78.5]	51.5 [31.0; 75.0]	0.032
System thinking	60.5 [43.3; 81.8]	63.0 [46.0; 79.3]	0.709
Resourcefulness	63.5 [47.3; 76.8]	59.5 [44.0; 76.0]	0.421

Note. Values are median; first and third quartile in squared brackets. Bonferroni multiplicity adjustment defines statistical significance as $p < .0015$ (= .05/34).

5.3.ii Relationship Between Knack Score and the Distinctive Characteristics of the Students

The next step in the analysis was a regression analysis, to assess whether having done an international internship adds to the experiential learning of a domestic internship in terms of graduate employability measured through the *Knack* score. The effect of potential control variables such as international or domestic casual work, study abroad, gender, and age was also evaluated. Only the students with at least a domestic internship experience or both a domestic and international internship were included in the model. In the case of this regression analysis significance would be for p values below .05. The results were not significant, $F(7, 380) = 1.02$, $p = .417$, $R^2 = 0.02$, indicating that neither program-related international internship nor any of the other control variable had an additive impact on employability as measured by the *Knack*.

5.3.iii Multivariate Analysis

An exploratory factor analysis (EFA) was performed on the data. This analysis is used to represent a set of variables through a more compact set of new ones independent of each other. To clarify the latent relational structure among the *Knack* scores, "promax" rotation (Jackson, 2014) was used to further simplify the factors' structure.

Before running the EFA, a correlation analysis was performed to scan the correlation matrix and look for correlations. A correlation matrix is a table showing correlation coefficients between variables. Each cell in the table shows the correlation between two variables. A correlation matrix is used to summarize data, as an input into further advanced analysis. Typically, a correlation matrix is "square," with the same variables shown in the rows and columns. Figure 5.1 shows the correlation between the 33 *Knack* predictors. The line of 1.00s going from the top left to the bottom right is the main diagonal, which shows that each variable always perfectly correlates with itself. This matrix is symmetrical, with the same correlation as shown above the main diagonal being a mirror image of those below the main diagonal.

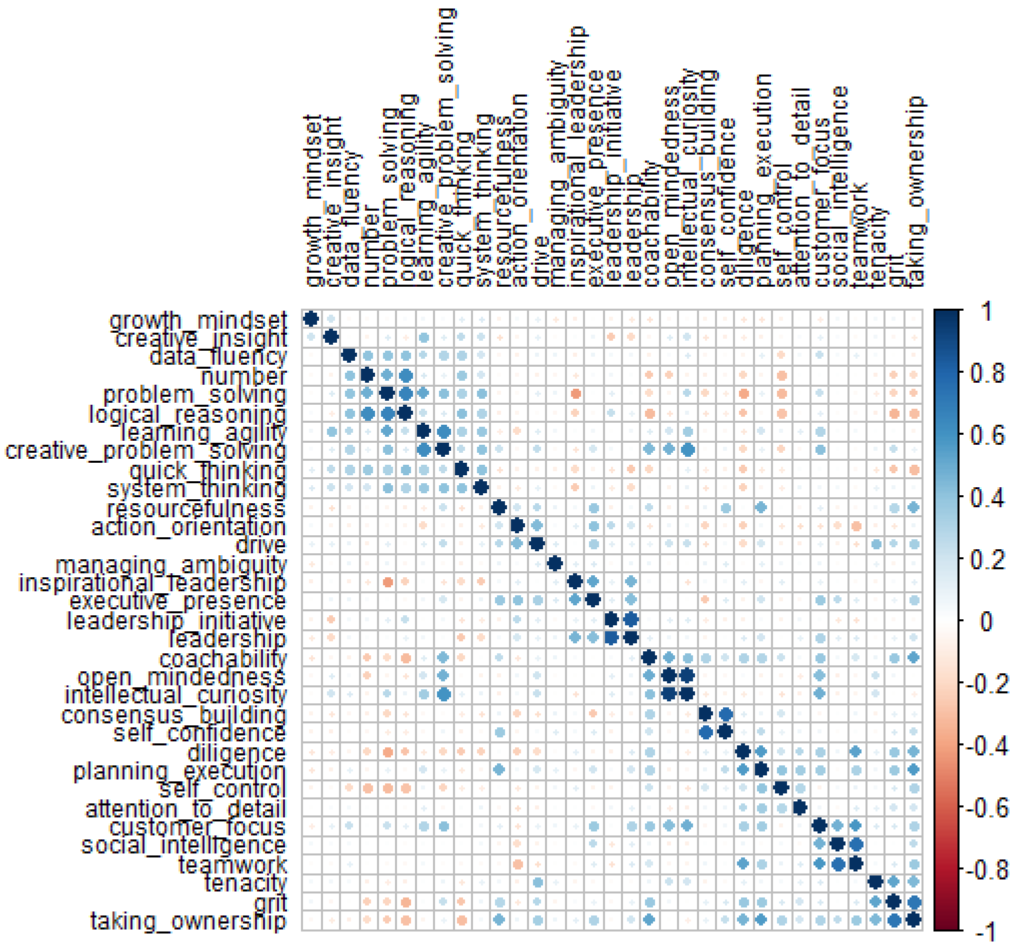
Figure 5.1clearly shows that most items have some correlation with others, meaning that they are connected. This implies that as one score varies, either up or down, the other score varies concurrently in the same direction (positive correlation in blue) or in the opposite direction (negative correlation in red). The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

Figure 5.1 also shows that there are some “clumps” of items that are positively correlated - evidence of some common factors. For instance, system thinking, quick thinking, creative problem solving, learning agility, logical reasoning, problem-solving, number, and data fluency are closely related and can be explained through a common underlying factor not directly measurable.

Therefore, the variability that characterized the scores measured over the sample can be represented by a common variance, that is the amount of variance shared among the items and a unique variance that is specific to an item. The extracted factors make up common variance. The EFA therefore allows us to understand what latent variables better contribute to represent employability as measured by *Knack* scores.

Figure 5.1

Plot correlations among variables (Knack predictors) involved in exploratory factor analysis



Note. The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

To prevent weakness in factor structure, the correlation matrix was visually scanned and checked for any variables with lots of weak correlations (*r* < .3) or very high correlation (*r* > .8). After testing for factorability and multicollinearity assumptions, 11 variables (quick thinking, social intelligence, diligence, learning agility, teamwork, attention to detail, customer focus, data fluency, action orientation, coachability, creative insight) were used to conduct the EFA. All variables had at least one correlation coefficient greater than .30 and the value of the determinant for the correlation matrix was .0041; it is above the rule of thumb of .00001 indicating that there was no multicollinearity in the data. Rotated eigenvalues and scree plot are then used to determine the number of significant factors, and parallel analysis suggested retaining two factors that are above the break (i.e., point of inflexion) as shown in Figure 5.2.

Cattell (1966) introduced scree plots, which are visual tools used to help determine the number of important factors in factor analysis. In everyday language the word "scree" refers to loose stones or rocky debris lying on a slope or at the base of a hill or cliff. In a scree plot, it is desirable to find a sharp reduction in the size of the eigenvalues (like a cliff), with the rest of the smaller eigenvalues constituting rubble. When the eigenvalues drop dramatically in size, an additional factor would add relatively little to the information already extracted. The ideal pattern in a scree plot is a steep curve, followed by a bend, and then a straight line. The point where the slope of the curve is leveling off (the "elbow) indicates the number of factors that should be generated by the analysis. To determine the "break," a comparison with observed and randomized eigenvalues is done. In Figure 5.2 two factors have the observed eigenvalues (black line) greater than the eigenvalues from the randomly generated variables (blue line). This means that two factors are the optimal number of factors needed to explain the variability of the underlying 33 *Knack* scores.

Figure 5.2
Scree plot comparing observed and random eigenvalues for parallel analysis

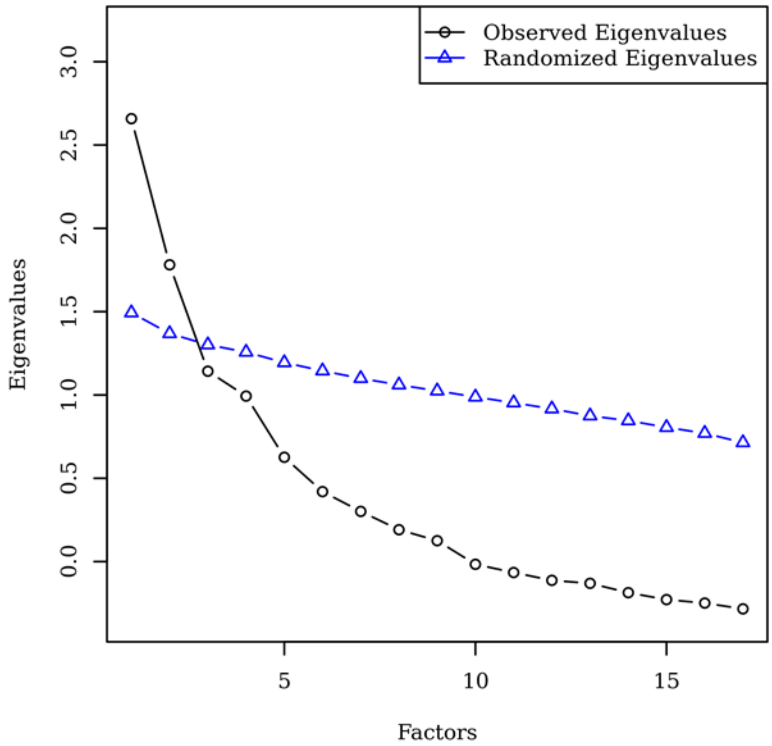


Table 5.6 shows the factors and loadings. This means that in Table 5.6 we understand which are the *Knack* scores that define the two factors revealed by the exploratory factor analysis. Factor loadings were interpreted by taking the absolute value of each and variables with loadings less than .32 or with no loading on at least one factor were suppressed (Tabachnik & Fidell, 2014). This analysis resulted in two factors which have been characterized as *Social*, because most of the *Knack* descriptors it includes relate to social capabilities, and the second, *Cognitive* because most descriptors here are centered around cognitive capabilities.

Table 5.6
Factor Loadings from Exploratory Factor Analysis

Variable	Factor loading		Communality
	Social	Cognitive	
Quick thinking		.62	.40
Social intelligence	.52		.27
Diligence	.61		.51
Learning agility		.64	.40
Teamwork	.87		.73

Attention to detail	.45		.20
Customer focus	.70		.50
Data fluency		.69	.46
Action orientation	-.38		.15
Coachability	.37		.16
Creative insight		.38	.14

Six variables (Table 5.6) were found to have a strong relationship (i.e., loadings > .32) with the *Social* factor, and four with the *Cognitive*, indicating a strong and solid factor structure (Costello & Osborne, 2005). Cronbach alpha coefficients were found to be 0.73 for the *Social* factor, and 0.64 for the *Cognitive* factor, indicating acceptable reliability

To summarize, the factor which aggregates quick thinking, learning agility, data fluency, and creative insight is described as the *Cognitive* factor, whereas that which aggregates social intelligence, diligence, teamwork, attention to detail, customer focus and coachability is termed the *Social* factor (Figure 5.3).

Figure 5.3
Cognitive and Social factors based on the Knack descriptors included

2017

COGNITIVE

- **learning agility**
- **quick thinking**
- **data fluency**
- **creative insight**

SOCIAL

- **social intelligence**
- **diligence**
- **teamwork**

- attention to details
- customer focus
- coachability

The *Social* factor includes the 6 employability predictors described in Table 5.7:

Table 5.7
Behaviors Defining the Predictors Grouped into the Social Factor

EMPLOYABILITY PREDICTORS	BEHAVIORS
Social intelligence	collaborate well with others, work effectively in teams, and quickly learn new cultures or customs
Diligence	be organized, get things done on time, carefully follow the procedure
Teamwork	enjoy working with different types of people, understand group dynamics, prefer to build team consensus, but will disagree when needed
Attention to detail	be careful and thoughtful, take the time to check and double-check
Customer focus	understand the customer's point of view, are open to feedback from customers
Coachability	are open to new ideas and ways of doing things, can handle the stress and challenge of learning new things

Source: Knack Sample Report – Appendix D.1

The *Cognitive* factor includes the 4 employability predictors described in Table 5.8:

Table 5.8
Behaviors Defining the Predictors Grouped in the Cognitive Factor

EMPLOYABILITY PREDICTORS	BEHAVIORS
Learning agility	learn new skills easily, adapt easily to unfamiliar environments, are open to new ideas
Quick thinking	thrive in fast-paced environments, can take in information quickly, make accurate decisions under time pressure

Data fluency	excel at thinking through tough problems, are open to data revealing new ideas, are thorough, and detail-oriented
Creative insight	make connections between seemingly unrelated ideas, can see problems differently, come up with novel solutions

Source: Knack Sample Report – Appendix D.1

To summarize, exploratory factor analysis was used to group the *Knack* scores that vary together. This makes it easier to model in a regression because it reduces many variables (i.e., the 33 *Knack* scores) into a smaller set of factors. Each factor explains a percentage of the total variance of the employability predictors. Factors that do not explain much variance might not be worth including in the final model. It takes some iteration to come up with the optimal number of factors, in this case two, which Were named *Social* and *Cognitive* factors. The next step (see Section 5.3.iv) is a regression analysis to test the significance of the association between the independent variable IV - having done an international internship - and the dependent variable DV - employability (measure by the *Knack* scores).

The factor analysis summary is shown in Table 5.9.

Table 5.9
Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors for the 10 Item Variable Set

Factor	**Eigenvalue**	**% of variance**	**Cumulative %**
Social	2.55	14.99	14.99
Cognitive	1.77	10.43	25.43

In particular, the *Social* factor accounted for 14.99% and the *Cognitive* factor for 10.43% of the variance, therefore the two-factor model accounted for 25.43% of the total variance in the data. This means that by using the 10 variables (4 for the *Cognitive* factor and 6 for the *Social* factor) it is possible to explain 25.43% of the variances of all 33 *Knack* scores.

5.3.iv Linear Regression Analysis Predicting Cognitive Factor

A regression analysis was conducted to assess whether the *Cognitive* factor is associated with having done an international internship. Also, the effect of potential control variables such as international or domestic casual work, study abroad, gender, major, and age was evaluated.

Only the students with at least domestic internship experience or both domestic and international internship were included in the model. Program-related international internship significantly affected *Cognitive factor* (t = 3.762, p = .0002).

The effect of control variables was then analyzed. Based on the Akaike Information Criterion (AIC) (Aho, Derryberry, & Peterson, 2014), age (0.885 $\pm$ .682, t = 1.298, p = 0.195), major (health/science vs. engineering, -.2956 $\pm$ 5.290, t = -.056, p = .956; social sciences/humanities vs. engineering, -2.613 $\pm$ 1.757, t = -1.487, p = 0.138), study abroad (-2.715 $\pm$ 1.648, t = -1.647, p = .100), and international (-.357 $\pm$ 3.345, t = -.107, p = .915) or domestic (-.120 $\pm$ 1.722, t = -0.070, p = .944) casual work turned up irrelevant as control variables, with no significant association to the *Cognitive* factor. Gender and its interaction with international internship instead were retained in the model. Gender resulted in an effect modifier affecting the *Cognitive* factor along with the investigated independent variable (having done an international internship or not having done it). Two values of effect size had to be calculated (one for each gender). This means that a further analysis was performed to understand if there is any significant effect on the *Cognitive* factor for males who have done an international internship (predictor or IV) and the same analysis was performed for females.

Next, a comparison was done between the gold standard model, a model which includes all potential control (age, major, study abroad and international or domestic casual work) variables, and the reduced regression models, the models without those variables.

This comparison did not highlight any confounding effect. Table 5.10 shows that the estimate of the predictor/IV (having or not done an international internship) is "essentially" the same in the gold standard (this is the model including all the potentially control variables) and when potentially control variables are dropped from the model. A difference of less than 10% between the estimates of the predictor variable under the different models is evidence of no confounding effect and in this analysis the maximum difference in estimates was 3.4% referred to the two control variables age and major, if retained in the model. This means that the association between the predictor/IV (having done an international internship or not) and the *Cognitive* factor is not affected by the presence of variables such as age, major, study abroad and international or domestic casual work. There is however an association with gender which was kept in the regression model (see Table 5.10).

Table 5.10

The gold standard model and the reduced models compared

Model	Estimate of the predictor	95% Confidence Interval	% Variation
Gold standard	12.030	5.640, 18.419	---
No age	12.414	6.045, 18.783	3.0%
No age, major	12.435	6.066, 18.804	3.4%
No age, major, study abroad	12.144	5.784, 18.504	1.0%
No age, major, study abroad, and domestic/international casual work	12.114	5.784, 18.445	0.7%

Note. A difference of less than 10% between the estimates of the predictor variable under the different models is evidence of no confounding effect.

The results of the final regression model were significant, $F(3, 384) = 8.24$, $p < 0.0001$, $R^2 = .06$, indicating that approximately 6% of the variance in the *Cognitive factor* was explained by program-related international internship, gender, and their interaction (Table 5.11). This means that, with our sample population, the talent analytic tool – i.e., the *Knack*, detected a *Cognitive* factor which is higher in male than in female students ($p = .0001$).

However, when the students experienced a program related international experience, this difference was removed ($p = .524$). Importantly this means that, overall, the effect of a program-related international internship is greater in female than in male students and the gender gap is eliminated.

This is a very unexpected and significant result, which indicates that while female students' *Cognitive* factor appears to be lower than males' *Cognitive* factor in the overall 2017 students' sample, the analysis found that this gender effect disappears for females who have done an international internship. It appears therefore that the association between the positive correlation with the *Cognitive* factor of an international internship is stronger for female students than for male.

Table 5.11

The final regression model analyzing the relationship between program-related international internship and Cognitive factor, adjusted for gender

Variable	β	*SE*	95% CI	*t*	*P*

(Intercept)	57.778	1.445	[54.937, 60.620]	39.98	< .0001
Gender (M vs F)	6.958	1.788	[3.442, 10.473]	3.89	.0001
Work Related International vs Domestic Internship	12.114	3.220	[5.784, 18.445]	3.76	.0002
Work Related International Internship*Gender	-9.360	4.156	[-17.532, -1.189]	-2.25	.0249

Note. Results: $F(3, 384) = 8.24$, $p < .0001$, $R^2 = .06$

5.3.v Linear Regression Analysis Predicting the Social factor

A regression analysis was conducted to assess whether having done an international internship adds something to the experiential learning of a domestic internship in terms of graduate employability measured through the *Social factor* and the effect of potential control variables such as international or domestic casual work, study abroad, gender, major, and age was also evaluated. Only the students with at least domestic internship experience or both domestic and international internship were included in the model. Regression results were not significant, $F(9, 378) = .908$, $p = .518$, $R^2 = .02$, indicating that neither program-related international internship nor any of the other control variables had an additive impact on employability skills as measured by the *Social factor* (Table 5.12).

This means that this study finds no association between the *Social factor* and international internship participation. Such a contradictory finding is also quite unexpected. Many studies (Jones, 2013 gives examples) identify predominantly social and interpersonal skills as being those usually developed by international experiences. It is surprising therefore that *Social* factor skills in this study were not associated with the international internship experience.

Table 5.12
Results of the regression model for the Social factor

Variable	**β**	***SE***	**95% CI**	***t***	***P***
(Intercept)	2110.641	1222.656	[-293.419, 4514.700]	1.726	.085

YOB	-1.028	0.613	[-2.235, 0.178]	-1.676	.095
Health/Science vs Engineering	-1.488	4.761	[-10.849, 7.873]	-0.313	.755
Social Sciences and Humanities vs Engineering	-1.298	1.582	[-4.408, 1.812]	-0.821	.412
Gender (M vs F)	-1.451	1.636	[-4.668, 1.766]	-0.887	.376
Work Related International vs Domestic Internship	-2.760	2.925	[-8.510, 2.991]	-0.944	.346
Work Related International Internship*Gender	2.035	3.760	[-5.358, 9.428]	0.541	.589
Casual Domestic Internship	0.332	1.549	[-2.715, 3.378]	0.214	.831
Casual International Internship	-3.657	3.010	[-9.575, 2.261]	-1.215	.225
Study Abroad	-1.637	1.483	[-4.553, 1.279]	-1.104	.270

Note. Results: $F(9,378) = 0.908$, $p = .518$, $R^2 = 0.02$

5.3.vi The Effect of Studying Abroad

To evaluate whether an international experience, in general, could increase employability, the relationship between studying abroad and program-related international internship was investigated. The 2016/2017 dataset included 246 students who studied abroad. Among them, 66 also had a program-related international internship.

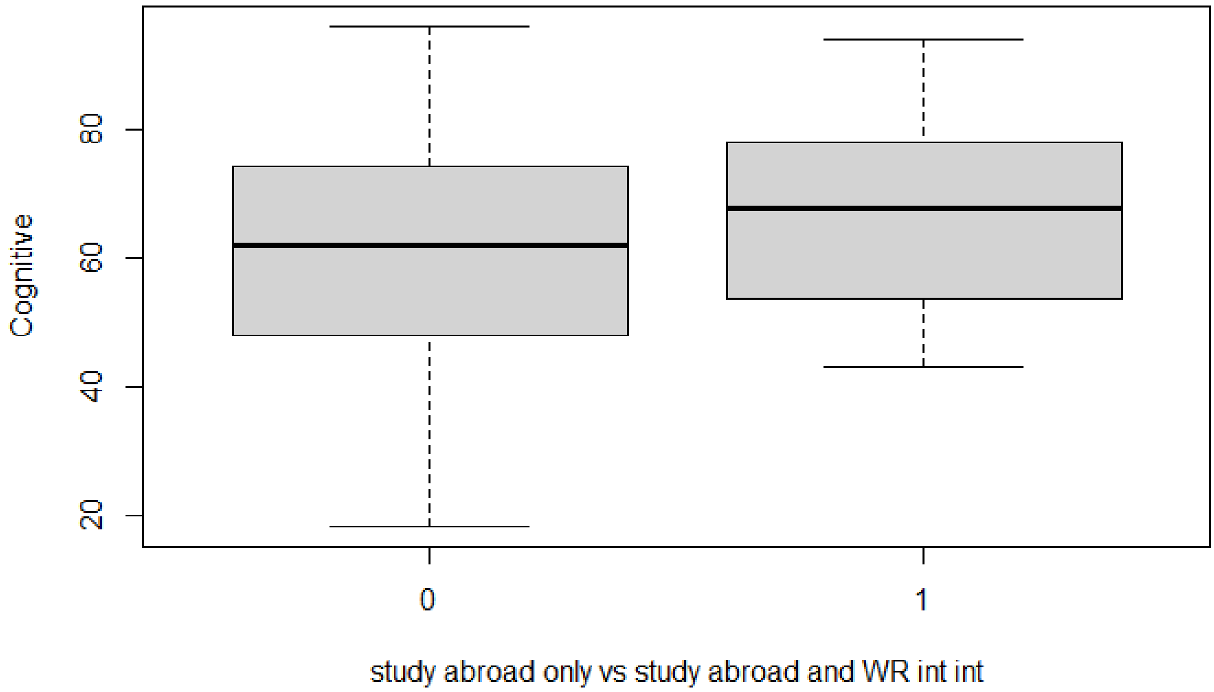
Figure 5.4 shows the distribution of the *Cognitive* factor based on the students' experience. It is worthy of note that having done an international internship adds to the experiential learning of studying abroad in terms of graduate employability measured through the *Cognitive factor*. Indeed, the value of the *Cognitive* factor for the students who experienced a program-related international internship was significantly greater than for those who did not (66.9 vs 61.1, $t = 59.892$, $df = 245.36$, $p < .0001$).

This is a quite significant finding, especially given that one of the limitations of this study is that employability of the students before the internships was not assessed. This result though gives at least one term of comparison, indicating the importance of the international internship over other kinds of international experience. What this result shows is that the

Cognitive factor is significantly higher for the students who have had both an international internship and a study abroad experience, if compared with those students who have had only a study abroad experience and no international internship.

The boxplot in Figure 5.4 shows this result graphically: the black line indicates the level of the *Cognitive* factor in the two groups of students. The students with both study abroad and international internship experiences have a significantly higher *Cognitive* factor.

Figure 5.4
Boxplot showing the relationship between having an experience abroad and employability measured through the Cognitive factor



Note. *PR*, program-related. 0 = study abroad; 1 = study abroad and having a program-related international experience.

5.4 Analysis of the 2018 Dataset

5.4.i Score Distribution of the Arctic Shores Digital Game-Based Tool

As noted in Section 4.7, in the methodology Chapter 4, the first phase of the analysis is to explore the relationships among the variables. This was a useful first step, i.e., to build the regression model aimed at assessing whether there is a difference between the scores for those who had completed an international internship compared with a domestic internship. It could then lead to an analysis of resulting behavior in terms of graduate employability measured through any of the *Arctic Shores* scores. This would then feed into the next stage of analysis in seeking to establish whether additional skills and behaviors would be associated with an international internship, compared to one which took place in a domestic setting. Only students with, as a minimum, domestic internship experience or both domestic and international internships were considered.

The values of the *Arctic Shores* were estimated and compared between two groups (Table 5.13): (a) students who attended both program-related international and domestic internship, and (b) students who exclusively attended a program-related domestic internship.

In this preliminary comparison, students with international experience had significantly greater scores for four items of the cognition domain (processing capacity, learning agility, processing speed, and executive functioning) than students with a domestic internship only. This can be read in the first column of Table 5.13. Here we see that the median score for students with both international and domestic internships is 7 for processing capacity, 8 for learning agility, 7 for processing speed, and 7 for executive functioning. The scores for students with only domestic internships are respectively 6 for processing capacity, 7 for learning agility, 7 for processing speed, and 6 for executive functioning. The numbers in square brackets indicate the first and third quartile of the Arctic Shores score for the specific predictor. Among the other domains, only resilience showed on average a greater score in students who experienced a program-related international internship compared to students who experienced a program-related domestic internship only.

Given the multiple comparisons required by this analysis it was necessary to use a technique developed to control multiple testing. Bonferroni's multiplicity adjustment (Bland & Altman, 1995) was used to avoid false-positive results. Bonferroni multiplicity adjustment defines statistical significance as $p < .0017$ (= .05/30), where the denominator, 30 is number of tested hypotheses. 30 tested hypotheses are referred to the 30 *Arctic Shores* predictors. The p values for processing capacity, learning agility, processing speed, executive functioning and resilience are below 0.0017 and indicate that on average students who experienced a program-related international internship had greater scores compared to students who experienced a program-related domestic internship only. All the p values of the other *Arctic Shores* predictors are above .0017 therefore not statistically significant.

Table 5.13

Scores of Arctic Shores tool stratified by program-related internship

Variable	Program-related Int. and Dom. Internship (N = 166)	Program-related Dom. Internship only (N = 265)	P
Cognition			
Processing capacity	7.0 [6.0; 9.0]	6.0 [5.0; 8.0]	<.0001*
Learning agility	8.0 [7.0; 10.0]	7.0 [6.0; 9.0]	<.0001*
Processing speed	7.0 [6.0; 9.0]	7.0 [6.0; 8.0]	<.0001*
Executive functioning	7.0 [5.0; 8.0]	6.0 [5.0; 8.0]	<.0001*
Concentration	7.0 [6.0; 9.0]	7.0 [5.0; 8.0]	.002
Drive			
Resilience	8.0 [6.0; 10.0]	7.0 [5.0; 8.0]	<.0001*
Performance under pressure	6.0 [5.0; 7.0]	5.0 [5.0; 6.0]	.340
Sensitivity to reward	7.0 [5.0; 8.0]	7.0 [5.0; 8.0]	.765
Sensitivity to loss	5.0 [4.0; 7.0]	5.0 [4.0; 6.0]	.097
Ownership and responsibility	7.0 [6.0; 8.0]	7.0 [6.0; 8.0]	.181
Self-discipline	7.0 [6.0; 8.0]	6.0 [5.0; 8.0]	.003
Determination	6.0 [5.0; 8.0]	6.0 [5.0; 7.0]	.331
Interpersonal style			
Altruism	6.0 [5.0; 8.0]	6.0 [5.0; 8.0]	.779
Self-monitoring	6.0 [5.0; 7.0]	6.0 [5.0; 8.0]	.007
Sociability	6.0 [5.0; 7.0]	6.0 [4.0; 7.0]	.567
Social dominance	7.0 [6.0; 9.0]	7.0 [5.0; 8.0]	.857
Self-belief	6.0 [5.0; 8.0]	7.0 [5.0; 8.0]	.661
Personal style			
Emotional stability	6.0 [4.0; 7.0]	6.0 [5.0; 8.0]	.328
Emotional recognition	7.0 [6.0; 9.0]	7.0 [6.0; 8.0]	.135
Thinking style			
Managing uncertainty	6.0 [5.0; 8.0]	6.0 [5.0; 7.0]	.531
Innovation potential	8.0 [6.0; 10.0]	7.0 [5.0; 9.0]	.002
Creativity	6.0 [5.0; 8.0]	6.0 [5.0; 8.0]	.928
Optimism	5.0 [5.0; 6.0]	5.0 [5.0; 6.0]	.668
Novelty seeking	6.0 [4.0; 7.0]	6.0 [4.0; 7.0]	.483
Need for structure	5.0 [3.0; 6.0]	5.0 [4.0; 6.0]	.032

Future orientation	6.0 [5.0; 7.0]	6.0 [5.0; 7.0]	.447
Impulsive risk	6.0 [4.0; 7.0]	6.0 [4.0; 7.0]	.706
Rational Decision-Making Style	6.0 [5.0; 7.0]	6.0 [5.0; 7.0]	.502
Deliberation	6.0 [5.0; 7.0]	7.0 [5.0; 8.0]	.002
Curiosity	7.0 [6.0; 8.0]	7.0 [6.0; 8.0]	.561

Note. Values are median, first, and third quartile in squared brackets. Bonferroni multiplicity adjustment defines statistical significance as $p<0.0017$ (=0.05/30), significant results are indicated with an "*."

5.4.ii Multivariate Analysis

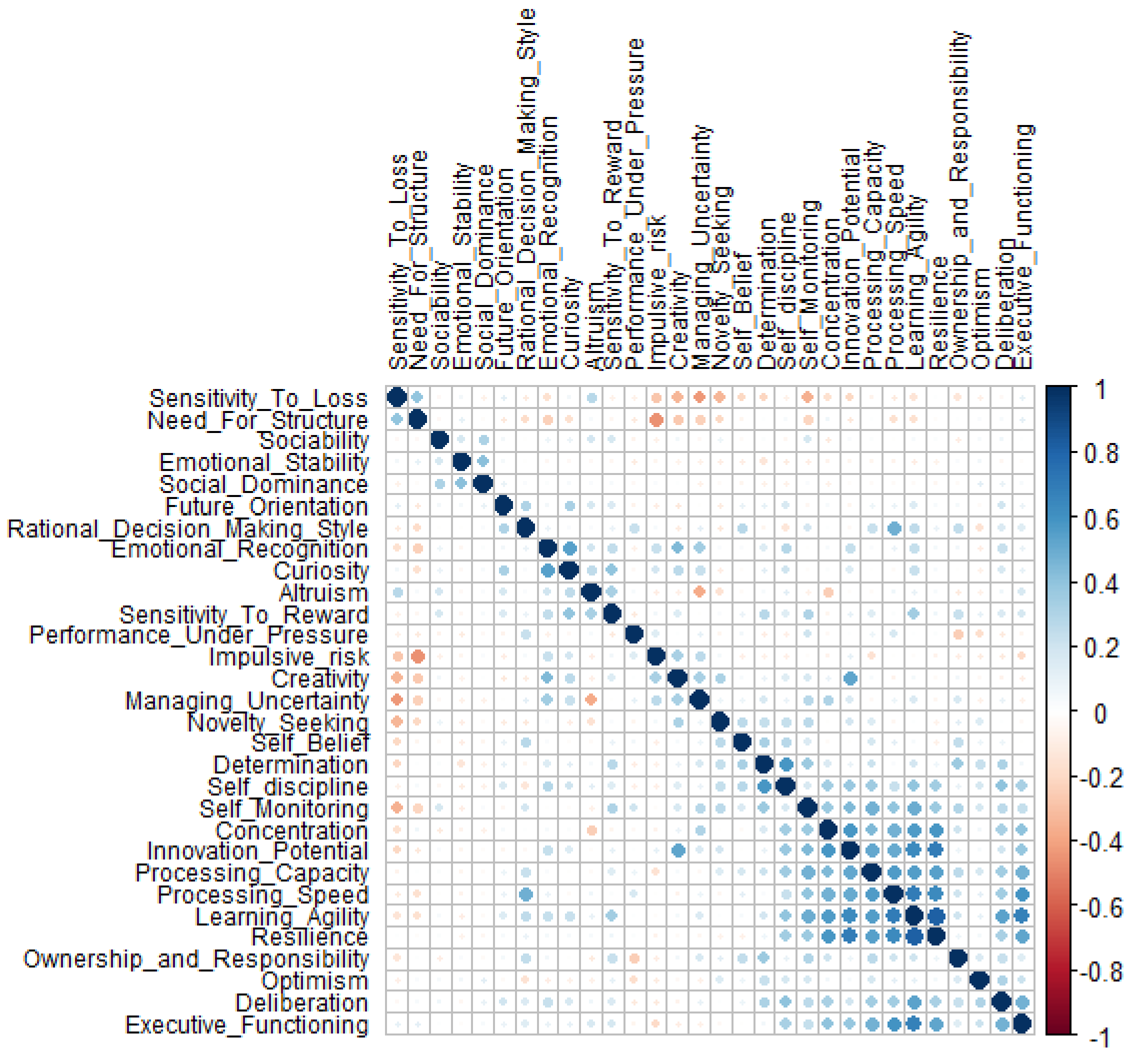
Exploratory factor analysis (EFA) was then performed. This analysis is used to represent a set of variables through a more compact set of new ones independent of each other. To clarify the latent relational structure among the *Arctic Shores* scores, "promax" rotation (Jackson, 2014) was used to further simplify the factors' structure.

Figure 5.5 shows the correlation between the 30 *Arctic Shores* predictors. The line of 1.00s going from the top left to the bottom right is the main diagonal, which shows that each variable always perfectly correlates with itself.

Figure 5.5 shows that there are some "clumps" of items that are positively correlated - evidence of some common factors. Indeed, the below picture clearly shows that most items have some correlation with each other, meaning that they are connected. This implies that as one score varies, either up or down, the other score varies concurrently in the same (positive correlation in blue) or the opposite (negative correlation in red) direction. The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

For instance, learning agility, processing speed, processing capacity, executive functioning, and resilience are closely related and can be explained through a common underlying factor not directly measurable. Therefore, the variability that characterized the scores measured over the sample can be represented by a common variance that is the amount of variance shared among the items and a unique variance that is specific to an item. The extracted factors make up common variance. In other words, the EFA allows us to understand what latent variables better contribute to represent employability measured by *Arctic Shores* scores.

Figure 5.5
Correlation plots among variables involved in exploratory factor analysis



Note. The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

To prevent weakness in factor structure, the correlation matrix was visually scanned and checked for any variables with weak ($r < .3$) or high correlations ($r > .8$). As determined by testing for factorability and multicollinearity assumptions, EFA was finally conducted for 8 variables (concentration, executive functioning, learning agility, processing speed, processing capacity, social dominance, sociability, emotional stability) using parallel analysis for determining the number of factors to retain with promax rotation. Indeed, all variables had at least one correlation coefficient greater than .30 and the value of the determinant for the correlation matrix was .077065; it is above the rule of thumb of .00001 indicating that there was no multicollinearity in the data. Rotated eigenvalues and scree plot are then used to determine the number of significant factors.

Looking at Figure 5.6, the scree plot displays two factors that have actual eigenvalues (blue line) greater than the eigenvalues from randomly generated variables (red dotted line). This means that two factors are the optimal number needed to explain the variability of the underlying 30 *Arctic Shores* scores.

Figure 5.6

Scree plot comparing observed and random eigenvalues for parallel analysis

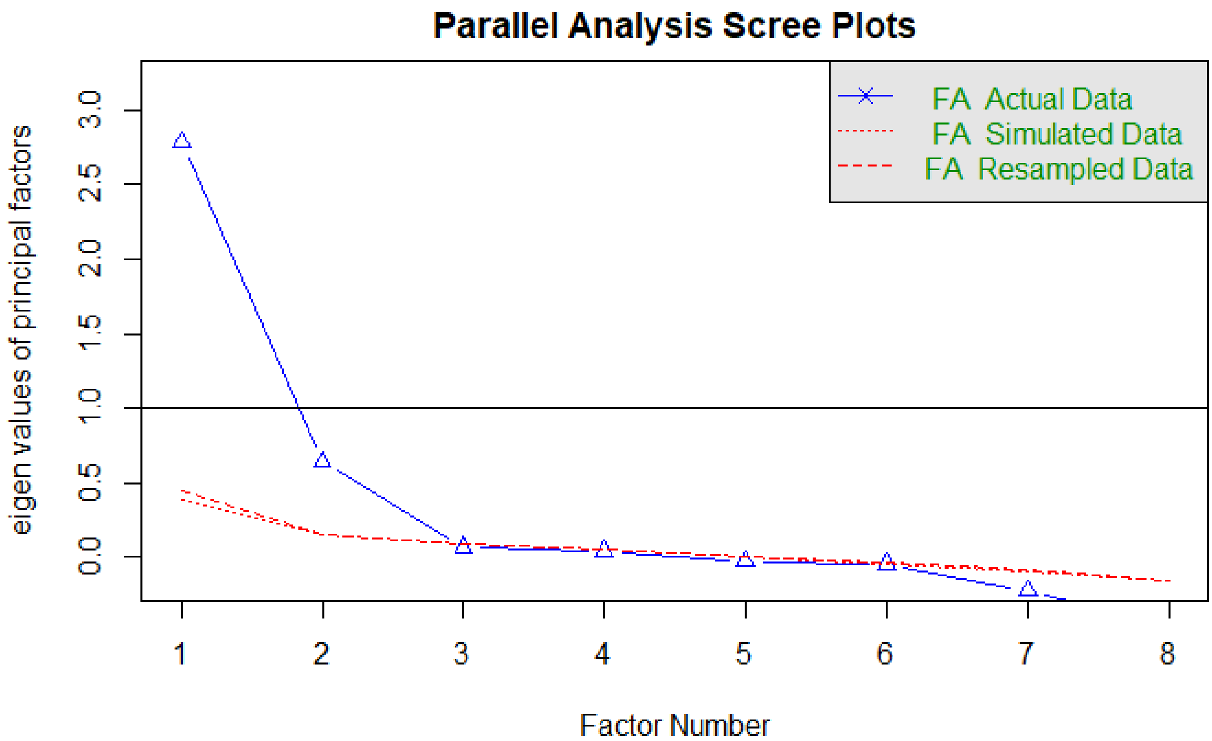


Table 5.14 shows the factors and loadings. This means that in Table 5.14 we understand which are the *Arctic Shores* scores that define the two factors revealed by the exploratory factor analysis. Variables with loadings less than .32 and with loadings on more than one factor were suppressed (Tabachnik & Fidell, 2014). This analysis resulted in two factors, Social and *Cognitive*.

Table 5.14

Factor Loadings from Exploratory Factor Analysis

	Factor loading		
Variable	**Cognitive**	**Social**	**Communality**
Concentration	.604		.38
Executive functioning	.733		.53
Learning agility	.884		.78

Processing speed	.805		.65
Processing capacity	.669		.45
Social dominance		.823	.67
Sociability		.390	.15
Emotional stability		.490	.24

Three variables (Table 5.14) were found to have a strong relationship (i.e., loadings > .32) with the *Social* factor, and five with the *Cognitive* factor, indicating a strong and solid factor structure (Costello & Osborne, 2005). The items for the *Cognitive* factor had a Cronbach's alpha coefficient of 0.85, indicating good reliability. The items for the *Social* factor had a Cronbach's alpha coefficient of 0.57, indicating poor or questionable reliability.

To summarize, the *Cognitive* factor aggregates concentration, executive functioning, learning agility, processing speed, and processing capacity, whereas the *Social* factor aggregates social dominance, sociability, and emotional stability the *Social* factor (Figure 5.7).

Figure 5.7
Cognitive and Social factors based on the Arctic Shores descriptors included

2018

COGNITIVE

- learning agility
- processing speed
- executive functioning
- concentration
- processing capacity

SOCIAL

- sociability
- social dominance
- emotional stability

The *Social* factor includes the 3 employability predictors described in Table 5.15:

Table 5.15
Behaviors Defining the Predictors Grouped in the Social Factor

EMPLOYABILITY PREDICTORS	BEHAVIORS
Sociability	are more inclined to feel energized by social stimulation and enjoy spending a lot of time interacting with other people, likely to become bored when lacking social interaction
Social dominance	are more likely to be self-assured, assertive, and confident when interacting with others
Emotional stability	tend to have a more consistent and stable mood and are more disposed to experience positive emotions, more likely to calmly manage stressful situations

Source: Arctic Shores Sample Report – Appendix D.2

The *Cognitive* factor includes the 5 employability predictors described in Table 5.16:

Table 5.16
Behaviors Defining the Predictors Grouped in the Cognitive Factor

EMPLOYABILITY PREDICTORS	BEHAVIORS
Learning agility	learn new skills easily, adapt easily to unfamiliar environments, are open to new ideas
Processing speed	tend to process information more quickly than others, likely to do well when rapid comprehension of information is required
Executive functioning	tend to have a greater capacity to plan tasks and adjust actions to unforeseen circumstances, likely to manage and analyze complex information with more ease
Concentration	tend to maintain focus in distracting environments and can perform at an optimal level for an extended period
Processing capacity	tend to be more confident than peers when mentally working with large amounts of information, likely to tackle analyses well

Source: Arctic Shores Sample Report – Appendix D.2

To summarize, exploratory factor analysis was used to group the *Arctic Shores* scores that vary together. This makes it easier to model in a regression because it reduces a large number of variables (i.e., the 30 *Arctic Shores* scores) into a smaller set of factors. Each factor explains a percent of the total variance of the employability predictors. Factors that do not explain much variance might not be worth including in the final model, and therefore takes some iteration to come up with the optimal number of factors. In the analysis two factors were revealed, i.e., *Social* and *Cognitive* factors. The next step in the analysis (see Section 5.4.iii) is a regression analysis to test the significance of the association between the independent variable IV - having done an international internship - and the dependent variable DV - employability (measure by the *Arctic Shores* scores).

The factor analysis summary is shown in Table 5.17.

Table 5.17
Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors for the 8 Item Variable Set

Factor	Eigenvalue	% of variance	Cumulative %
Cognitive	2.78	34.8	34.8
Social	1.09	13.6	48.3

In particular, the *Cognitive* factor accounted for 34.8% of the variance, while the *Social* factor accounted for 13.6% of the variance. The two-factor model accounted for 48.3% of the total variance in the data. This means that by using the 8 variables (5 for the *Cognitive* factor and 3 for the *Social* factor) it is possible to explain 48.3% of the variances of all 30 *Arctic Shores* scores.

5.4.iii Linear Regression Analysis Predicting the Cognitive factor

A regression analysis was conducted to assess whether the *Cognitive* factor is associated with having done an international internship. Also, the effect of potential control variables such as international or domestic casual work, study abroad, gender, major, and age was evaluated.

To specifically answer the research question, only students with at least a domestic internship experience or both a domestic and international internship were included in the model. Program-related international internship significantly affected the *Cognitive factor.*

The effect of control variables was then analyzed. Based on the Akaike Information Criterion (AIC), age (.002 $\pm$ .005, t = .335, p = .738), major (health/science vs. engineering, .091 $\pm$ .308, t = .294, p = .769; social/humanistic vs. engineering, .080$\pm$ .1144, t = .695, p = .488), gender (.003 $\pm$ .120, t = .022, p = .983), study abroad (.004 $\pm$ .197, t = .022, p = .982), and international (.094 ± .168, t = 0.555, p = .579) or domestic (-.026 ± .094, t = -.277, p = .782) casual work turned up irrelevant as control variables, with no significant association to the *Cognitive* factor. Finally, the comparison between the gold standard model which includes all potential control variables and the reduced models highlight the confounding effect of gender in the interaction with the main predictor. Indeed, as shown in the Table 5.18**,** the estimate of the predictor in the reduced model differed of a factor of approximately 29% from the gold standard (model including all the potentially control variables), when the gender and the interaction term were dropped from the model. This means that gender confounded the effect of the program-related international internship, and therefore an adjusted estimate of the effect size was calculated.

Table 5.18
The model with all variables (gold standard) and the reduced models, compared

Model	Estimate of the predictor	95% Confidence Interval	% of variation
Gold standard	0.397	0.123, 0.671	---
No gender	0.511	0.323, 0.700	28.7%
No age	0.395	0.119, 0.670	-0.5%
No age, major	0.395	0.120, 0.669	-0.5%
No age, major, study abroad	0.395	0.120, 0.669	-0.5%
No age, major, study abroad, and domestic/international casual work	0.397	0.123, 0.671	0.0%

Note. A difference less than 10% between the estimates of the predictor variable under the two models is evidence of no confounding effect.

The final model included program-related international internship as a predictor adjusted for gender as main control variable. The results of the final regression model were significant, $F(3, 426) = 10.56$, $p < .0001$, $R^2 = .07$, indicating that approximately 7% of the variance in the *Cognitive factor* was explained by program-related international internship (Table 5.19).

Table 5.19
The final regression model for Cognitive factor

Variable	β	*SE*	95% CI	*t*	*p*
(Intercept)	-0.190	0.088	[-0.364, -0.017]	-2.16	.032
Work Related International vs Domestic Internship	0.397	0.139	[0.123, 0.671]	2.85	<.0046
Gender (M vs F)	-0.004	0.119	[-0.238, 0.229]	-0.04	.971
Work Related Internship*Gender	0.225	0.190	[-0.149, 0.599]	1.18	.238

Note. Results: $F(3, 426) = 10.56$, $p < .0001$, $R^2 = .07$

5.4.iv Linear Regression Analysis Predicting the Social factor

A regression analysis was conducted to assess whether having done an international internship adds something to the experiential learning of a domestic internship in terms of graduate employability measured through the *Social factor*. Also, the effect of potential control variables such as international or domestic casual work, study abroad, gender, and age was evaluated. To specifically answer the research question, only the students with at least domestic internship experience or both domestic and international internship were included in the model. Regression results were not significant, $F(9, 420) = 0.430$, $p = .919$, $R^2 = .01$, indicating that neither program-related international internship nor any of the other control variables had an additive impact on employability skills as measured by the *Social factor* (Table 5.20).

This means that this study finds no association between the *Social factor* and international internship participation. Such a contradictory finding is also quite unexpected. Many studies (Jones, 2013 gives examples) identify predominantly *social* and interpersonal skills as being those usually developed by international experiences. It is surprising therefore that *Social* factor skills in this study were not associated with the international internship experience.

Table 5.20
Results of the regression model for Social factor

Variable	β	*SE*	95% CI	*t*	*p*
(Intercept)	6.063	10.499	[-14.575, 26.701]	0.577	.564
YOB	-0.003	0.005	[-0.013, 0.007]	-0.583	.560
Health/Science vs Engineering	0.071	0.318	[-0.013, 0.007]	0.224	.823
Social Sciences and Humanities vs Engineering	-0.109	0.118	[-0.341, 0.123]	-0.921	.357
Gender (M vs F)	0.005	0.124	[-0.239, 0.248]	0.038	.969
Work Related International vs Domestic Internship	-0.037	0.145	[-0.322, 0.249]	-0.251	.802
Work Related International Internship*Gender	0.019	0.198	[-0.370, 0.409]	0.096	.923
Casual Domestic Internship	-0.067	0.097	[-0.257, 0.123]	-0.690	.491
Casual International Internship	0.190	0.174	[-0.152, 0.531]	1.090	.276
Study Abroad	0.174	0.203	[-0.226, 0.573]	0.854	.394

Note. Results: $F(9, 420) = 0.430$, $p = 0.919$, $R^2 = 0.01$

5.4.v The Effect of Studying Abroad

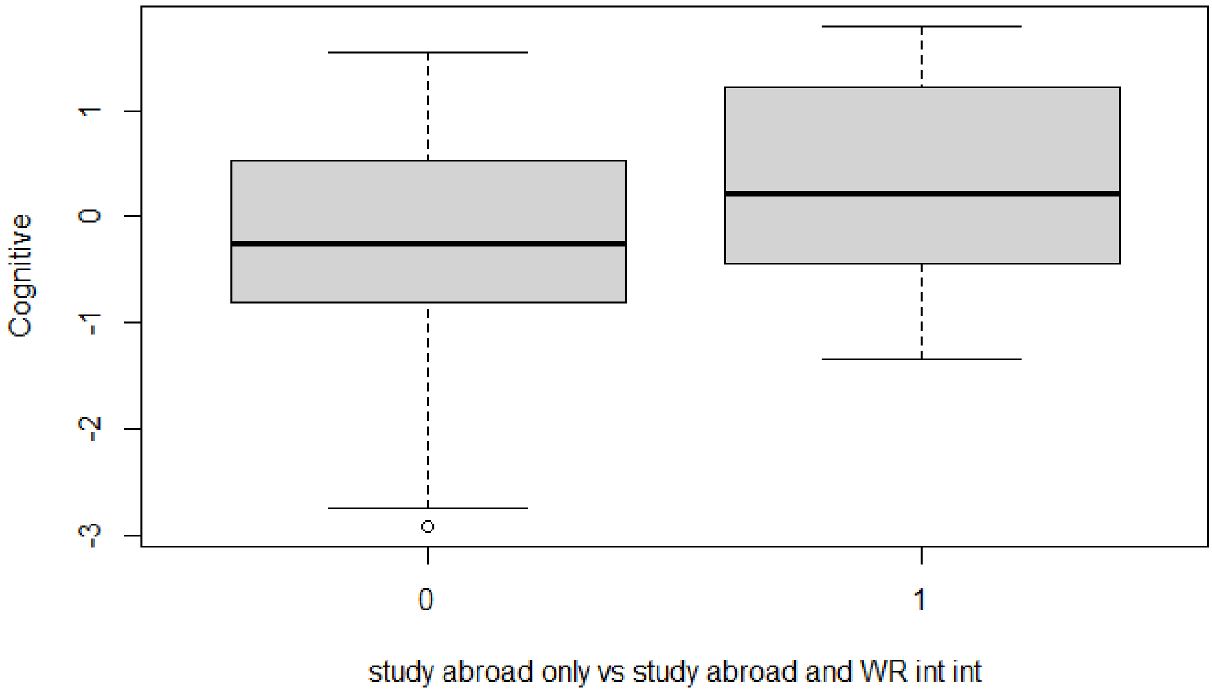
To evaluate whether an international experience in general could increase the employability, the relationship between studying abroad and program-related international internship was investigated. The 2017/2018 dataset included 414 students who studied abroad. Among them, 165 also had a program-related international internship.

Figure 5.8 shows the distribution of the *Cognitive* factor based on the student's experience. Noteworthy, having done an international internship adds something to the experiential learning of studying abroad in terms of graduate employability measured through the *Cognitive factor*. Indeed, the value of the *Cognitive* factor for students who experienced a program-related international internship was significantly greater than for those students who did not (.322 vs. -.198, $t = -7.190$, $df = 604.95$, $p < .0001$).

This is a quite significant finding, especially given that one of the limitations of this study is that student employability was not assessed before the internships. This result though gives at least one term of comparison, indicating the importance of the international internship over other kinds of international experience. What this result shows is that the *Cognitive* factor is significantly higher for the students who have had both an international internship and a study abroad experience, if compared with those students who have had only a study abroad experience and no international internship.

The boxplot in Figure 5.8 shows this result graphically: the black line indicates the level of the *Cognitive* factor in the two groups of students. The students with both study abroad and international internship experiences have a significantly higher *Cognitive* factor.

Figure 5.8
Boxplot showing the relationship between having an abroad experience and employability measured through the Cognitive factor



Note. *WR*, program-related. 0 = study abroad; 1 = study abroad and having a program-related international experience.

5.5 Analysis of the 2019 Dataset

5.5.i Score Distribution of the Arctic Shores Digital Game-Based Tool

As noted in Section 4.7, in the methodology Chapter 4, the first phase of the analysis is to explore the relationships among the variables. This was a useful first step, i.e., to build the regression model aimed at assessing whether there is a difference between the scores for those who had completed an international internship compared with a domestic internship. This could then lead to an analysis of resulting behavior in terms of graduate employability measured through any of the *Arctic Shores* scores. This would then feed into the next stage of analysis in seeking to establish whether additional skills and behaviors would be associated with an international internship, compared to one which took place in a domestic setting. Only students with, as a minimum, domestic internship experience or both domestic and international internships were considered.

The values of the scores of the *Arctic Shores* were estimated and compared between two groups (Table 5.21): (a) students who attended both program-related international and domestic internship, and (b) students who exclusively attended a program-related domestic internship.

In this preliminary comparison, students with international experience had significantly greater scores in five items of the cognition domain (processing capacity, learning agility, processing speed and executive functioning, concentration) than students with domestic internship only. This can be read in the first column of Table 5.21. Here we see that the median score for students with both international and domestic internships is 8 for processing capacity, 8 for learning agility, 7 for processing speed, 6 for executive functioning and 7 for concentration. The scores for students with only domestic internships are respectively 7 for processing capacity, 7 for learning agility, 7 for processing speed, 7 for executive functioning and 7 for concentration. The numbers in square brackets indicate the first and third quartile of the Artic Shores score for the specific predictor. Among the other domains, only resilience showed on average a greater score in students who experienced a program-related international internship compared to students who experienced a program-related domestic internship only.

Given the multiple comparisons required by this analysis it was necessary to use a technique developed to control multiple testing. Bonferroni's multiplicity adjustment (Bland & Altman, 1995) was used to avoid false-positive results. Bonferroni multiplicity adjustment defines statistical significance as $p < .0017$ (= .05/30), where the denominator, 30 is number of tested hypotheses. 30 tested hypotheses are referred to the 30 *Arctic Shores* predictors. The p values for processing capacity, learning agility, processing speed, executive functioning and resilience are below 0.0017 and indicate that on average students who experienced a program-related international internship had greater scores compared to students who experienced a program-related domestic internship only. All the p values of the other *Arctic Shores* predictors are above .0017 therefore not statistically significant.

Table 5.21
Scores of Arctic Shores tool stratified by program-related internship

Variable	Program-related Int. and Dom. Internship (N = 163)	Dom. Internship only (N = 273)	p
Cognition			
Processing capacity	8.0 [6.0; 10.0]	7.0 [5.0; 8.0]	< .0001*
Learning agility	8.0 [7.0; 10.0]	7.0 [6.0; 9.0]	< .0001*
Processing speed	7.0 [6.0; 9.0]	7.0 [5.0; 8.0]	< .0001*
Executive functioning	6.0 [5.0; 7.0]	7.0 [5.0; 8.0]	< .0001*
Concentration	7.0 [6.0; 9.0]	7.0 [5.0; 8.0]	.001
Drive			
Resilience	7.0 [6.0; 9.0]	6.0 [5.0; 8.0]	< .0001*
Performance under pression	6.0 [5.0; 7.0]	5.0 [5.0; 6.0]	.188
Sensitivity to reward	7.0 [5.0; 8.0]	7.0 [5.0; 8.0]	.827
Sensitivity to loss	5.0 [4.0; 7.0]	5.0 [4.0; 6.0]	.055
Ownership and responsibility	7.0 [6.0; 8.0]	7.0 [6.0; 8.0]	.221
Self-discipline	6.0 [5.0; 8.0]	7.0 [6.0; 8.0]	.002
Determination	6.0 [5.0; 7.0]	6.0 [5.0; 8.0]	.287
Interpersonal style			
Altruism	6.0 [5.0; 8.0]	6.0 [5.0; 8.0]	.533
Self-monitoring	6.0 [4.3; 7.0]	6.0 [5.0; 8.0]	.241
Sociability	6.0 [5.0; 7.8]	6.0 [4.0; 7.0]	.496
Social dominance	7.0 [5.3; 8.0]	7.0 [5.0; 8.0]	.997
Self-belief	7.0 [5.0; 8.0]	7.0 [5.0; 7.8]	.619
Personal style			
Emotional stability	6.5 [5.0; 8.0]	6.0 [5.0; 7.0]	.002
Emotional recognition	7.0 [6.0; 8.0]	7.0 [6.3; 9.0]	.124

Thinking style			
Managing uncertainty	6.0 [5.0; 8.0]	6.0 [5.0; 7.0]	.331
Innovation potential	7.0 [5.0; 9.0]	8.0 [6.0; 10.0]	.002
Creativity	6.0 [5.0; 8.0]	6.0 [5.0; 8.0]	.900
Optimism	5.0 [5.0; 6.0]	5.0 [4.0; 6.0]	.683
Novelty seeking	6.0 [5.0; 7.0]	6.0 [4.0; 7.0]	.378
Need for structure	5.0 [3.0; 6.0]	5.0 [4.0; 6.0]	.025
Future orientation	6.0 [5.0; 7.0]	6.0 [4.0; 7.0]	.513
Impulsive risk	6.0 [4.0; 7.0]	6.0 [4.0; 7.0]	.613
Rational Decision-Making Style	6.0 [5.0; 7.0]	6.0 [5.0; 7.0]	.531
Deliberation	7.0 [5.0; 8.0]	6.0 [5.0; 7.0]	.001
Curiosity	7.0 [6.0; 8.0]	7.0 [6.0; 8.0]	.738

Note. Values are median, first and third quartile in squared brackets. Bonferroni multiplicity adjustment defines statistical significance as $p < .0017$ (= .05/30), significant results are indicated with an "*."

5.5.ii Multivariate Analysis

Exploratory factor analysis (EFA) was then performed. This analysis is used to represent a set of variables through a more compact set of new ones independent of each other. To clarify the latent relational structure among the *Arctic Shores* scores, "promax" rotation (Jackson, 2014) was used to further simplify the factors' structure.

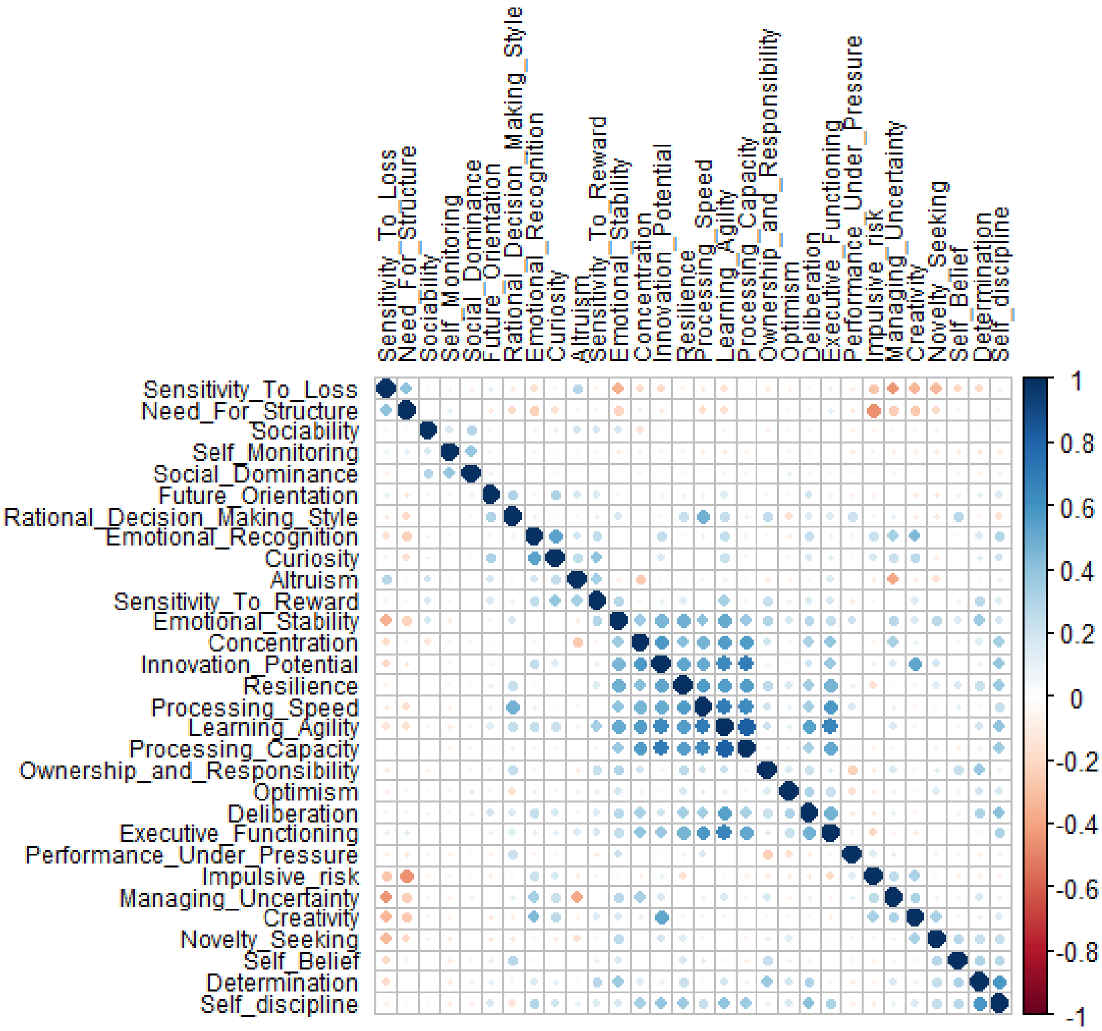
Figure 5.9 shows the correlation between the 30 *Arctic Shores* predictors. The line of 1.00s going from the top left to the bottom right is the main diagonal, which shows that each variable always perfectly correlates with itself.

Figure 5.9 shows that there are some "clumps" of items that are positively correlated - evidence of some common factors. Indeed, the below picture clearly shows that most items have some correlation with each other meaning that they are connected. This implies that as one score varies, either up or down, the other score varies concurrently in the same (positive correlation in blue) or opposite (negative correlation in red) direction. The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

For instance, social dominance, self-belief, sociability, managing uncertainty, self-monitoring, and processing capacity are closely related and can be explained through a common underlying factor not directly measurable. Therefore, the variability that characterized the scores measured over the sample can be represented by a common variance that is the amount of variance shared among the items and a unique variance that is specific to a particular item. The extracted factors make up common variance. In other words, the EFA allows us to understand what latent variables better contribute to represent employability measured by *Arctic Shores* scores.

Figure 5.9

Plot of correlations among variables involved in exploratory factor analysis



Note. The different colors refer to the strength and direction of the paired correlations as shown by the right bar. Blue implies a positive correlation, while red a negative correlation.

To prevent weakness in factor structure, the correlation matrix was visually scanned and checked for any variables with lots of weak correlations ($r < .3$) or very high correlation ($r > .8$). Factor analysis was iteratively performed, and the final model included the following variables: self-monitoring, sociability, social dominance, resilience, concentration, executive functioning, learning agility, processing speed. For these data, the determinant of the correlation matrix including these variables were equals to .083435, it is above the rule of thumb of .00001 meaning no multicollinearity. Rotated eigenvalues and a scree plot are then used to determine the number of significant factors.

Looking at Figure 5.10, the scree plot displays two factors that have actual eigenvalues (blue line) greater than the eigenvalues from randomly generated variables (red dotted line). This means that two factors are the optimal number needed to explain the variability of the underlying 30 *Arctic Shores* scores.

Figure 5.10
Scree plot comparing observed and random eigenvalues for parallel analysis

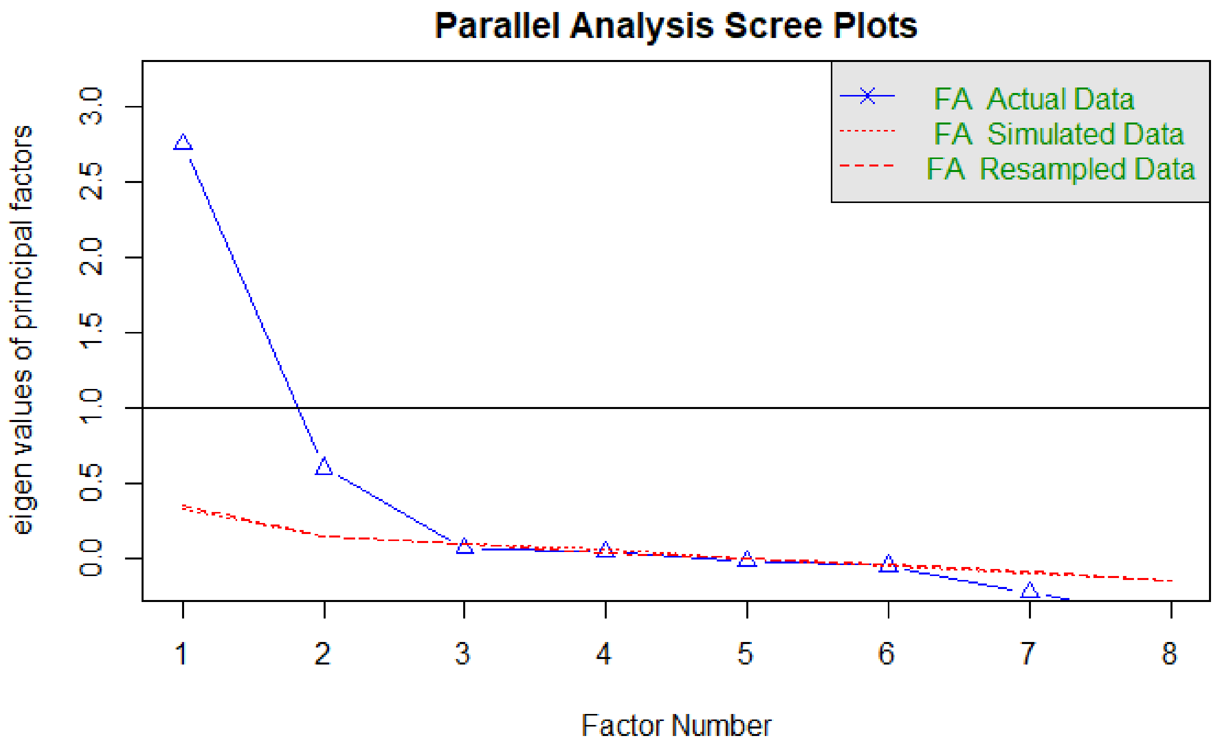


Table 5.22 shows the factors and loadings. This means that in Table 5.22 we understand which are the *Arctic Shores* scores that define the two factors revealed by the exploratory factor analysis. Variables with loadings less than .32 and with no loading on more than one factor were suppressed. (Tabachnik & Fidell, 2014). This analysis resulted in two factors. These two factors have been named *Social* and *Cognitive*.

Table 5.22
Factor Loadings from Exploratory Factor Analysis

Variable	Factor loading		Communality
	Cognitive	**Social**	
Concentration	.592		.37
Executive functioning	.724		.52
Learning agility	.885		.78
Processing speed	.804		.64
Resilience	.669		.45
Self-monitoring		.791	.62
Sociability		.376	.14
Social dominance		.478	.23

Three variables (Table 5.22) were found to have a strong relationship (i.e., loadings > .32) with the *Social* factor, and five with the *Cognitive*, indicating a strong and solid factor structure (Costello & Osborne, 2005). Regarding consistency, the items for both the *Cognitive* and *Social* factors had a Cronbach's alpha coefficient of .85 and .54, respectively, indicating poor or questionable reliability.

To summarize, the factor which aggregates concentration, executive functioning, learning agility, processing speed and resilience is designated the *Cognitive* factor, whereas the one which aggregates self-monitoring, sociability, and social dominance is the *Social* factor (Figure 5.11).

Figure 5.11

Cognitive and Social factors based on the Arctic Shores descriptors included

2019
COGNITIVE
○ learning agility
○ processing speed
○ executive functioning
○ concentration
○ resilience
SOCIAL
○ sociability
○ social dominance
○ self-monitoring

The *Social* factor includes the 3 employability predictors described in Table 5.23:

Table 5.23

Behaviors Defining the Predictors Grouped in the Social Factor

EMPLOYABILITY PREDICTORS	BEHAVIORS
Sociability	are more inclined to feel energized by social stimulation and enjoy spending a lot of time interacting with other people, likely to become bored when lacking social interaction
Social dominance	are more likely to be self-assured, assertive, and confident when interacting with others
Self-monitoring	are more inclined to regulate their behavior in response to social cues, to accommodate the requirements of a situation or audience

Source: Arctic Shores Sample Report – Appendix D.2

The *Cognitive* factor includes the 5 employability predictors described in Table 5.24:

Table 5.24
Behaviors Defining the Predictors Grouped in the Cognitive Factor

EMPLOYABILITY PREDICTORS	**BEHAVIORS**
Learning agility	learn new skills easily, adapt easily to unfamiliar environments, are open to new ideas
Processing speed	tend to process information more quickly than others, likely to do well when rapid comprehension of information is required
Executive functioning	tend to have a greater capacity to plan tasks and adjust actions to unforeseen circumstances, likely to manage and analyze complex information with more ease
Concentration	tend to maintain focus in distracting environments and can perform at an optimal level for an extended period
Resilience	tend to recover more quickly from setbacks and are more likely to remain focused on a goal under adverse circumstances

Source: Arctic Shores Sample Report – Appendix D.2

To summarize, exploratory factor analysis was used to group the *Arctic Shores* scores that vary together. This makes it easier to model in a regression because it reduces a large number of variables (i.e., the 30 *Arctic Shores* scores) into a smaller set of factors. Each factor explains a percent of the total variance of the employability predictors. Factors that do not explain much variance might not be worth including in the final model and in this analysis, two factors were identified, i.e., *Social* and *Cognitive*. The next step in the analysis (see Section 5.5.iii) is a regression analysis to test the significance of the association between the independent variable IV - having done an international internship - and the dependent variable DV - employability (measure by the *Arctic Shores* scores).

Table 5.25
Eigenvalues, Percentages of Variance, and Cumulative Percentages for Factors for the 8 Item Variable Set

Factor	Eigenvalue	% of variance	Cumulative %
Cognitive	2.75	34.4	34.4
Social	1.01	12.6	47.1

In particular, the *Cognitive* factor accounted for 34.4% of the variance with an eigenvalue of 2.75, while the *Social* factor accounted for 12.6% of the variance with an eigenvalue of 1.01. Therefore, the two-factor model accounted for 47.1% of the total variance in the data. The factor analysis summary is shown in Table 5.25. This means that by using the 8 variables (5 for the *Cognitive* factor and 3 for the *Social* factor) it is possible to explain 47.1% of the variances of all 30 *Arctic Shores* scores.

5.5.iii Linear Regression Analysis Predicting the Cognitive factor

A regression analysis was conducted to assess whether the *Cognitive* factor is associated with having done an international internship. Also, the effect of potential control variables as international or domestic casual work, study abroad, gender, and age was evaluated.

To specifically answer the research question, only the students with at least domestic internship experience or both domestic and international internship were included in the model. Program-related international internship considerably affected the *Cognitive factors*.

The effect of control variables was then analyzed. Based on the Akaike Information Criterion (AIC), age (.001 $\pm$ .005, t = 0.257, p = .798), major (health/science vs engineering, -.013 $\pm$ .294, t = -0.044, p = .965; social/humanistic vs engineering, -.18 $\pm$ .108, t = -.167, p = .867), study abroad (-.020 $\pm$ .104, t = .189, p = .850), and international (.134$\pm$.154, t = .873, p = .383) or domestic (.070 $\pm$.098, t = -0.712, p = .477) casual work turned up irrelevant as control variables, while gender and its interaction with international internship were retained in the model. The gender resulted in an effect modifier affecting the employability along with the investigated predictor meaning that two values of effect size must be calculated, one for each gender. This means that a further analysis was performed to understand if there is any significant effect on the *Cognitive* factor for males who have done an international internship (predictor or IV) and the same analysis was performed for females.

Finally, the comparison between the gold standard model which includes all potential control variables (age, major, study abroad and international or domestic casual work variables, and the reduced regression models, the models without those variables was done.

The reduced models did not highlight any confounding effect. Indeed, as shown in Table 5.26**,** the estimate of the predictor in the reduced models is "essentially" the same as the gold standard (model including all the potentially control variables), when potentially control variables are dropped from the model. A difference of less than 10% between the estimates of the predictor variable under the different models is evidence of no confounding effect and in this analysis the maximum difference in estimates was 3.4% referred to the two control variables age and major, if retained in the model. This means that the association between the predictor/IV (having done an international internship or not) and the *Cognitive* factor is not affected by the presence of variables such as age, major, study abroad and international or domestic casual work. There is however an association with gender which was kept in the regression model.

Table 5.26
The model with all variables (gold standard) and the reduced models, compared

Model	Estimate of the predictor	95% Confidence Interval	% of variation
Gold standard	0.673	[0.389, 0.956]	---
No age	0.674	[0.391, 0.958]	0.0%
No age, major	0.673	[0.391, 0.955]	0.0%
No age, major, study abroad	0.679	[0.475, 0.912]	0.9%
No age, major, study abroad, and domestic/international casual work	0.681	[0.407, 0.956]	1.2%

Note. A difference less than 10% between the estimates of the predictor variable under the two models is evidence of no confounding effect.

The overall final model was significant, $F(3, 431) = 24$, $p < .0001$, $R^2 = .14$, meaning that approximately 14% of the variance in *Cognitive factor* is explainable by WR international internship, gender, and their interaction (Table 5.27). This means that in the enrolled population the talent analytic tool detected a *Cognitive* factor which is higher in male than in female students ($p < .0001$). However, when the students experienced a program-related international experience, this difference was drastically reduced ($p = .07$). Overall, the effect of a program-related international internship is greater in female than in male students.

This is a very unexpected and significant result, which indicates that while female students' *Cognitive* factor appears to be lower than males' *Cognitive* factor in the overall 2019 students' sample, the analysis found that this gender effect disappears for females who have done an international internship. It appears therefore that the association between the positive correlation with the *Cognitive* factor of an international internship is stronger for female students than for male.

Table 5.27
The final regression model analyzing the relationship between program-related international internship and Cognitive factor adjusted for gender

Variable	β	*SE*	95% CI	*t*	*p*
(Intercept)	-0.538	0.078	[-0.690, -0.385]	-6.936	< .0001
Gender (M vs F)	0.688	0.111	[0.470, 0.906]	6.205	< .0001
Work Related International vs Domestic Internship	0.681	0.140	[0.407, 0.956]	4.882	< .0001
Work Related International Internship*Gender	-0.437	0.185	[-0.799, -0.074]	-2.367	.0184

Note. Results: $F(3, 431) = 24$, $p < 0.0001$, $R^2 = .14$

5.5.iv Linear Regression Analysis Predicting the Social factor

A regression analysis was conducted to assess having done an international internship adds something to the experiential learning of a domestic internship in terms of graduate employability measured through the *Social factor*. Also, the effect of potential control variables such as international or domestic casual work, study abroad, gender, major, and age was evaluated. To specifically answer the research question, only the students with at least domestic internship experience or both domestic and international internship were included in the model. Regression results were not significant, F (9, 426) = 0.682, p = .725, R^2 = .01, indicating that neither program-related international internship nor any of the other control variables had an additive impact on employability skills as measured by the *Social factor* (Table 5.28).

This means that this study finds no association between the *Social factor* and international internship participation. Such a contradictory finding is also quite unexpected. Many studies (Jones, 2013 gives examples) identify predominantly social and interpersonal skills as being those usually developed by international experiences. It is surprising therefore that *Social* factor skills in this study were not associated with the international internship experience.

Table 5.28
Results of the regression model for Social factor

Variable	β	*SE*	95% CI	*t*	*p*
(Intercept)	1.725	10.300	[-18.521, 21.971]	0.167	.867
YOB	-0.001	0.005	[-0.011, 0.009]	-0.143	.886
Health/Science vs Engineering	0.141	0.319	[-0.485, 0.767]	0.443	.658
Social Sciences and Humanities vs Engineering	-0.078	0.117	[-0.308, 0.151]	-0.671	.503
Gender (M vs F)	-0.190	0.121	[-0.428, 0.047]	-1.574	.116
Work Related International vs Domestic Internship	-0.007	0.156	[-0.314, 0.301]	-0.042	.967
Work Related International Internship*Gender	0.032	0.202	[-0.365, 0.430]	0.160	.873
Casual Domestic Internship	-0.080	0.106	[-0.289, 0.129]	-0.752	.452
Casual International Internship	0.120	0.167	[-0.208, 0.447]	0.716	.474
Study Abroad	-0.102	0.112	[-0.323, 0.118]	-0.913	.362

Note. Results: $F(9,426) = 0.682$, $p = .725$, $R^2 = .01$

5.5.v The Effect of Studying Abroad

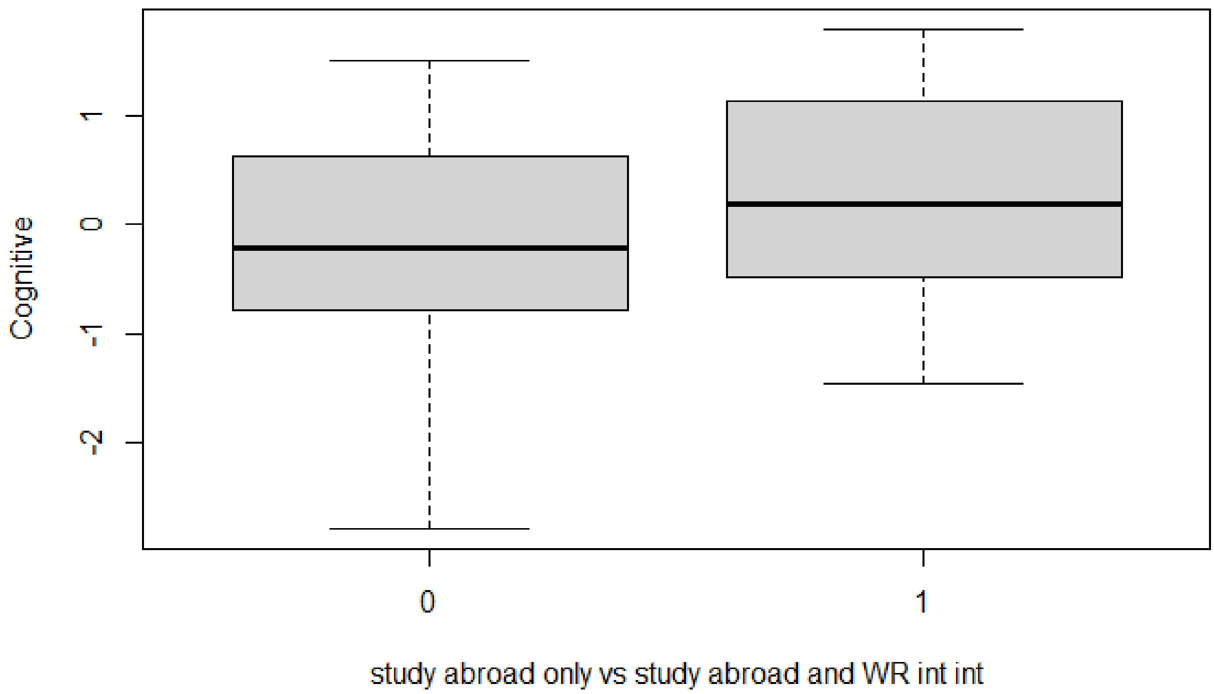
To evaluate whether an international experience in general could increase the employability, the relationship between studying abroad and program-related international internship was investigated. The 2017/2018 dataset included 329 students who studied abroad. Among them, 165 also had a program-related international internship.

Figure 5.12 shows the distribution of the *Cognitive* factor based on the student's experience. It is worthy of note that, having done an international internship adds something to the experiential learning of studying abroad in terms of graduate employability measured through the *Cognitive factor*. Indeed, the value of *Cognitive* factor in the students who experienced a program-related international internship was significantly greater than in the students who did not experienced it (.276 vs. -.182, $t = -7.573$, $df = 492.76$, $p < .0001$).

This is a quite significant finding, especially given that one of the limitations of this study is that employability was assessed before the internships. This result though gives at least one term of comparison, indicating the importance of the international internship over other kinds of international experience. What this result shows is that the *Cognitive* factor is significantly higher for the students who have had both an international internship and a study abroad experience, if compared with those students who have had only a study abroad experience and no international internship.

The boxplot in Figure 5.12 shows this result graphically: the black line indicates the level of the *Cognitive* factor in the two groups of students. The students with both study abroad and international internship experiences have a significantly higher *Cognitive* factor.

Figure 5.12
Boxplot showing the relationship between having an abroad experience and employability measured through the Cognitive factor



Note. *WR*, program-related. 0 = study abroad; 1 = study abroad and having a program-related international experience.

5.6 Key Results and their Size Effect

Table 5.29 summarizes the key results from the three years covered by the analysis.

The second column indicates the factors representing the dependent variable, employability. The *Social* and the *Cognitive* factors are the two factors that emerged from the EFA. The third column is the predictor or independent variable (IV), whether the students have done an international internship or not. The fourth column is for the control variables that were found significant, in this case only gender. The last column is Cohen's *d* (Cohen, 1988; Kelley & Preacher, 2012), a number that represents the size of the influence of the predictor/IV and the control variables on employability, represented by the *Cognitive* and *Social* factors.

Cohen's *d* is used to look at the effect size when comparing any two groups to see how substantially different they are. Cohen's *d* is defined as the difference between the mean values of the factor under study between two conditions (having a specific characteristic or not) divided by the standard deviation of the factor. In our case the difference in the means of the *Cognitive* factors between the group of students, where the condition is having done an international internship or not. Cohen's *d* is dimensionless and its interpretability follows the suggestions of Cohen (Cohen, 1988) that indicated .2 as small, .5 as a medium, and .8 as large effects.

Table 5.29
List of the variables that were associated with employability as defined through dimensional constructs

Year	Underlying factor	Predictor/IV	Control variable (s)	Effect size (Cohen's *d*)
2017	Cognitive	Work Related International Internship	Male	0.20
			Female	0.76
	Social	---	---	---
2018	Cognitive	Work Related International Internship	---	0.41
	Social	---	---	---
2019	Cognitive	Work Related International Internship	Male	0.27
			Female	0.75
	Social	---	---	---

In the 2017 and 2019 dataset, gender, and the investigated predictor/IV (having done an international internship or not) resulted in an effect modifier affecting employability, subsequently two effect sizes were calculated, one for each gender. This means that in 2017 and 2019 the combined effect of having done an international internship and the gender female resulted in a significant effect on the *Cognitive* factor. The combination of an international internships and the gender female appears in both years, 2017 and 2018 as a rather large size effect, with a Cohen's *d*, of 0.76 and 0.75, close to the .8 which defines a large effect.

This means that with a Cohen's d of 0.76, 77.3% of the group of students with international internships will be above the mean of those with no international internship (Cohen's U3), 70.8% of the two groups will overlap, and there is a 70.2% chance that a person picked at random from the group of students with international internships will have a higher score than a person picked at random from the group of students with no international internship (probability of superiority).

To summarize, this means that undertaking an international internship is associated with enhanced employability. Cognitive skills represent the main factor involved in this kind of experiential learning process. This finding is confirmed throughout the three investigated years. In addition, when a gender difference in the *Cognitive* factor associated with employability emerges (years 2017 and 2019), having undertaken an international internship drastically reduced the gap.

5.7 Summary

This results chapter is strongly based on the statistical analysis of the quantitative data. It began with descriptive statistics, where detailed information about the characteristics of the students in the datasets was presented. Inferences from the data progressed to more general considerations by using the appropriate statistical models. Finally, results were analyzed to test their significance. The focus in this chapter was on trying to clearly explain the statistical methodology used, for the study to be replicable and for the reader to be able to follow the process leading from the data collection to the results.

In this chapter there was little focus on the impact of the results and how they relate to the research question. Chapter 6 therefore acts as a transition between the results chapter and the recommendations. First, a summary of the results is presented, along with how these results relate to the main variables of the study and how the results translate into findings. Section 6.4, discusses the implications of the information provided by the findings concerning the research question.

Chapter 6 : Summary of Findings and Discussion

6.1 Introduction

The research question this study sought to answer was: Do higher education student internships in an international context differentially influence employability behaviors compared to a domestic internship alone?

The significant findings of this study that relate to the research question are discussed in this chapter.

The first finding answers the research question. When an internship takes place in a country different from that of the student's home, there is additional experiential learning from the international context, which contributes further to the experiential and transformative learning already developed through the internship.

It also appears that this additional element is associated with employability behaviors predicted by *Cognitive* and not *Social* factors. This contrasts with earlier studies on the impact of international experiences, which generally find that social and interpersonal skills are developed.

This study also finds that when there appears to be a gender bias toward male students in employability behaviors predicted by cognitive abilities, this bias disappears when associated with international internships.

This chapter discusses the research findings in more detail, in the context of the theories that inform the theoretical framework of this study and in the context of the existing literature.

Some sections are reproduced from two jointly-authored sources. The first is a chapter "Understanding how international experiences engage employability. A game-based analytics approach" (Predovic & Dennis, 2019). The second is an article entitled "International internships and employability: A game-based assessment approach" by Predovic, Dennis and Jones (accepted by Higher Education Research and Development and published online on March 22nd, 2021). Reproduced with thanks and permission from my co-authors.

6.2 Translating Results into Findings

In the three years covered by the analysis, the exploratory factor analysis reveals two independent factors a *Cognitive* and a *Social* one. Table 6.1 illustrates in each year the single predictors grouped under the *Cognitive* and the *Social* factor.

Table 6.1
The Factors, by year of data collection

2017 DATASET	2018 DATASET	2019 DATASET
• **Cognitive**: o learning agility o quick thinking o data fluency o creative insight • **Social:** o social intelligence o diligence o teamwork o attention to details o customer focus o action orientation o coachability	• **Cognitive:** o learning agility o processing speed o executive functioning o concentration o processing capacity • **Social**: o sociability o social dominance o emotional stability	• **Cognitive**: o learning agility o processing speed o executive functioning o concentration o resilience • **Social**: o sociability o social dominance o self-monitoring

The quantitative results from this study show that, for all three years covered by the analysis, an internship taking place in a country different from the student's country of origin is associated with an additional element in employability behaviors and that this additional element is related to students' cognitive and not social abilities.

Table 6.2 illustrates the variables that had a significant association with the *Cognitive* factor.

Table 6.2
The Relationship Between the Cognitive Factor and Experiences (predictors sorted by year)

2017 DATASET	2018 DATASET	2019 DATASET
• **Cognitive**: o international internship o gender o interaction - international internship and gender	• **Cognitive**: o international internship	• **Cognitive**: o international internship o gender o interaction - international internship and gender

Note. The *Social* Factor had no statistically significant predictors in any of the datasets.

6.3 Description of Significant Results

Four significant findings emerge from this research.

The first finding answers the research question: Do higher education student internships in an international context differentially influence employability behaviors compared to a domestic internship alone?

The answer is yes. Consistently in all three years covered by the analysis, international internships are associated with higher levels of employability related behaviors.

But there is an even more important aspect to this. The higher levels of employability associated with students who have done an international internship are unexpectedly related to cognitive behavior predictors and not to social ones.

Using exploratory factor analysis, the number of variables used to predict the behaviors associated with employability was reduced to two factors: the *Cognitive* and the *Social*. It was therefore easier to understand and interpret the results using only two factors associated with the level of employability, instead of having to consider more than 30 *Knack* or *Arctic Shores* scores originally used as measures of employability. What these results demonstrate is that in all the three years covered by the analysis, the *Cognitive* factor is higher in students who have taken part in international internships. This means that the behaviors associated with capabilities such as e.g., learning agility, quick thinking, and processing speed were predicted in the group of students with an international internship more frequently and strongly than in those with no international internship experience.

This is a rather unexpected finding. This research is among the first to demonstrate that cognitive skills are associated with international internship participation, as opposed to the social skills which are usually identified as being impacted by international experiences (Janson et al., 2009). No significant direct relationship was in fact found between any of the variables (independent – international or domestic internship - or control variables – age, gender, major, study abroad, casual work experience) and the *Social* factor.

The third finding of the analysis is that in 2017 and 2019 there is a significant association between the gender male and the *Cognitive* factor, meaning that males perform better on the cognitive abilities measured by the digital-game-based assessments than females.

In 2017 and 2019, both the years wherein a gender bias in the *Cognitive* factor was found, this gender bias disappears for the students who have done an international internship. This means that, although in the sample of 414 students for 2017 and 459 for 2019, males appear to perform better on the *Cognitive* factor, in those two years *Cognitive* factor performance is the same for both males and females amongst the 94 students doing an international internship in 2017 and the 186 who did so in 2019. What this implies is that the positive association for student employability of an international internship appears to be greater for female than male students.

This last finding is the most unexpected. This study did not aim at investigating or understanding if or why there is a gender bias in the correlation of international internship experiences with employability. The literature review did not focus on gender bias, either associated with internships or international experiences, or with cognitive abilities or gaming.

To summarize, this research makes a unique contribution to the field in that it is the first to find, by measuring predicted workplace behaviors and not self-reported skills, that there is:

- a significant association between international internships and cognitive abilities, used to assess employability;
- a potentially higher positive association between international internship and cognitive abilities, used to assess employability, for female than for male students.

6.4 Interpretation of Findings

The interpretation of this study's findings is discussed in three different sections. The first section discusses the findings relative to the research question and describes the implications regarding the relationship between international internships and cognitive abilities. The second section examines the implications of the findings relative to gender differences in cognitive skills and digital gaming. The third section focuses on the interaction between international internships, gender, and cognitive abilities. To support the discussion on the results of the quantitative analysis and better understand the underlying implications for practice, an overview of previous research on the individual variables will also be presented in each section.

6.4.i International Internships and Cognitive Abilities

The first finding of this study shows a significant association between international internships and the behaviors that predict employability. The second finding adds further insight to the first finding and reveals that it is the behaviors associated with cognitive abilities that are associated with international internship and not the social or interpersonal ones. These findings are consistent over the three years covered by the analysis. This means that students who have done an international internship scored higher than their peers on the *Knack*/*Arctic Shores* predictors grouped by the Exploratory Factor Analysis as a *Cognitive* factor.

A significant amount of literature (Chapter 2) investigates the positive relationship between work experiences and employability. There is a wide consensus on the fact that internships are an effective instrument for the development of students' technical and transferable skills and therefore that they enhance employability. The literature supporting these findings relies on data collection methodologies based on the use of surveys with students and employers. Students' perceptions on the positive effects of internships on the development of transferable skills have been investigated extensively (Ruth Brooks & Youngson, 2016; Drysdale et al., 2016; Edwards, 2014; D. Jackson & Wilton, 2017b; Mahmood et al., 2014; Qenani et al., 2014). Also, employers' perspectives on the benefits for students in terms of skill development after an internship have been investigated (Hall et al., 2010; Jaaffar, 2016; Sauder et al., 2019; Stack & Fede, 2017). Employers though not only agree on the fact that internships help develop transferable skills in students, but also find that having done an internship has a strong signaling effect on potential employers. It appears that students who have done internships are more likely to get hired (Gault et al., 2010; McMurray et al., 2016).

The research, based on the analysis of students' behaviors associated with employability, supports the findings of these previous studies but only if the internships take place abroad. No significant association was found between domestic internships and the *Social* or *Cognitive* factors associated with employability behaviors.

There are though significant differences between the approach adopted in the research and those in the literature referred to. This study is the first to measure employability through a digital game-based assessment which measures employability based on predicted behaviors. All previous research instead relied on employability assessment methodologies such as questionnaires or surveys. These questionnaires and surveys investigate the level of students' transferable skills as perceived by the different stakeholders. Such assessments vary from self-assessements done by students/graduates to surveys aimed at capturing the perceptions of employers or higher education professionals.

There is also a significant amount of research (Chapter 2) supporting the benefits of international experiences for employability. Graduates who have participated in international experiences during their studies perceive these experiences as very positive in terms of their transferable skill development (European Commission, 2019; Farrugia & Sanger, 2017; Ota & Shimmi, 2020; D. Potts, 2019). A lot of research supports the signaling effect of international experiences. Both students and employers find international experiences to be important for the enhancement of employability, with a focus on the symbolic capital and "pursuit of distinction" that having done such an experience communicates to potential employers (Brooks, Waters, & Pimlott-Wilson, 2010; Green, King, & Gallagher, 2020; Tran & Soejatminah, 2016).

According to Woolf (2018), "the real value of internships has less to do with direct employability and more to do with transferable skills" development (Woolf, 2018 p. 82). Besides, "the gains from international experience represent enhancements to the skills and abilities, which tend to be developed by all graduates rather than being part of a unique set of attributes gained through concentrated engagement with another culture and society" (Wright, Jones, & Welland, 2018, p.256).

The research has found that international internships are indeed associated with higher levels of employability. What is unexpected, however is that the research finds international internships are not associated with behaviors related to social or interpersonal abilities (Janson et al., 2009), but with cognitive skills. This study observes that students who have done an international internship are more likely to exhibit employability behaviors defined by the higher order, cognitive, skills according to Bloom's taxonomy (Bloom, 1956).

Learning agility is the behavior that really stands out among those grouped in the *Cognitive* factor (see Table 6.1). Students who have done international internships are those who have learned to learn quickly. This is not a word-game but a concept associated with an ability which is crucial (Predovic, 2020). Being able to learn how to quickly learn things it is particularly relevant in today's very dynamic world of work. Learning to learn new skills quickly is what makes the difference in being able *"to find, create and sustain meaningful work across the career lifespan"* (Bennett, 2018a, p. iv). This study suggests that this ability as well as other cognitive abilities such as quick thinking and processing speed are those associated with the behaviors of students who have done an international internship.

There is some evidence that students who have done internships score higher on math and problem solving (Drysdale et al., 2016). Leppanen, Saarinen, Nupponen, and Airas (2014) examined employers' perceptions in Finland and demonstrated the link between international experiences and cognitive skills, both of which are highly valued in the workplace.

No study known has yet investigated the relationship between domestic and international internships in terms of workplace behaviors and cognitive capabilities. There are a few studies (Cranston, Pimlott-Wilson, & Bates, 2020; Tran & Soejatminah, 2017) which instead analyze from the employers' perspective the symbolic capital, signaling effect, and the distinctiveness of an international internship versus a domestic one.

Tran and Soejatminah (Tran, 2016; Tran & Soejatminah, 2016, 2017), in analyzing work-integrated learning experiences of international students in Australia, use Bourdieu's framework of social capital, habitus, and field to understand students' development and employability gains. For students, being immersed in an international work environment is, in Bourdieu's terms, the equivalent of entering a new social field. This allows them to "develop habitus for their future workplace and thus enhance their employability" (Tran & Soejatminah, 2016, p.342). This entails "economic capital gain and enables learners to develop knowledge and skills reflecting cultural capital development" (Tran & Soejatminah, 2016, p.351). At the same time, they develop social capital again very closely linked to economic capital. International work experience is seen as an element of distinction which differentiates graduates in highly competitive domestic job markets and is closely linked to the return on the investment in the international experience.

Cranston, Pimlott-Wilson, and Bates (2020) confirm that also for UK students including international work experience in a resume bears a symbolic value and is *"articulated … in the context of distinction through gaining cultural capital"* (Cranston et al., 2020, p.146).

This study seems to suggest that international internships are associated not only with gains in terms of symbolic, social, and cultural capital as discussed by Tran and Soejatminah (2017) and Cranston et al (2020), but that there appears to be more. Entering the novel social field of an international workplace challenges students' habitus. Students' attitudes, aptitudes, and aspirations, or dispositions are shaped by their personal histories, familial background, previous education, and previous experiences. This study finds that international internships are associated with changes in students' habitus, and more precisely with more developed cognitive abilities and not the abilities that pertain to the social or interpersonal sphere.

Pinto and Pereira (2019), through an experimental research design, compare the perceived employability of students with domestic, international, or no internships in Portugal. They create six fictitious resumes, two with international internships, two with domestic internships, and two with no internship. Recruiters in companies were asked to rate the resumes according to a questionnaire. The absence of an internship decreases the perceived employability, but the international internship does not seem to offer any distinctiveness against a domestic one or increase the chances of a job interview. Their findings contradict Tran (2016) and Cranston et al. (2020) who researched the symbolic value of international internships and found that students with international work experience gain a positional advantage in their domestic labor markets as well.

But, as previously stated, none of these studies compare the employability associated with an international versus a domestic internship. These studies focus instead on societal, political, and labor market factors, not on predicted workplace behaviors, which is the way employability is measured in the current research.

The effect of internships and international experiences on employability have been considered through the literature review but the findings are quite contradictory. However, in the current research, the findings are consistent over the three years of analysis in pointing towards a significant association between international internships and the *Cognitive* factors that affect the behaviors associated with employability.

A really important difference between this study and the extant literature lies in the way employability is defined and assessed. For this reason, relevant literature on employability definitions, development strategies and assessment methodologies has been extensively described and analyzed. Most studies on the effects of internships and international experiences on employability focuses on whether the experience increased the possession of a set of transferable skills in students. Furthermore, the assessment is done by surveying the perceptions of the stakeholders: the students themselves, the employers, or the higher education professionals. The current research, instead, is not based on perceived employability but, through the use of digital game-based assessments, it uncovers the hidden employability potential in students' predicted behaviors.

Reviewing the literature to find reasons for the positive association found in this dissertation between international internships and behaviors associated with cognitive abilities proved rather inconclusive. In order to better understand this unexpected relationship, it is necessary to go back to the theoretical framework on which this study is grounded.

Is an internship in an international context an experience so transformative that it triggers learning in a different way? Chapter 3 demonstrates, supported by literature, that both internships and international experiences are learning experiences. The challenge in understanding the findings of the current study is to isolate the particular characteristics of an international internship experience which differentiate it from either domestic internships or other types of international experiences, such as study abroad.

The first of the three theoretical frameworks used in the current study is experiential learning theory (section 3.2.i). This posits that for learning to occur, there must be a continuous reflection on and understanding of what is being experienced and how the resulting learning can be transferred to other contexts. The second framework, transformative learning theory (section 3.2.ii) postulates that learning occurs when a person experiences something which challenges their frames of reference. In the third framework, Bourdieu provides the theoretical concepts (section 3.2.iii) which can frame the whole process. A student enters an experience with his/her own cultural and social capital, carrying his/her own habitus, derived from the social fields they have experienced.

The literature reviewed up to this point helps to demonstrate that internships and international experiences are both learning and transformative experiences. Tran and Soejatminah (Tran, 2016; Tran & Soejatminah, 2016, 2017) frame these experiences using Bourdieu's concepts of social field and habitus. Internships and international experiences are new social fields for students, and by experiencing them the students develop new habitus. This adds to their existing habitus, thus increasing their cultural and social capital. The question is why the international context of an internship triggers a different kind of learning than either a domestic internship or other kinds of international experience.

Grounded in experiential and transformative learning and cultural capital theories, several reasons can be proposed. First, the amount of reflection, conceptualization, and experimentation (experiential learning theory) needed to succeed during an internship in another country may be more than that needed for a study abroad experience or a domestic internship. During internships students have supervisors who monitor their work and with whom they reflect on their progress. In the case of an international internship this supervisor is likely to be from a different nationality and cultural background. It is reasonable to suppose that learning how to interact, communicate and deliver performance daily in a workplace different from what a student may be used to at home, may require more effort in terms of reflection and understanding. This could be one reason behind the association between an international internship and cognitive factors such as learning to learn quickly.

Similarly, having to work with, report and prove oneself to a person who does not necessarily share the same values, see things in the same way or react in ways one would expect can be disorienting and may cause personal frames of reference to be questioned. It is possible that this profound disorientation is more likely to occur in an international working environment than in a domestic one. It might determine the need to be more concentrated and to be able to think quickly to understand what is expected and how to manage new situations.

Finally, Bourdieu's theory can yield a different perspective. Based both on studies of self-selectivity in students who participate in mobility experiences (section 2.3.iii) and on Bourdieu's cultural and social capital theory several questions can be raised. Is it possible that students who decide to participate in an international internship are different from non-mobile students, or even more specifically are they different from students who are internationally mobile but who choose study abroad programs and not international internships? Is it possible that the relationship between international internships and cognitive factors works the other way round, namely that students are more likely to participate in international internships because of their specific abilities/characteristics? If these reflect a given student's habitus, it is also plausible that higher cognitive skills relate to a higher likelihood of participating in international internships.

Several studies have suggested that international mobility serves as a strategy for distinction and reproduction of social class (Netz & Finger, 2016; Pöllmann, 2016; Wiers-Jenssen, 2013; Wiers-Jenssen & Støren, 2020). Krarup and Munk (2016) suggest using Bourdieu's field theory when analysing phenomena through the lens of cultural and social capital.

> One inevitable consequence of the field theoretical approach is starting out with a *display of overall structures of the field. Such a display can be done based on educational outcomes, possibly taken in relation to socioeconomic, sociogeographical, and sociopolitical background. It may seem counter-intuitive to start out with outcomes, but statistics are always post-factum and in a sense the explanans is always deduced from the explanandum in statistics. But rather than assuming that a social structure of unequal outcomes has somehow emerged from isolated individuals with different traits starting to interact, in field theory it is more appropriate to think of individuals as being positioned in social structures from the outset and as being affected by these structures in various ways depending on life trajectories in the field structures.* (Krarup & Munk, 2016, p.21).

It is therefore quite possible that scoring higher on cognition does relate to a higher likelihood of participating in an international internship.

However, the results of the analysis presented in sections 5.3.vi, 5.4.v and 5.5.v add an interesting perspective to the association of international internships with cognitive abilities. The results presented in those sections indicate a significantly higher cognitive factor in students who have done an international internship compared with those who studied abroad. This highlights the fact that it appears not to be the international context tout court that is associated with the cognitive factor but specifically an internship undertaken in an international context. As suggested by Wiers-Jenssen et al (2020) further studies on the employability and selectivity of mobile students must be careful in making a clear distinction between different types of international experiences and the specific impact of the international context on internships in general.

6.4.ii Gender, Cognitive Abilities, and Digital Gaming

The third finding of this study reveals that men perform, over two of the three years (2017 and 2019) covered by the analysis, better than women on behaviors associated with the *Cognitive* factor abilities. Employability in this study was measured through a digital game-based assessment, therefore this section analyzes the possible gender bias of this kind of assessment linked to cognitive capabilities, in the context of the relevant literature.

Two elements appear to be significant in interpreting these findings:

- males' versus females' performance on cognitive abilities,
- males' preferences and performance differences compared to females in digital games.

Based on psychological research from the 1930s to the 1970s, gender stereotypes on men outperforming women in cognitive abilities such as math tests were held as accurate (Hyde, 2016). Today, though, in current studies on sex differences in cognitive abilities, gender stereotypes about males outperforming females are not confirmed, on the contrary, no differences are found for example on the results for mathematics assessments between men and women (Halpern & Lamay, 2000; Hyde, 2016; Solianik et al., 2016).

It is necessary to investigate further literature to look for possible explanations. The gender bias in one very specific cognitive domain has been noted in the literature: the manipulation of visual images in working memory (Halpern & Lamay, 2000), short-term memory in general, and attention switching (Solianik et al., 2016). Hirnstein, Freund, and Hausmann's research (2012) and Hyde's (2016) meta-analyses of gender stereotypes research, confirmed that males, in general, outperform females in spatial tests (Wieder & Wachs, 2012), while women outperform men on verbal tests (Borgonovi, 2016). These findings are very relevant for understanding the implications of this study. Manipulation of visual images in short-term working memory and attention switching are relevant abilities for digital games. The tasks the players must perform during the gameplay very often involve these abilities, therefore the literature on gender and digital gaming is discussed in greater detail.

Quaiser-Pohl, Geiser, and Lehmann (2006) investigated the relationship between these gender differences in spatial visualization abilities and gender preference for gaming. Their results confirm that, also in games, males perform better than females on mental rotation tests (MRT) and that males who play games often, perform better on MRT compared to males who play games less frequently. However, the same result was not found for females who play games often, compared to females who play games less frequently.

In general, males compared to females have a preference for digital games and tend to be more competitive (Quaiser-Pohl et al., 2006). The preference of males for digital games and their superior performance in MRT could have been a possible explanation for the results indicating that males perform better than females in the behaviors associated with cognitive abilities. However, this does not appear to be the case. In year 2017 (Table 5.2) there are fewer female (36% female students) than male students in the sample. But both in 2018 (Table 5.3) and 2019 (Table 5.4) the proportion of female to male students is the same, 46% female vs 54% male. Furthermore, both in 2018 and 2019 the same digital game-based assessment was used, the *Arctic Shores*. It appears therefore that the reported preference of males for digital games and their superior performance in MRT cannot be the cause of the results in this study.

Research on gender differences in digital gaming has demonstrated that men play more videogames than women (Shen, Ratan, Cai, & Leavitt, 2016), even though the number of game-playing women is increasing (Shaw, 2012; D. Williams et al., 2009). When playing, research shows that women exhibit higher levels of anxiety than men (Huang, Hood, & Yoo, 2013) and that males have a more positive attitude about gaming than females (Bonanno & Kommers, 2008; Vermeulen & Van Looy, 2016).

Regarding the competitiveness element in gender-based results (Hopland & Nyhus, 2016), research demonstrates that men, in general, are more likely to be motivated by achievement (Chung & Chang, 2017; Sailer, Hense, Mayr, & Mandl, 2017; D. Williams et al., 2009; Yee, 2006) and to play highly competitive games (Hanek, Garcia, & Tor, 2016; Hartmann & Klimmt, 2006). Females, on the other hand, are more motivated to play via social interaction (Dyck & Holtzman, 2013; D. Williams et al., 2009), relationship, and immersion (Yee, 2006). The literature on a possible gender bias in cognitive abilities, in digital gaming and in cognitive abilities associated with digital gaming is not conclusive nor there is really any kind of strong consensus. It does not seem that the gender bias in these findings can be attributed to any of the above factors. Further research is needed to appropriately interpret the findings of this study concerning the gender bias associated with cognitive abilities in 2017 and 2019.

To be able to correctly interpret the results of this study, it would be necessary to try and isolate the gender effect from the digital game-based assessments. How relevant is the gender bias in understanding why in this study males outperform women in cognitive abilities? Do spatial visualization abilities, short-term working memory, and gaming preferences play a significant role for *Knack* and *Arctic Shores* players?

The *Knack,* used as the measurement tool in 2017, has a very basic graphical interface. The two games (Meta Maze and Dashi Dash) used for the assessment do not involve moving objects in space or moving from one environment to a different one, but they do make extensive use of short-term working memory to perform the requested tasks.

The *Arctic Shores Skyrise* game used in 2018 and 2019, was chosen by the multinational's HR team because it is much more enticing in terms of visual experience. According to them it "looks more like a real video-game." It is a 3D game, where the player moves from one floor to another in a skyscraper and faces different challenges. *Skyrise* does involve the use of short-term working memory and has also a significant amount of mental rotation involved in performing the tasks requested. This could appear to partially explain the gender bias in 2019, consistent with Quaiser-Pohl et al's (2006) findings, but it is not the case, because the same *Skyrise* game was used also in 2018, when no gender bias toward cognitive abilities was found.

Unfortunately, there is no academic research yet to support the evidence of these differences. The research on the two assessments is significant but only on their high reliability and validity in terms of the construct tested. There was no research instead on gender bias or the possible advantage for frequent and assiduous players (gamers).

Finally, the findings of this research are unaffected by the type of digital game based-assessment. Only through the discussion in the next paragraph of the unexpected and significant interaction between the *Cognitive* factor and the annulment of the gender effect for the students who have done an international internship can the most interesting interpretations be developed.

6.4.iii International Internships, Cognitive Abilities, and Gender

The fourth and most unexpected finding of this study is that when there is a gender bias in cognitive abilities (2017 and 2019), this bias disappears for those students who have done an international internship. This means that while the 263 males in the 2017 sample and the 247 males in the 2019 sample performed better than females on the *Cognitive* factors that affect the behaviors associated with employability, this bias disappears for the 40 female students in 2017 and the 72 female students in 2019 who took part in an international internship. This result is even more unexpected than the association between the *Cognitive* factor and international internships.

This finding suggests that international internships are associated more strongly for female than for male students with the cognitive abilities referring to behaviors that predict employability.

Even through a thorough analysis of the existing research, no mention of a possible relationship between international experiences or internships and female vs. male cognitive abilities was found.

Some possible reasons and significant implications, within the clear limitations of this study, can nevertheless be discussed. Study abroad international experiences have been historically biased towards female participation (European Commission, 2014, 2019). This female-biased participation in study abroad programs might be related to the widespread perceptions that international experiences are linked to the development of social and interpersonal abilities.

Jackson (2013c) finds that the perceived ability in critical thinking is higher for males both before and after an internship. The results from the research included in this dissertation suggests that Jackson's results might not be confirmed for international internships when critical thinking capabilities are assessed through predicted behaviors instead of perceptions.

The evidence for the above studies combined with the results of this research seems to imply that during the international internship the challenges and experiences to which the students are exposed, may be associated with a stronger impact on the cognitive abilities of the female students who do an international internship.

This further association between cognitive abilities and international internships is very interesting and could have relevant implications for the future design of internships both for mobile and non-mobile students. This could be a challenge, however, as cognitive abilities seem to be the most difficult to develop (Bloom, 1956; Cavanagh, Burston, Southcombe, & Bartram, 2015) although they are highly regarded by employers (Pang, Wong, Leung, & Coombes, 2019a).

6.5 Summary

This chapter has discussed the implications of the findings. To better understand their importance, connections with the relevant literature have been made. The first two findings were discussed in connection with literature on international internships and cognitive abilities. The gender effect found in this study was then analyzed referring to literature on both the relationship between gender and cognitive abilities and gender and digital games. Finally, attention was turned to the most unexpected finding, the positive association found between the cognitive abilities of female students and international internships, which appears to eliminate any gender bias for those females who have taken part.

In the next chapter the key implications of the findings are related to recommendations for academics, educators, and researchers. These considerations also pertain to the design of academic curricula to give all students access to employability enhancing activities, leading to more equitable internationalization at home strategies.

Chapter 7 : Recommendations

7.1 Introduction

In addition to the various implications discussed above, findings from this study offer educators and academics recommendations for introducing new institutional practices, guidelines, and interventions, or simply adjusting current ones using newly informed strategies. In this chapter are presented four directions which may support the development of such guidelines, interventions, and strategies.

First, by using digital game-based analytics in assessing employability the research, focused on predicted workplace behaviors. This allowed for the uncovering of important associations between international internships and employability. Most previous studies found associations between international experiences and social and interpersonal skills through reported perceptions of possession of transferable skills. By using predicted behaviors to measure employability instead, this study discovered an unexpected association between cognitive skills and international internships.

Analyzing these predicted behaviors was made possible with digital game-based assessments, developed using behavioral science, artificial intelligence, and smart video games. The assessment tasks are based on experiments founded on psychological, cognitive neuroscience, and computational neuroscience principles of human behavior. This kind of assessment may well be of wider value in curriculum development to the benefit both of students and higher education professionals.

The second recommendation discussed in this chapter is on finding ways to integrate into higher education curricula the benefits that this study found were associated only with international internships.

The third section of this chapter discusses international versus intercultural experiences, and whether intercultural experiences in the domestic context could result in the same association with cognitive abilities as international internships.

Finally, virtual international internships are recommended as a possible alternative to international internships that involve physical mobility. It may be the case that these provide similar associations with additional employability behaviors.

7.2 Digital Game-Based Employability Assessments

The findings of this study concur with Holmes view that assessing employability only within the context of skills development can be misleading (Holmes, 1995). The research does attempt to add a further element beyond simply assessing the possession of skills, in that it focuses on the demonstrable behaviors associated with those transferable skills. By using game-based talent analytics, the underlying processes that guide behavior, thoughts, and emotions are assessed and mapped onto well-known and tested measures (Gray et al., 2016; Or et al., 2019).

This approach to the operationalization of employability is an attempt to predict the potential degree of learning transfer for each student; in other words, how effectively the skills acquired during the internship are translated into workplace performances (D. Jackson, 2013a). Leveson (2000) finds that, while academics are concerned with teaching transferable skills to students, employers are less interested in the possession of the skills, but rather on the results these skills produce when used in the workplace. Studies have demonstrated that the assessments used in this study, *Knack* and *Arctic Shores,* are found to be both highly reliable and highly valid for predicting this kind of workplace performance (Gray et al., 2016; Grimmett, 2017; Or et al., 2019).

Educators, academics, and researchers have been searching for ways to assess employability objectively and comprehensively. Comprehensive models of employability have been developed in the literature. Pool and Sewell's (2007) *CareerEDGE* is a comprehensive model which, they suggest, can be used as a framework for working with students to develop their employability. Tomlinson's (2017) graduate capital model integrates into one comprehensive model different approaches – i.e., Bourdieu's cultural and social capital theory (Bourdieu, 1986), traditional human capital theory (Becker, 1964), Holmes' graduate identity approach (Holmes, 2013b) and the personal traits that define every single graduate.

However, what is still missing in these models is a way to objectively assess the level of employability defined in this comprehensive way. Pöllmann (2013) attempts to suggest one way forward. His research builds on Bourdieu's concept of cultural capital by extending it to the notion of intercultural capital. *"In an ever more interdependent world, intercultural capital emerges as an increasingly significant type of cultural capital and marker of sociocultural distinction."* (Pöllmann, 2013, p.1). In the study Pöllmann focuses on intercultural capital in the embodied state. The three characteristic forms of cultural capital in Bourdieu's original theory (Bourdieu, 1986) are the objectified state (i.e. writings, paintings, musical compositions, tools or other objects), the institutionalized state (official certifications by schools and universities) and the embodied state (people's cultural knowledge and know-how). Embodied intercultural capital *"entails intercultural skills, competencies, and sensitivities….but also to their relative exchange value and circumstances under which they are more likely to be realized"* (Pöllmann, 2013, p.2).

Pöllmann argues that socio-economic environment can affect the degree of realization of acquired intercultural capital and the derived benefits. Intercultural capital has a strong symbolic value in terms of social distinction. Family background, individual characteristics, and group memberships are all elements that affect the degree to which an individual can aspire to accumulate, realize, and convert intercultural capital and ultimately benefit from it. To try and overcome the effect of sociocultural inequalities in intercultural capital realization, Pöllmann suggests a way to operationalize it. Quantitative measures that account for factors such as the number of foreign languages spoken, number of intercultural friends, and experience of living abroad are interesting but too simplistic (Pöllmann, 2010). Instead, he argues, quantitative research in international education should explore novel empirical "measures" of an individual's likelihood to accumulate and realize intercultural capital to realize its full potential. These indicators could then serve as predictors of transnational employability.

The need to objectively assess the levels of employability and to find a quantitative measure is also one of the reasons digital game-based assessments were chosen for the analysis in this study. Although Pöllmann (2010) does suggests a way to operationalize and find a quantitative measure of employability, his approach is based on seeing employability as possession of skills (see Section 2.2). According to Krarup and Munk (2016), Pöllmann attempts to operationalize the impact of intercultural experiences on employability by using Bourdieu's cultural capital theory in a limited way. Pöllmann appears to be focusing on the isolated effect of cultural capital on educational attainment, instead of using the structural and relational aspects of cultural capital theory, embedded in the concepts of field theory. This research does not focus on the links between the possession of individual resources but is based instead on a concept of employability linked to behaviors and predicted workplace performances. Digital game-based analytics was, therefore, chosen to obtain quantitative measures of predicted employability inferred from behaviors, thus providing a new dimension beyond existing studies.

How do international experiences and internships impact all forms of graduate capital (Tomlinson, 2017)? The transition between different social fields impacts students' capital. Behaviors are affected by all forms of graduate capital; anecdotal evidence suggests that recruiters and employers are increasingly using tools to accurately measure how these different forms of capital transform into behaviors and finally into potential workplace performances. Finding ways to objectively measure all the forms of graduate capital that constitute the building blocks of comprehensive definitions of employability is crucial. Only by succeeding in this task will it be possible to properly tailor employability development strategies and make them accessible to all students.

The first recommendation arising from this study is therefore for curriculum designers and academics to consider this kind of assessment in other contexts to see whether it may offer wider opportunities. Researchers also may wish to extend the findings of this study, and this is explored further in Chapter 8.

7.3 International Internships

This research finds a significant association between international internships and the behaviors that predict employability. This means that when an internship takes place in a country different from that of the student's home, there is additional experiential learning associated with the international context, which appears to contribute further to the experiential and transformative learning already developed through the internship.

What is unexpected is that in previous research (Deakin, 2014; European Commission, 2014, 2019; Green et al., 2020; Hubbard et al., 2018; Molony, Sowter, & Potts, 2011) the transferable skills usually associated with international experiences are social and interpersonal skills. What this research finds instead is that there is an association between students who have done international internships and higher order cognitive skills. This means that students who have done an international internship are more likely to exhibit employability predicting behaviors defined by cognitive abilities such as learning agility, quick thinking, and processing speed.

Cole (2018) suggests that universities often use a narrow framework of analysis when investigating what happens to students during international experiences. By focusing only on psychological aptitudes (*skills* and *competencies*) and sociological understandings (*capital*), the overall potential of international experiences could be underestimated. He suggests a more philosophical approach to understanding how international experiences can change and expand the student's notion of learning beyond the simple experience. He argues that international experiences *"that include a preponderance of highly scaffolded activities, go against the enactment of individuation and the transformative potential of the new encounters for students"* (Cole, 2018, p.244) because it shields students *"from the raw, organic nature of new, complex informational learning in the actual situation"* (Cole, 2018, p.244).

The findings of the research suggest that it could be argued that international internships are, using Cole's words, not "highly scaffolded" (Cole, 2018) international experiences, which may result in a combination of two elements. The first involving transfer of knowledge learned at university to the workplace, and the second living abroad and interacting constantly in a different cultural context, both in the workplace and in daily life. This may enhance the "self-discerning reflections" described by Adam et al. (Adam, Obodaru, Jackson, Maddux, & Galinksy, 2018).

It is not simply the experience of studying or working abroad that shapes a graduate into becoming more employable. Adam et al. (2018) examine whether and how an international experience can transform a person's sense of self. They find evidence that living abroad increases these "self-discerning reflections" because

> *when people live in their home country, they are often surrounded by others who mostly behave in similar ways, so they are not compelled to question whether their behaviors reflect their core values or the values of the culture in which they are embedded. In contrast, when living abroad, our data found that people's exposure to novel cultural values and norms prompts them to repeatedly engage with their values and beliefs, which are then either discarded or strengthened* (Adam et al., 2018, online).

"Self-discerning reflections" prompt a clearer sense of self, which in turn produces a better alignment between how people see themselves and how others see them. This congruence translates directly into being able to project a clear and consistent self-image to others, which impacts both a student's perceived employability and strengthens the claim of being a graduate worthy of employment, or "graduate identity" (Holmes, 2013a) when it comes to proving personal employability to the person hiring. An international experience

> *should therefore been seen as a process of 'becoming' because it represents a means for international students to realize their aspiration to become more advanced in their profession and enhance their future social and economic positioning ... The process of being and becoming has been regarded as fundamental to professional identity development* (Tran, 2016, p.1278).

The unexpected finding of this study is that the distinctive feature of an international internship appears to be that the "self-discerning reflections" and the "becoming" translate into behaviors associated with cognitive capabilities and not with interpersonal or social skills. The predicted workplace behaviors by students who have done an international internship are characterized by higher level capabilities (Bloom, 1956), such as learning agility and quick thinking.

This study did not assess employability levels before the international internship, but the students who took part in a study abroad experience, in contrast, demonstrated no significant association with *Cognitive* factor skills; it appears therefore that the cognitive abilities are associated specifically with international internships.

Understanding more clearly what specifically within the international internship experience appears to be associated with cognitive abilities is extremely important both for academics and career services. This will enable them to more precisely design curricula aimed at supporting the development of abilities such as learning agility, quick thinking, and processing speed for the broader student population. Only a minority of students have the economic and cultural capital, and the personal circumstances to be able to go abroad as part of their program of study, while some are unwilling or unable to do so for other reasons. Family and personal history, previous mobility experiences, as well as language competence, are all linked to cultural capital in what Murphy-Lejeune (2003) defines as 'mobility capital'.

Since the overwhelming majority of students do not go abroad as part of their program, it is helpful to understand precisely which activities or aspects of an international internship are associated with the kind of cognitive abilities shown in this study. Further consideration could then be given as to how these might be integrated into curricula and replicated in a domestic environment. While further research is needed (see Chapter 8) this study has already contributed in identifying the distinction between an international internship and other kinds of international experience.

The second recommendation from this study is therefore to find ways to integrate into higher education curricula the study's findings which were associated only with international internships.

Leask's work in general (2013, 2015) and in particular her conceptual framework for Internationalization of the Curriculum (Leask, 2015:27) suggests how this might be implemented. In the process of Curriculum Internationalization, she argues that the core work must be done by academic staff in disciplinary teams. *"An important part of the process of internationalization of the curriculum involved challenging dominant paradigms, exploring emerging paradigms in the disciplines, and imagining new possibilities"* (Leask, 2013, p.111).

Not all students enter academic programs with the same degree of cognitive capabilities or learning styles. Especially in the field of education "one size fits all" does not apply. The development of cognitive capabilities, which this study finds play such an important role in the behaviors that predict employability, can be developed in different ways. This is why Leask's work is so relevant in informing academics and higher education professionals on how to continuously explore new ways of developing knowledge and skills. Curriculum design is fundamental, with both formal and informal curriculum playing a pivotal role. Internationalizing the curriculum in a domestic context and helping all students to achieve the kind of experiential learning outcomes which are associated with international internships is therefore the second recommendation arising from this study.

7.4 International versus Intercultural Experiences

In this research, the term international refers to a broadly accepted definition in the field of internationalization, referring to a country different from the native country or the country where an individual has been living most of their life. But is this definition still appropriate?

To try an illustrate the concept it may be useful to compare two hypothetical experiences for two Italian students. The first was born in Milan, has lived in Milan all his/her life, is well travelled, has attended an international school, speaks three languages, and attends a university in Milan. Using Murphy-Lejeune's (2003) concept this student has high mobility capital. The second student comes from Stigliano, a very small village near Matera, in Basilicata a region in the south of Italy. This second student was born and has always lived in Stigliano. He/she attended a traditional Italian classical high school, the only foreign language spoken is a very basic English learned at school. This student has traveled only once to Rome and once to London on school trip and attends the only university in his/her region. The university is 80 km from Stigliano and he/she commutes to school every day. How does doing an internship in London for the first student from Milan compare with doing an internship in Milan for the second student from Basilicata? Is it possible that the internship in London for the first student is an experience less disruptive and challenging than doing an internship in Milan for the student from Basilicata?

To understand the impact of such experiences on graduate employability and be better prepared to give an appropriate answer to the questions raised by this example, it is necessary to reimagine, not only the concept of international students as suggested by Jones (2017), but also of the nature of international experiences. Jones categorizes four different factors, or "milieus," that affect students' experience: personal (individual personality), familial (family history and experience), institutional (facilities, support, and service provided), and national (language, education system, and sociocultural aspects). Different elements can affect the challenge that a student faces when going abroad. It could be external factors, such as the language spoken in the destination country and the kind of accommodation, or personal ones such as the degree of social/cultural/intercultural capital (Pöllmann, 2013) or mobility capital (Murphy-Lejeune, 2003) of a student before the mobility experience (Jones, 2016).

Jones' (2017) "milieus" and Tran (2016) and Tran and Soejatminah's (2016) use of Bourdieu's framework in analyzing international students' experiences yield similar conclusions. They both highlight the importance of cultural capital, field, and habitus in understanding the transformative and learning impact of experiences on the development of students' identities into graduates' identities.

> *A range of factors may make mobility more or less challenging for a student, depending on their existing level of social/cultural/intercultural capital. Factors in terms of the degree of challenge include the language spoken in the destination country, the nature of accommodation they will experience, the degree of support provided by home staff, support from host staff etcetera. Social or cultural capital factors may include the degree to which students have monocultural or multicultural friendship groups, the time they have spent in other countries, and the nature of this experience, family background, socio-economic group, their existing language skills, and so on* (Jones, 2016, p.111).

It may be the case that international internships offer a particular kind of environment in line with the more challenging type of experience outlined here. With respect to the social/cultural/intercultural capital of the students who go abroad for internships, this study raises important points for educators and higher education professionals. How do cultural capital and habitus interact with the new international social field experienced by students who are doing an international internship? It appears from the findings of the research that it is the international element of an internship that triggers the association with employability behaviors defined by cognitive abilities.

Jones argues that also within the same country but in different geographical locations it is possible to expose students *"to alternative perspectives and cultural contexts [which] can result in a questioning of personal identity, values, beliefs, and mindsets, and can offer significant results in terms of personal growth, self-efficacy, and maturity"* (Jones, 2014, p.7). Going back to the hypothetical student from southern Italy it may be that, for someone with this kind of background, a domestic internship could present similar challenges as an international internship might offer the student from Milan.

It is for this reason that further research is needed (see Chapter 8) to determine the precise distinctive features associated with an international internship but, again, this study has identified important first steps. The findings of this research suggest that the main benefits, in terms of employability, for students to engage in an internship through a mobility experience abroad are associated with challenging and expanding perspectives linked to working in an international environment. If so, could the intercultural rather than the international element be the key to experiential and transformative learning in a domestic context (Jones, 2016)?

The findings of this research suggest a positive association between international internships and employability. However,

> *if we accept that transformational learning, of the kind identified in the literature on international mobility, relates to the intercultural and experiential dimensions of that international experience, it is likely that replication in domestic intercultural contexts may offer some equivalence* (Jones, 2014, p.8).

Further research in this field could follow two main directions, both relative to finding the possible equivalence between intercultural domestic and international internships.

First, future studies could focus on looking into the differences among the companies/institutions where domestic internships take place: for example, is it a multinational or domestic company and, if domestic, does it have operations abroad, are the employees international, is the company culturally diverse?

Second, future studies might address the question of how distant is the cultural and even the physical/geographical environment of an internship compared to the student's home country.

By focusing on these aspects of internships, it may be possible to investigate further the association between international internships and cognitive abilities and how to design curricula that can make the employability benefits of an internship abroad accessible also to the non-mobile majority of students.

7.5 Internationalization at Home and Virtual Internships

This research finds that the international element of an internship extends the experiential and transformative learning that occurs during a domestic internship. But this raises the question as to how the benefits in terms of employability from an international internship could be made accessible also to the majority of students, who do not take part in mobility programs, and not only to the mobile minority. The fourth recommendation from this study, therefore, is to consider the potential role of Virtual Internships in delivering an equivalent experience.

Not all students have the inclination, the means, or the possibility to go abroad (Jones & Killick, 2013). Therefore, incorporating existing internationalization at home strategies into intercultural initiatives which may promote the employability skills and behaviors outlined in this study is very important. Only by doing so can we begin to reach a more equitable approach which can be of benefit to all students.

Realizing intercultural capital is one means to this end. According to Pöllmann (2016), and a way to maximize intercultural capital for all is through intercultural education (E. Jones, 2019).

To be able to fully benefit from the potential of international and intercultural education, it is first necessary to reconcile the two concepts of *habitus* and *reflexivity*. *Habitus* refers to the set of skills and knowledge aspects of the embedded cultural capital. Habitus is linked to the social fields experienced by an individual. Before an internship or a mobility experience students' habitus is shaped by their family, friends, previous experiences, and education.

Traditionally, *reflexivity* is associated with cognitive forms of human development and learning (Archer, 2010). In devising internationalization at home strategies, institutions may wish to reflect on the proposition that intercultural capital development is a product of both habitus and reflexivity. This might translate into assisting all students to develop intercultural capital by leveraging these two constructs. This means focusing both on what happens within the academic educational environment of the university (more linked to reflexivity) – formal curriculum (assessed) -, as well as on other more informal experiences and types of knowledge (habitus) – informal curriculum (not assessed) - gained by engagement through different social encounters, and experience of diverse social, cultural, and economic backgrounds.

Beelen and Jones' (2015) definition of internationalization at home highlights very clearly the combination of the two elements of habitus and reflexivity, through the integration of the formal and informal curriculum. *"Internationalization at Home is the purposeful integration of international and intercultural dimensions into the formal and informal curriculum for all students within domestic learning environments"* (Beelen & Jones, 2015, p. 69). As explained by Beelen and Jones, referring to "domestic learning environments" extends the integration of the international and intercultural dimensions beyond the academic learning context and highlights the potential value of, for example, domestic internship locations.

The findings of this research suggest that international internships are associated with higher levels of cognitive abilities, apparently closer to the reflexivity sphere of intercultural development suggested by Pöllmann (2016). As noted above, this is quite unexpected given that most previous research on international experiences (Murphy-Lejeune, 2003; Tran, 2016; Tran & Soejatminah, 2017) focused mostly on the habitus linked to the access to novel social fields, and somehow it was always implicitly linked to the development of capabilities within the social and interpersonal sphere.

International and intercultural dimensions can become part of the experience of a domestic internship. Especially today in the aftermath of the pandemic crisis which hit the world in 2020, new solutions that do not involve physical mobility become imperative (Elspeth Jones & Berquist, 2020). This is especially so if higher education institutions wish to deliver comprehensive internationalization strategies (NAFSA, 2014). An interesting example of a new work-integrated learning model is described by Schech, Kelton, Carati, and Kingsmill (2017) and has been developed and tested in partnership between a Swedish and an Australian university. Students gained experience, collaborated with online peers, and interacted in a simulated professional context across national and cultural boundaries by using technology:

> *Students' reflections on the model indicate that this model can foster a range of generic soft skills that enable them to apply their academic knowledge, collaborate with a culturally diverse group, and work in a digital world. To refine this blended learning model, more attention needs to be paid to designing appropriate evaluation tools and harnessing cultural diversity more effectively.* (Schech et al., 2017, p.1476)

The most significant finding of Schech et al's study (2017) is in the reflection provided by the students who participated in the program. They say that throughout the program they were able to practice and develop the most relevant transferable skills. Even though these findings are based on students' self-assessments, and not predicted employability behaviors, they still give significant impulse to developing more such initiatives.

Virtual exchanges have increasingly become part of internationalization at home initiatives. *Virtual exchange* is a term which has been used to describe a variety of activities (Garcés & O'Dowd, 2020) which involve *"online intercultural interaction and collaboration with partner classes from other cultural contexts under the guidance of educators and/or expert facilitators"* (O'Dowd, 2017, p.8). O'Dowd tries to classify virtual exchanges into four main categories, depending on how extensively educators are involved.

The first type started evolving from the beginning of the internet in the early 1990s, especially in the field of foreign languages. These exchanges are based on the principle of autonomy, with the success of the exchange resting mainly on the learners. Language learners get connected and each learner takes the role of peer tutor who corrects their partner's mistakes. In these exchanges, the involvement of the class teacher is usually minimal.

The second category involves class-to-class partnerships with collaborating institutions. In this kind of initiative, teachers and students from different cultures collaborate on projects involving comparisons of their cultures. These projects can take the form of developing websites, or presentations, or bilingual essays. The involvement of educators is tangible and these projects are integrated informal education/curricula, not simply "add-ons."

The third category is more subject-specific and is mostly developed in business studies where students work online in groups with colleagues and customers from other countries. The main interest here is developing *"Global Virtual Teams"* (O'Dowd, 2017, p.15) and providing experience on international collaborations in a professional setting.

The fourth category is based on a shared syllabus approach and is usually referred to as the COIL (Collaborative Online International Learning) model. It was developed in 2004 by Jon Rubin and his colleagues at the SUNY network of universities (State University of New York) (Rubin & Guth, 2016) and has become one of the largest Virtual Exchange networks.

> *The COIL approach to Virtual Exchange involves connecting two or more classes of similar course content in different countries. Once connected, the instructors in the partner universities design course modules in a way that the two different student populations will engage in communication and collaboration together. ... COIL adds a collaborative and comparative perspective to the subject content by creating a shared syllabus that is worked on by all participating classes* (O'Dowd, 2017, p.17).

Especially in 2020 during the pandemic crisis, solutions such as collaborative online learning (COIL) initiatives alongside international virtual internships (Marr, 2019) have increasingly become part of higher education institutions internationalized curricula (Elspeth Jones & Haug, 2020).

Physical domestic internships in multinational companies or multicultural institutions may also become increasingly part of internationalized curricula. But for either physical domestic internships in companies, with embedded international or intercultural learning experiences, or technology-based solutions such as international virtual internships, the design of these experiences (D. Jackson, 2015; Malacarne, 2018) and the assessment of the learning outcomes (Deardorff & Jones, 2012; Deardorff, 2011; Leask, 2015; Toyoda, 2016) have to be very carefully planned.

Planning and integrating virtual international internships, can become part of the strategies of higher education institutions in delivering internationalization of the curriculum at home.

As already stated, cognitive capabilities are considered as higher-order skills in Bloom's taxonomy (Bloom, 1956) and are considered the most difficult to develop (Cavanagh et al., 2015), but also the most sought after by employers (Pang et al., 2019a). Yet this study shows that international internships are associated with precisely these skills. The challenge is therefore to enhance students' employability by developing their cognitive abilities, and one of those means could be through virtual international internships which can be made accessible to all students.

Further research is needed to determine whether virtual international internships can contribute to the development of cognitive abilities in the same way that, this study suggests, appears to happens with physical international internships (see Section 6.4). It is also necessary to better define how international virtual internships can be designed to ensure that developing cognitive activities becomes one focus of the experience. However, until this study, the cognitive dimension of skills associated with international internship was poorly understood. The fourth recommendation arising from the study, therefore, is to consider virtual international internships as a possible alternative to international internships that involve physical mobility.

7.6 Summary

The implications from the findings of the research lead to several recommendations for educators, academics, and researchers which have been summarized in this chapter:

- Guidelines towards developing and implementing employability assessments linked more to what employers look for when hiring graduates and less to simple stakeholder perceptions.
- The importance of differentiating international experiences based on the kind of mobility experience undertaken. It is not simply going abroad that necessarily affects employability but how this experience translates into workplace behaviors, and it is experience aligned with the program of study, i.e., internships, which appear to have the most significant association with enhanced employability.

- The need for strategies aimed at designing internships in domestic intercultural contexts or multinational companies/institutions that may offer the same benefits as international internships.
- The worldwide pandemic and the rapid rise of remote working has determined a very steep increase in the use of technology associated with workplace behaviors; it might be easier now to give all students (not only the mobile minority) access to collaborating and interacting in a professional context across national and cultural boundaries.

Chapter 8 discusses the limitations of the study and makes recommendations for future research. The conclusions drawn from this study in terms of relevance of the findings are offered in Chapter 9 and those drawn from my personal experience as a researcher in Chapter 10.

Chapter 8 : Limitations and Further Research

8.1 Limitations

This dissertation is believed to be the first empirical analysis of data on graduate employability collected through a game-based predictive analytics tool. This represents the first attempt to operationalize the measurement of graduate employability through an objective assessment, not based on perceptions or self-reported measures. The study, like every other study, has its limitations. Future research on the relationship between international versus domestic internships on graduate employability should consider these limitations and open new research directions.

The first limitation is that the study includes only Italian students. The data was collected while working on a talent project with the HR staff of the Italian branch of a multinational consulting company. Expanding the student sample beyond the Italian students on which this research is based would allow confirmation of the association between international internships and employability, from alternative countries of origin of the students.

This limitation, on the other hand, may also be seen from a different point of view and even seen as a strength. Since the sample only included Italian students, this guarantees that the analysis is based on a relatively homogeneous group, which can be important in exploratory research. This is particularly important in light of the most recent research exploring the link between psychological traits/capital and employability and indicates the variability of personal characteristics across countries (Ayala Calvo & Manzano García, 2021; Bakari & Khoso, 2017).

Second, the sample represents only those students who have voluntarily decided to participate in the selection process for the multinational consulting company's talent program. Probably these students already have a drive towards employability which might not necessarily be representative of the average Italian student.

Third, game-based assessments do provide an objective way to measure skills and behaviors related to employability but have some limitations as well. These tools have only been developed relatively recently. There is a limited amount of scientific literature on the potential impact of a possible gender bias associated with their use. There may be some proprietary research commissioned by companies who own the rights to the game-based assessments pointing to this possible bias but, if this is the case, the results have not been made publicly available.

Using game-based assessments to measure employability, restricts the measurement of employability to the set of transferable cognitive and interpersonal skills and personality traits and how these skills and traits translate into behaviors. However, the use of these tools for measuring employability does not capture all kinds of extracurricular skills developed abroad, such as language proficiency.

Fourth, students' levels of employability before the international internship experiences were not measured in this study. Although they do not suffer from the potential limitations of a self-reported study, the findings inform us only about employability measured post-experience.

The inferences on employability developed during an international internship are drawn by making comparisons with students who have only domestic internship experiences, but it is not possible to make precise claims about the degree of employability developed during a domestic versus an international internship, as the differences found can only be described as inferential. To properly understand the impact of an international internship on the development of employability, it would be necessary to measure students' employability before and after the internship. By then comparing the increase in employability of the students who have had an international internship versus those who have had a domestic experience instead, it would be possible to separate the experiential from the international element of an internship. This advance in knowledge would be very useful to inform higher education policymakers about the specific benefits associated with international internships.

Fifth, no data was available either on students' academic achievement or on their socio-economic status. Both these elements might have had an impact on the skills and behaviors measured through the game-based assessments used to define students' employability levels. Students' academic achievement and their socio-economic status have an influence on Bourdieu's cultural capital and in particular Murphy-Lejeune's (Murphy-Lejeune, 2003) mobility capital. This might have a substantial impact both on the level of employability of students before an internship and, linked to this, the type of students who choose to go abroad for an internship.

8.2 Further Research

During the years of research that have led me to the study underlying this dissertation I have found many new research paths and directions, linked to my research question. Arising from this study are a number of interesting directions for further research on the links between employability and international internships.

From a methodological standpoint, in this study the EFA has been used to determine the number of latent constructs underlying the over 30 dependent variables measured by the digital game-based assessments, used as a proxy of employability. Factors have been created to explain the variation among these variables by condensing information and defining the meaning of the factors. Further research could now rely on CFA (Confirmatory Factor Analysis) to statistically test the hypothesis between the observed variables (the over 30 indicators measured with the digital game-based assessments) and the factors found through the EFA.

More insight into the specific nature of the internship would be very useful for policymakers. Detailed information on part-time vs. full-time, length, selected industry, and even the type of company or institution (for example whether operations are exclusively domestic or international / multinational) might lead to interesting insights on how to better support students in developing employability. Furthermore, significant information might also arise if further research could focus more on the degree of cultural diversity of the company where the internship takes place. It might be interesting to adopt Holliday's "small cultures" approach to separate the notion of culture from those of ethnicity and country. This could have important implications for internationalization at home strategies and inform studies that focus on the characteristics of intercultural versus international experiences.

Further research would be also useful to better understand whether the cognitive factor associated with international internships found in this study depends on the fact that students who decide to participate in an international internship are different from other students. It is possible that the students who score higher on cognitive factors are the ones most likely to participate in an international internship. In further research by using an instrumental variable approach (Messer & Wolter, 2007) or propensity score matching, this problem could be circumvented.

Finally, as suggested in Chapter 7, further research is needed also to determine whether the association between international internships and cognitive abilities found in this study can be achieved also with virtual international internships. Understanding better how virtual international internships should be designed to ensure that developing cognitive activities becomes part of the virtual international experience could have major implications for internationalization of the curriculum strategies, and for serving the needs of higher education institutions which have a majority of non-mobile students.

Finally, it would be very interesting to also investigate further the link between transnational mobility experiences and career outcomes for graduates, in order to objectively assess the impact of international experiences, such as internships, on graduates' transition to employment. In their systematic literature review of career outcomes linked to transnational educational mobility Waibel, Rüger, Ette, & Sauer (2017) categorize the research according to whether career outcomes are analyzed based on graduate self-assessments – subjective measures – or objective indicators, such as: transition period between education and work, wage differences at different times after graduation and occupational status.

The results of comparative studies on career outcomes are, however, quite inconclusive. Many different studies in the last 20 years have analyzed the effects of study abroad on career outcomes in different countries using objective indicators. Rodrigues (2013) compared 16 European countries and found that, five years after graduation, in the Netherlands there is a negative association between the wages of students with international experience and their non-mobile peers. The opposite happens in Italy, Poland, the Czech Republic, Germany and Spain. More recently Liwinski (2016) finds that in Poland students who have studied abroad have a wage premium in their first job, but only in the private sector, only if they studied abroad for longer than one semester and that the premium is higher for male students. For the US, Schmidt and Pardo (2017) find that there is no significant wage premium for study abroad alumni versus their non-mobile peers. Similarly, Jacob, Kühhirt and Rodrigues (2019) find in a study covering 13 European countries no consistent results in career outcomes for graduates with or without international experiences in terms of early career wages, five years after graduation or occupational status. No significant difference in the *"likelihood of being unemployed or severely mismatched, versus being employed in a relevant job position 6 months after graduation"* (Wiers-Jenssen & Støren, 2020, p.2) is found by Wiers-Jenssen and Støren (2020) referring to Norwegian students with one or two semesters of study abroad experience.

Several studies suggest that the country of origin of the students does have an impact on their employment outlook after a mobility experience. These studies (European Commission, 2016; Janson et al., 2009; Rodrigues, 2013; Teichler & Janson, 2007; Waibel et al., 2017) argue that students with mobility experiences who come from Eastern or Southern European countries have more positive effects on their career outcomes post-graduation.

As noted above, the current research focuses on the links between international internships and students' employability behaviors, not on labor market outcomes. However, this could be a fruitful direction for future research using similar methodologies to those used in this study.

Chapter 9 : Conclusion

This study evaluated international internships and their influence on graduate employability. Using game-based analytics, students' transferable skills, personality traits, and behaviors were predicted and used as a measure of employability for a total of 1315 Italian students. The research question of this study was:

Do higher education student internships in an international context differentially influence employability behaviors compared to a domestic internship alone?

Data from students in years 2017, 2018, and 2019 were collected and two different digital game-based assessment tools, the *Knack,* and the *Arctic Shores* were used to measure students' employability.

This study differs significantly from previous research that investigated the effect of international experiences on employability for several reasons:

1. the effect on employability is not investigated through questionnaires aimed at assessing the perceived improvement in the acquisition of skills linked to employability, but on measuring the actual behaviors which define employability in terms of workplace performance;
2. exploratory factor analysis consistently revealed two factors associated with employability behaviors, one *Cognitive* and one *Social*. The analysis is therefore not focused a priori on investigating the association of international experiences with skills and capabilities linked to the social sphere, on the contrary, what emerges as a significant and unexpected finding from the analysis is linked to the association of cognitive capabilities with international internship in contrast to the social and interpersonal skills development usually reported in the literature;
3. the digital game-based assessments used as tools to measure employability in this study are the two most commonly used assessment tools used by employers when hiring graduates; this allowed for the claim that they are the actual measures of employability employers may use when deciding whom to hire. Often the biggest risk when relying on employer surveys is that the personal experiences of the person answering the questionnaire can strongly bias their perceptions of the impact of international experiences on employability (S. Trooboff, Vande Berg,

& Rayman, 2007). Using this assessment method therefore allows a more objective approach, because it does not assess the employability perceived by different stakeholders through surveys, but measures employability by observing behaviors that predict the workplace performances most valued by employers.

This research finds that over the three years covered by the analysis, the employability of those students who took part in an international internship was associated with an additional element which was linked to cognitive abilities.

Furthermore, and unexpectedly, the study found that the gender bias observed in years 2017 and 2019 was more complicated than at first sight. For those years, males outperformed females in terms of cognitive abilities. However, an important and original finding of this study is that this bias disappeared for those students who had done an international internship. This means that the effect of taking part in international internships is more significant for females than males insofar as the development of cognitive capabilities linked to employability is concerned.

It is hoped that these findings prove useful as the basis for new ways of thinking about international mobility experiences and international internships in particular. The findings have implications for policy and practice in this respect. However, the study will hopefully be a starting point for future research. Although much further research is needed, this study represents an important first step in distinguishing international from domestic experiential learning experiences. It provides context and informs the development and design of internationalized curricula at home, so crucial for the vast majority of university students who do not have the opportunity of an international experience as part of their program of study.

Chapter 10 : Reflections on the Research Journey

The research journey started with the research proposal. When I handed it in and was accepted on the program, I felt very confident about what I had to do to start and carry on the research and the years ahead seemed endless, given that I thought I had it all already figured out. But I was very wrong.

There were three major difficulties and setbacks faced during the research journey.

The research proposal was over ambitious with its research questions. I wanted not only to give an answer to what is the actual research question of this study but also to other two questions. First, I had intended to measure the behaviors associated with employability in students who do a domestic internship and compare it with that of students who do an international internship, both before and after the experience. During the first year of the research project, I asked students to play the games before their internships. Many friends and colleagues helped me in organizing presentations in various universities to students before they started their internships. I asked the students to play the games and then collected the results. I shared the results of the digital game-based assessment and the scores of the employability predictors with the colleagues from the universities that were hosting me. Everything still looked perfectly on track. The students left for their internships. The problem surfaced when after a few months, when the students had finished their internships, less than 10% of those who had played the games before played them again after the end of the internship. This was a real setback as I did not have enough data to make a before vs after comparison. In the meantime, the first year had passed.

As mentioned in Chapter 1, I work on internship with students and so still had enough data to carry on with the research and find an answer to the research question. But the direct comparison of the employability levels before and after was no longer possible. In the end the results turned out to be very interesting, but it was a quite challenging moment in my process. The support and encouragement of my supervisors was what really made the difference and helped me at that stage.

The second difficulty I faced is that as a 'mature' student I cannot plan my life according to the rhythms of my studies and research. There were a few months during which I really could not focus on the research. And yet again there were my supervisors with their support.

The third issue is related to my choice of using quantitative methods. My background is in finance. My idea of research when I started this study was postpositivist. I could not understand how research could be qualitative, a constructivist approach to research was a concept I had never heard of. I do not have a background in statistics, but I felt that to have some significant findings I had to use numbers and investigate the relationship between an independent variable and a dependent one. This is exactly what I have done in the research. During my journey, thanks to my Jerome, I learned what a constructivist approach is and how significant are the findings of research which uses qualitative methods. Some of the best papers I read and from which I learned most, in my search for relevant literature, are qualitative research papers. I am still a little undecided though on which methods I will favor in my future research. On the one side I feel that it is very difficult to capture in numbers the multifaceted dimensions of human behavior, on the other I still carry with me my old self - finance woman - and feel uncomfortable if I do not use numbers to prove things. But honestly, I did struggle a lot with the quantitative part of the research.

Now I have reached the end of this research journey. What has been special in my experiences was the everyday learning, the constant discovery, and the unfolding of unexpected findings.

Thanks to the research and to this PhD journey I have learned new things every day in these past 4 years. I have learned things about internationalization, about employability, about internships, about research methods and about myself. I really hope this learning process will continue also when this journey ends.

I have discovered new ideas, concepts, and theories. What really affected the direction of the research and my everyday work with students are Bourdieu's concept of cultural and social capital. I used his theories to understand how the experiential and transformative learning that occurs during an internship is transformed into employability predicting behaviors. The concepts of habitus and social field are at the foundation of the conceptual framework of this study.

Finally, one of the biggest fears of every researcher is that the data analysis will not reveal anything significant. This was my biggest fear too, especially when I realized that I was not able to collect the before and after data. This study though has revealed more results than I could have ever hoped for.

Two truly unexpected findings have emerged. The first one being that the additional element associated with the behaviors that predict employability for the students who have done international internships is associated with cognitive abilities and not social and interpersonal ones. The second is that for those years, in which males outperformed females in terms of cognitive abilities, this bias disappeared for those female students who had done an international internship.

I have analyzed and discussed the implications of these findings, but I feel that being so unexpected, there are numerous novel research directions that these findings point to for researchers interested in further pursuit of these related topics.

Now I am at the end of my PhD research journey, it has been an *experiential and transformative learning experience*. I started this journey with my *habitus, which was the product of my personal history, my familial background, my previous education*, *and my experiences. Navigating* through this PhD journey has changed my *habitus*. Now I am curious to find out how this will affect my behaviors……

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APPENDIX A.1: 2019 Data Set - Descriptive Statistics of Socio-Demographic Characteristics

Descriptive statistics of socio-demographic features of students whose data was collected between November 2018 and February 2019

All the statistical analysis included in this document were performed using R software for Windows.

Introduction to R

R is a language and environment for statistical computing and graphics. It is a GNU project which is similar to the S language and environment which was developed at Bell Laboratories (formerly AT&T, now Lucent Technologies) by John Chambers and colleagues. R can be considered as a different implementation of S. There are some important differences, but much code written for S runs unaltered under R.

R provides a wide variety of statistical (linear and nonlinear modelling, classical statistical tests, time-series analysis, classification, clustering, …) and graphical techniques, and is highly extensible. The S language is often the vehicle of choice for research in statistical methodology, and R provides an Open Source route to participation in that activity.

One of R's strengths is the ease with which well-designed publication-quality plots can be produced, including mathematical symbols and formulae where needed. Great care was taken over the defaults for the minor design choices in graphics, but the user retains full control.

R is available as Free Software under the terms of the Free Software Foundation's GNU General Public License in source code form. It compiles and runs on a wide variety of UNIX platforms and similar systems (including FreeBSD and Linux), Windows and MacOS.

The R environment

R is an integrated suite of software facilities for data manipulation, calculation, and graphical display. It includes

an effective data handling and storage facility, a suite of operators for calculations on arrays, in particular matrices, a large, coherent, integrated collection of intermediate tools for data analysis, graphical facilities for data analysis and display either on-screen or on hardcopy, and a well-developed, simple, and effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities. The term “environment” is intended to characterize it as a fully planned and coherent system, rather than an incremental accretion of very specific and inflexible tools, as is frequently the case with other data analysis software.

R, like S, is designed around a true computer language, and it allows users to add additional functionality by defining new functions. Much of the system is itself written in the R dialect of S, which makes it easy for users to follow the algorithmic choices made. For computationally-intensive tasks, C, C++, and Fortran code can be linked and called at run time. Advanced users can write C code to manipulate R objects directly.

Many users think of R as a statistics system. The researcher prefers to think of it as an environment within which statistical techniques are implemented. R can be extended (easily) via packages. There are about eight packages supplied with the R distribution and many more are available through the CRAN family of Internet sites covering a very wide range of modern statistics.

R has its own LaTeX-like documentation format, which is used to supply comprehensive documentation, both on-line in several formats and in hardcopy.

Loading the useful R packages
Packages are a collection of R functions, complied code and sample data. They are stored under a directory called “library” in the R environment. By default, R installs a set of packages during installation. More packages are added later, when they are needed for some specific purpose.

readr R package. The goal of ‘readr’ is to provide a fast and friendly way to read rectangular data (like ‘csv,’ ‘tsv,’ and ‘fwf’). It is designed to flexibly parse many types of data found in the wild, while still cleanly failing when data unexpectedly

catspec R package. Special models for categorical variables; it includes ‘ctab’ function that produces one-way, two-way, or multi-way percentage tables.

```
library(readr)
library(catspec)
```

Descriptive statistics of socio-demographic features

In the following steps the R commands are performed to load the dataset and prepare the data for the analysis. Indeed, sometimes the variables included in a dataset are not in the correct format, and therefore the researcher needs to transform them or to create new variables.

APPENDIX A.2: 2019 Data Set - Descriptive Statistics of Arctic Shores Scores

Descriptive statistics of scores of Arctic Shores digital game-based assessment retrieved between November 2018 and February 2019

Descriptive statistics of scores in dataset 2019

This paragraph summarizes and compare the gaming scores by grouping the sample based on the previous program-related experiences.

This is an exploratory phase of the analysis that precedes the model strategy aimed at assessing whether having done an international internship add something to the experiential learning of a domestic internship in terms of graduate employability measured through any item of the Arctic Shores digital game-based tool. To specifically answer to the research question only the students with at least domestic internship experience or both domestic and international internship were considered. The values of the scores of the Arctic Shores for each item were estimated and compared between two groups: (a) students who attended both program-related international and domestic internship, and (b) students who exclusively attended a program-related domestic internship.

Boxplots were used for graphically depicting groups of numerical data through their quartiles.

The results of this descriptive analysis are included in the Table 4.17 of the Chapter 4 (Results).

LOADING THE DATASET

```
## Parsed with column specification:
## cols(
##   .default = col_double(),
##   Gender = col_character(),
##   Major = col_character(),
##   Major_class = col_character()
## )

## See spec(...) for full column specifications.

## # A tibble: 6 x 32
##   Dom_Int_WR Int_Int_WR Altruism Concentration Creativity Deliberation
##        <dbl>      <dbl>    <dbl>         <dbl>      <dbl>        <dbl>
## 1          1          0        4             7          5            6
## 2          1          1        8             8          5            6
## 3          1          1        7             5          3            7
## 4          1          1        6            10          9           10
## 5          1          1        9             3          7            6
```

```
## 6          1          0        7             5          9            5
## # ... with 26 more variables: Determination <dbl>, Emotional_Recognitio
n <dbl>,
## #   Emotional_Stability <dbl>, Processing_Speed <dbl>,
## #   Future_Orientation <dbl>, Impulsive_risk <dbl>, Innovation_Potentia
l <dbl>,
## #   Learning_Agility <dbl>, Sensitivity_To_Loss <dbl>,
## #   Need_For_Structure <dbl>, Novelty_Seeking <dbl>, Curiosity <dbl>,
## #   Optimism <dbl>, Ownership_and_Responsibility <dbl>,
## #   Rational_Decision_Making_Style <dbl>, Performance_Under_Pressure <d
bl>,
## #   Executive_Functioning <dbl>, Resilience <dbl>, Sensitivity_To_Rewar
d <dbl>,
## #   Self_discipline <dbl>, Self_Belief <dbl>, Self_Monitoring <dbl>,
## #   Sociability <dbl>, Social_Dominance <dbl>, Managing_Uncertainty <db
l>,
## #   Processing_Capacity <dbl>
```

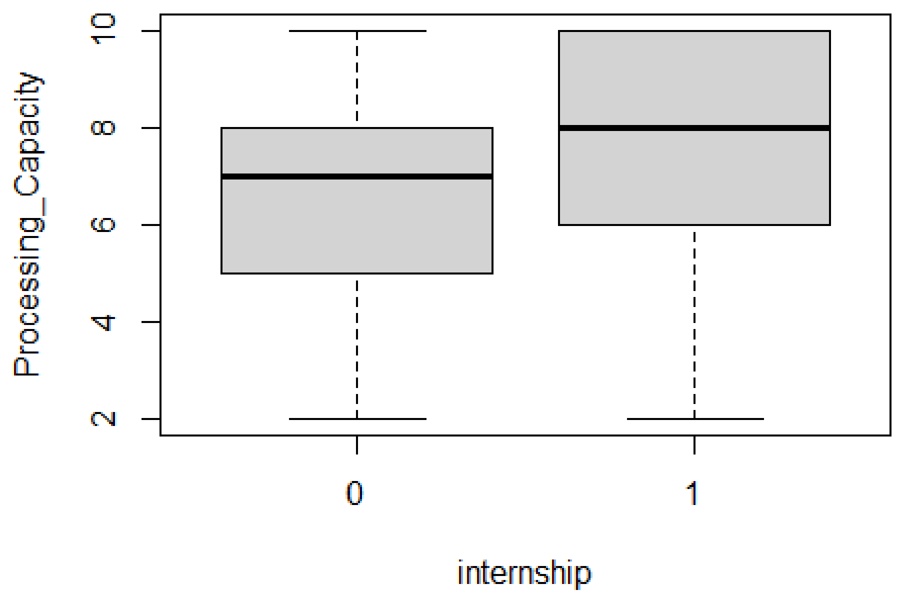
NAMES OF THE COLUMN

```
##  [1] "Dom_Int_WR"                     "Int_Int_WR"
##  [3] "Altruism"                       "Concentration"
##  [5] "Creativity"                     "Deliberation"
##  [7] "Determination"                  "Emotional_Recognition"
##  [9] "Emotional_Stability"            "Processing_Speed"
## [11] "Future_Orientation"             "Impulsive_risk"
## [13] "Innovation_Potential"           "Learning_Agility"
## [15] "Sensitivity_To_Loss"            "Need_For_Structure"
## [17] "Novelty_Seeking"                "Curiosity"
## [19] "Optimism"                       "Ownership_and_Responsibility"
## [21] "Rational_Decision_Making_Style" "Performance_Under_Pressure"
## [23] "Executive_Functioning"          "Resilience"
## [25] "Sensitivity_To_Reward"          "Self_discipline"
## [27] "Self_Belief"                    "Self_Monitoring"
## [29] "Sociability"                    "Social_Dominance"
## [31] "Managing_Uncertainty"           "Processing_Capacity"
```

SCORES

Processing Capacity by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   7.000   6.802   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   6.000   8.000   7.731  10.000  10.000
```

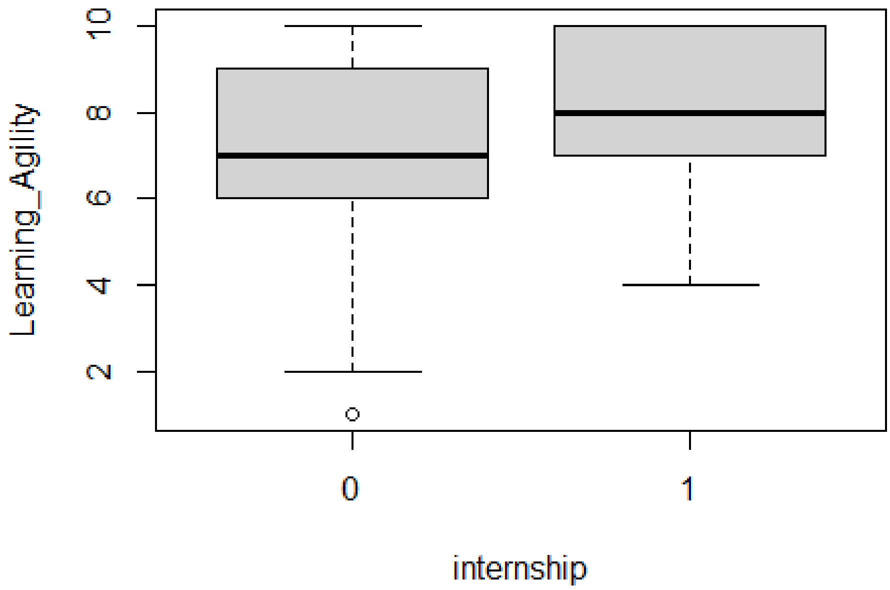


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  Processing_Capacity by internship
## W = 19481, p-value = 1.676e-05
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Processing_Capacity by internship
## t = -4.5127, df = 394, p-value = 8.464e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.3337108 -0.5242592
## sample estimates:
## mean in group 0 mean in group 1
##        6.802198        7.731183
```

Learning Agility by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   6.000   7.000   7.179   9.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   4.000   7.000   8.000   8.124  10.000  10.000
```



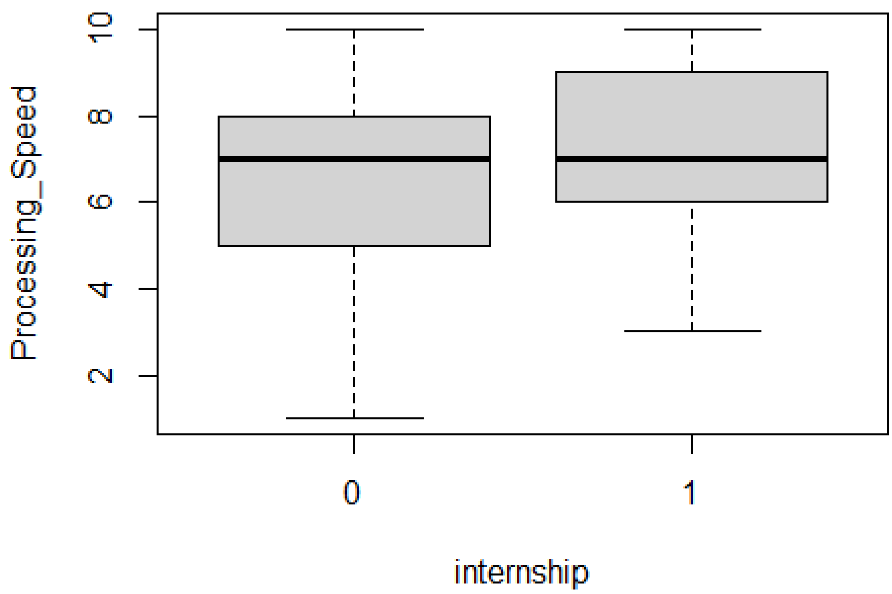
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Learning_Agility by internship
## W = 18734, p-value = 1.209e-06
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Learning_Agility by internship
## t = -5.3123, df = 433.53, p-value = 1.734e-07
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.2934918 -0.5948457
## sample estimates:
## mean in group 0 mean in group 1
##        7.179487        8.123656
```

Processing Speed by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   7.000   6.571   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   3.000   6.000   7.000   7.473   9.000  10.000
```



Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

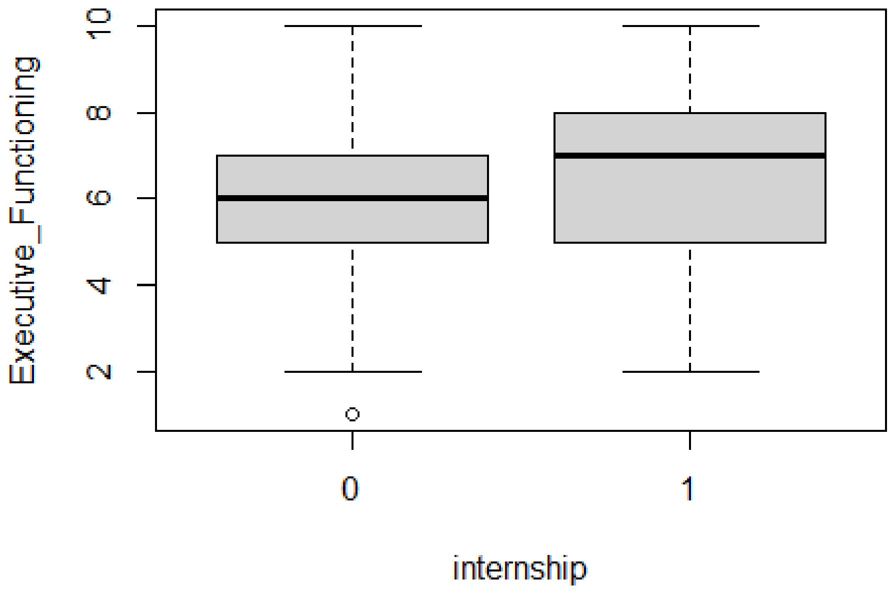
```
## Wilcoxon rank sum test with continuity correction
##
```

```
## data:  Processing_Speed by internship
## W = 18638, p-value = 9.134e-07
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Processing_Speed by internship
## t = -5.399, df = 425.66, p-value = 1.116e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.2299558 -0.5734236
## sample estimates:
## mean in group 0 mean in group 1
##        6.571429        7.473118
```

Executive Functioning by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.161   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   7.000   6.935   8.000  10.000
```

Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

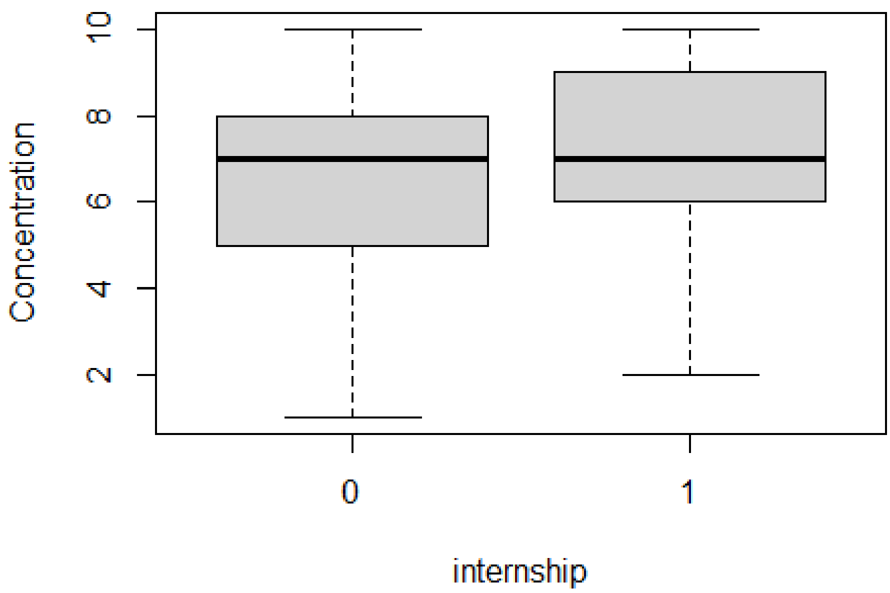


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Executive_Functioning by internship
## W = 19908, p-value = 7.081e-05
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Executive_Functioning by internship
## t = -4.0639, df = 394.73, p-value = 5.825e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.1488993 -0.3997241
## sample estimates:
## mean in group 0 mean in group 1
##        6.161172        6.935484
```

Concentration by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   7.000   6.678   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    2.00    6.00    7.00    7.36    9.00   10.00
```

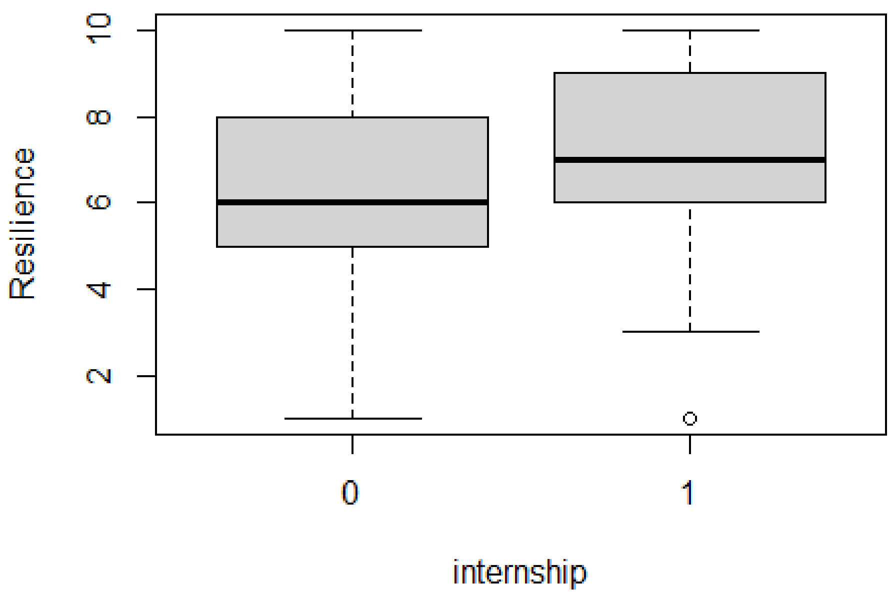


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
##
## Wilcoxon rank sum test with continuity correction
##
## data:  Concentration by internship
## W = 20892, p-value = 0.001117
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Concentration by internship
## t = -3.4903, df = 400.69, p-value = 0.0005361
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.0670079 -0.2981109
## sample estimates:
## mean in group 0 mean in group 1
##        6.677656        7.360215
```

Resilience by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.495   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   6.000   7.000   7.247   9.000  10.000
```



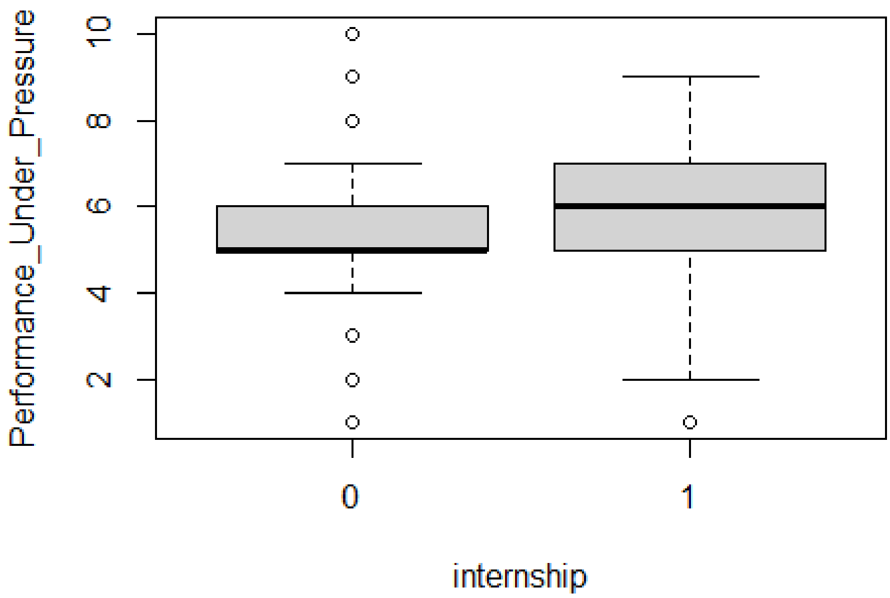
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Resilience by internship
## W = 20010, p-value = 9.096e-05
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Resilience by internship
## t = -4.2995, df = 397.89, p-value = 2.156e-05
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.0970274 -0.4085853
## sample estimates:
## mean in group 0 mean in group 1
##        6.494505        7.247312
```

Performance Under Pressure by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   5.000   5.418   6.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.511   7.000   9.000
```



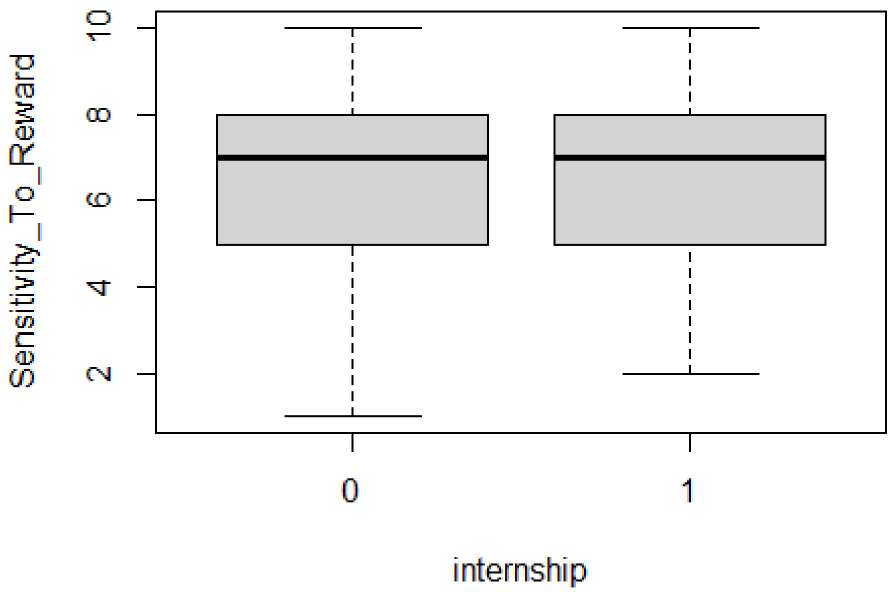
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Performance_Under_Pressure by internship
```

```
## W = 23592, p-value = 0.1878
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Performance_Under_Pressure by internship
## t = -0.61564, df = 373.11, p-value = 0.5385
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3907555  0.2044150
## sample estimates:
## mean in group 0 mean in group 1
##        5.417582        5.510753
```

Sensitivity to Reward by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   7.000   6.612   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   7.000   6.656   8.000  10.000
```

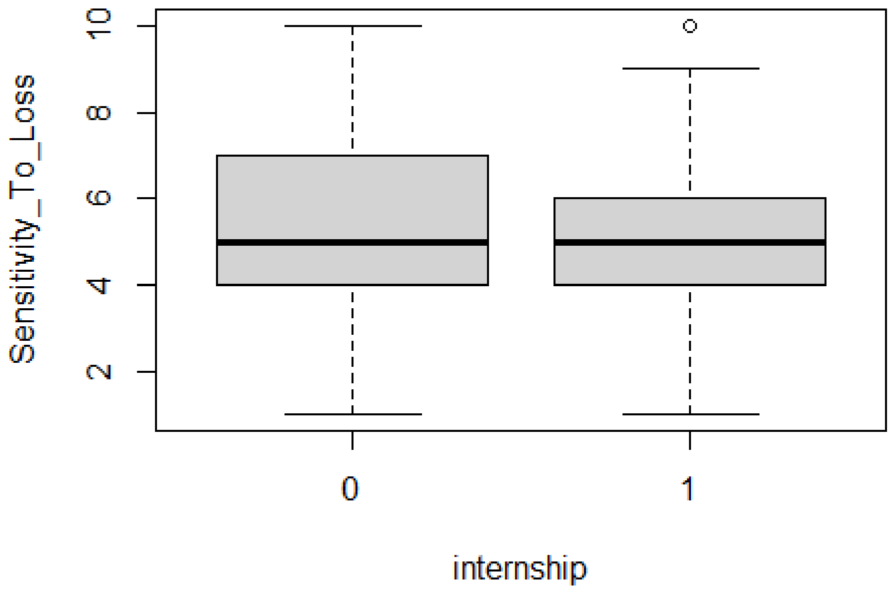


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Sensitivity_To_Reward by internship
## W = 25088, p-value = 0.8273
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Sensitivity_To_Reward by internship
## t = -0.24131, df = 411.31, p-value = 0.8094
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4041897  0.3158049
## sample estimates:
## mean in group 0 mean in group 1
##        6.611722        6.655914
```

Sensitivity to Loss by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   4.000   5.000   5.282   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    4.00    5.00    4.93    6.00   10.00
```

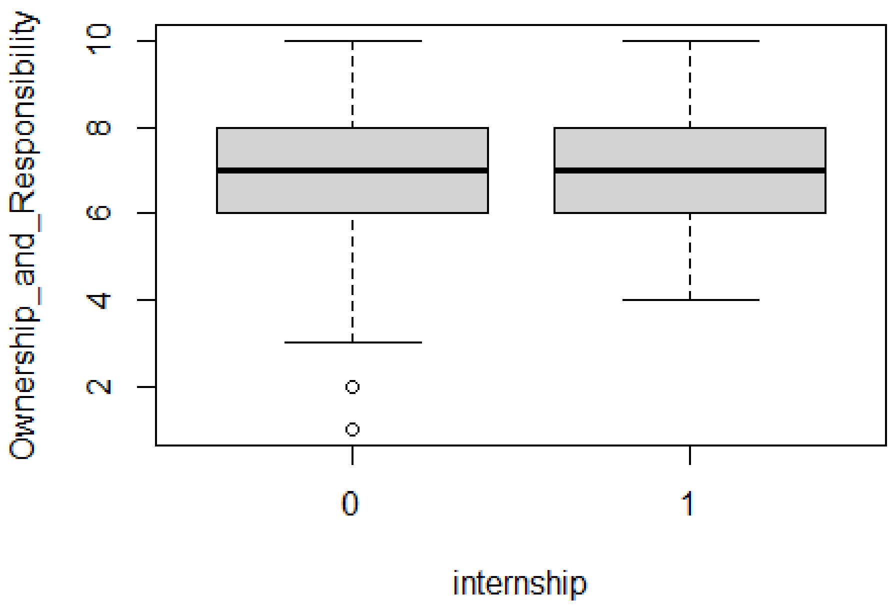


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Sensitivity_To_Loss by internship
## W = 28035, p-value = 0.05498
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Sensitivity_To_Loss by internship
## t = 1.8714, df = 412.81, p-value = 0.06199
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.01773008  0.72161759
## sample estimates:
## mean in group 0 mean in group 1
##        5.282051        4.930108
```

Ownership and Responsibility by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   6.000   7.000   6.744   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##       4       6       7       7       8      10
```



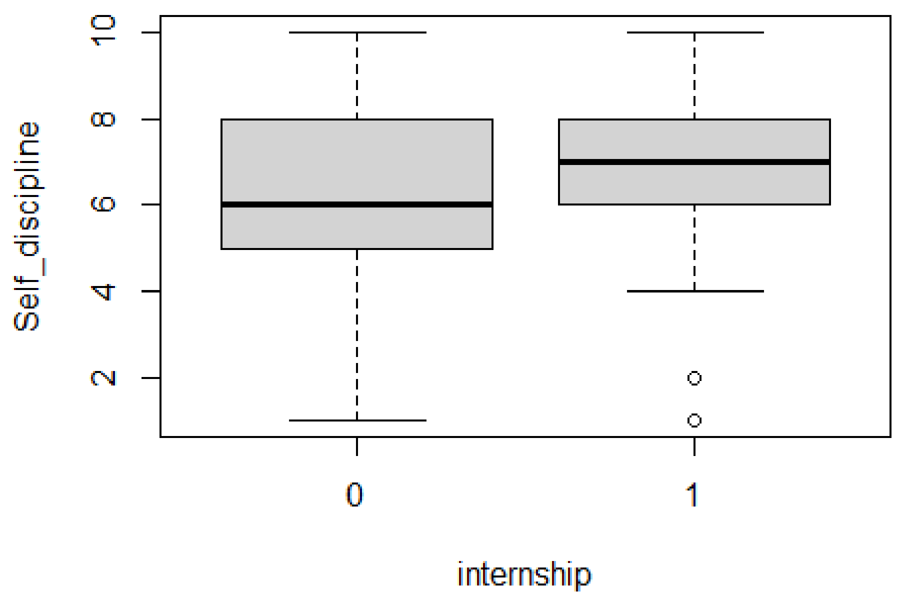
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Ownership_and_Responsibility by internship
## W = 23704, p-value = 0.2212
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Ownership_and_Responsibility by internship
## t = -1.4583, df = 391.64, p-value = 0.1456
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.60210476  0.08928424
## sample estimates:
## mean in group 0 mean in group 1
##         6.74359         7.00000
```

Self-Discipline by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.418   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   6.000   7.000   6.978   8.000  10.000
```

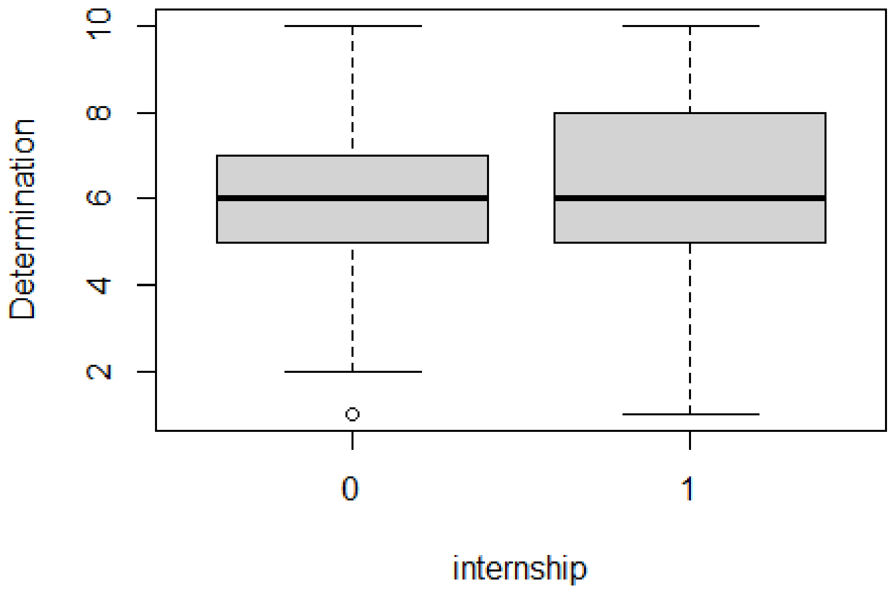


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Self_discipline by internship
## W = 21147, p-value = 0.002092
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Self_discipline by internship
## t = -3.0324, df = 392.01, p-value = 0.002588
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.9245768 -0.1972476
## sample estimates:
## mean in group 0 mean in group 1
##        6.417582        6.978495
```

Determination by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.084   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.323   8.000  10.000
```

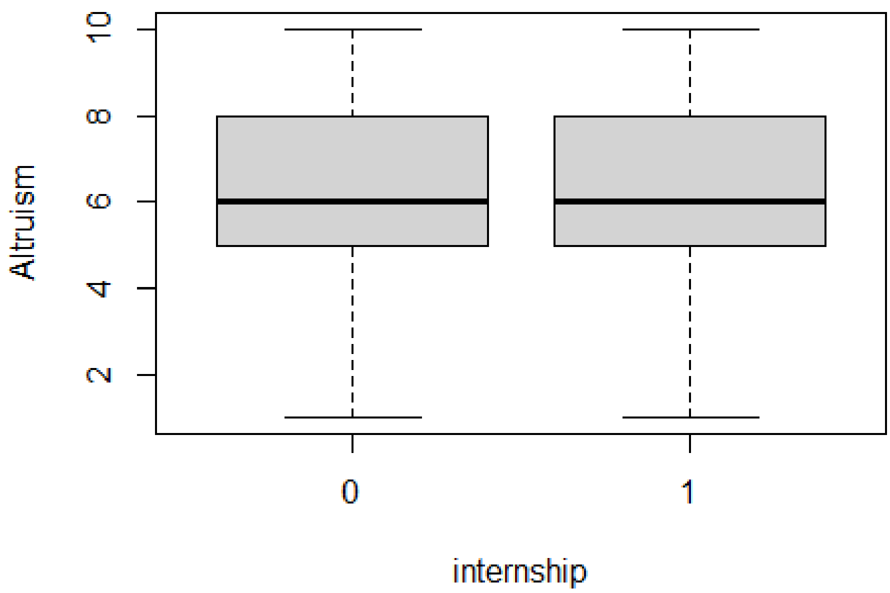


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Determination by internship
## W = 23923, p-value = 0.287
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Determination by internship
## t = -1.364, df = 383.72, p-value = 0.1734
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5818843  0.1052212
## sample estimates:
## mean in group 0 mean in group 1
##        6.084249        6.322581
```

Altruism by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    5.00    6.00    6.48    8.00   10.00
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.339   8.000  10.000
```



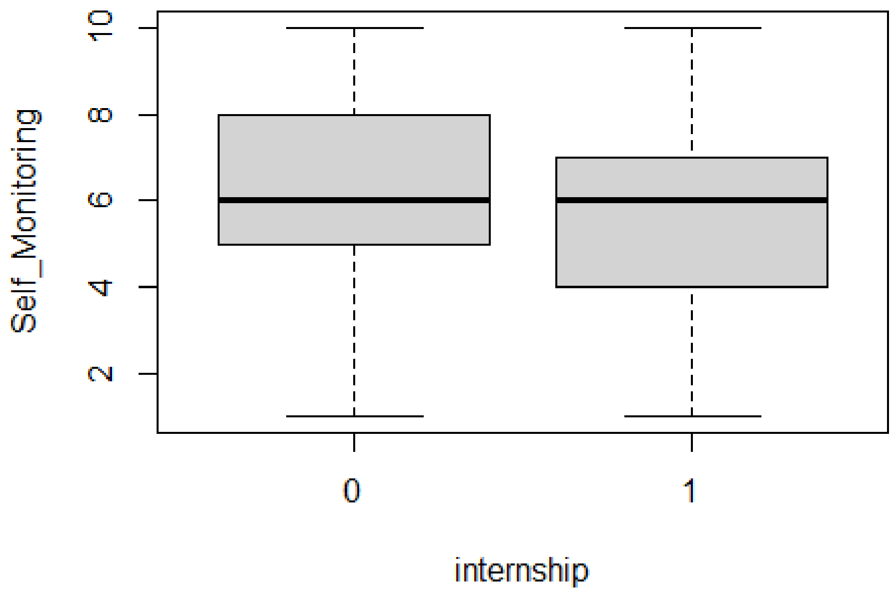
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
##  Wilcoxon rank sum test with continuity correction
##
## data:  Altruism by internship
## W = 26248, p-value = 0.5334
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Altruism by internship
## t = 0.7466, df = 389.26, p-value = 0.4558
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2305423  0.5128299
```

```
## sample estimates:
## mean in group 0 mean in group 1
##         6.479853        6.338710
```

Self-Monitoring by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    5.00    6.00    6.07    8.00   10.00
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   4.250   6.000   5.855   7.000  10.000
```



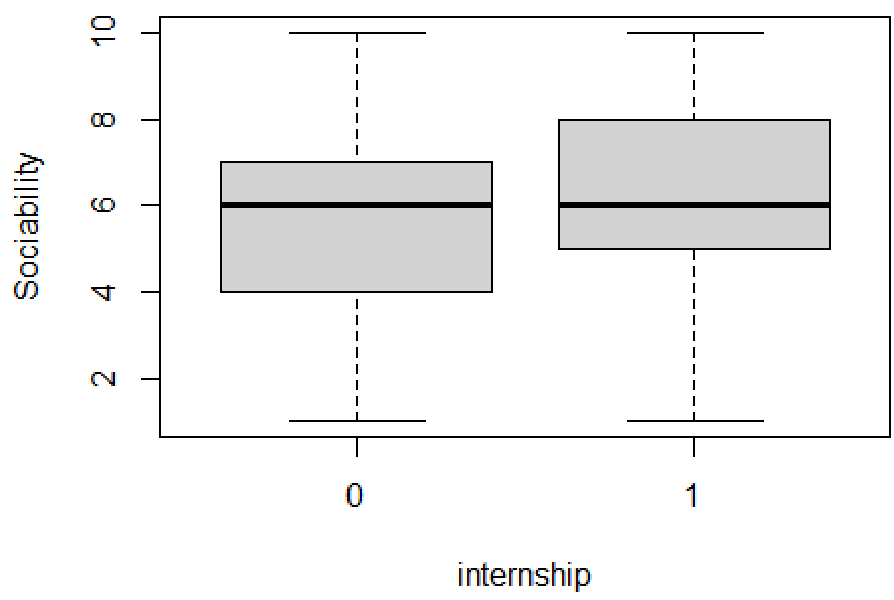
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Self_Monitoring by internship
## W = 27008, p-value = 0.2413
## alternative hypothesis: true location shift is not equal to 0
```

```
##
##  Welch Two Sample t-test
##
## data:  Self_Monitoring by internship
## t = 1.1174, df = 397.89, p-value = 0.2645
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.1630992  0.5926159
## sample estimates:
## mean in group 0 mean in group 1
##        6.069597        5.854839
```

Sociability by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    4.00    6.00    5.89    7.00   10.00
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.048   7.750  10.000
```

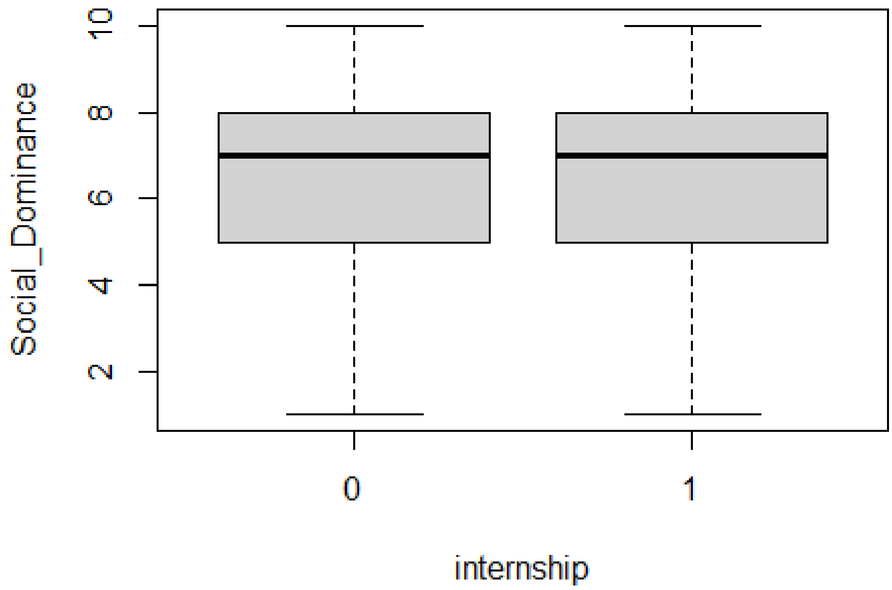


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Sociability by internship
## W = 24449, p-value = 0.4962
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Sociability by internship
## t = -0.81948, df = 387.46, p-value = 0.413
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5380187  0.2214643
## sample estimates:
## mean in group 0 mean in group 1
##        5.890110        6.048387
```

Social Dominance by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   7.000   6.769   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.250   7.000   6.726   8.000  10.000
```

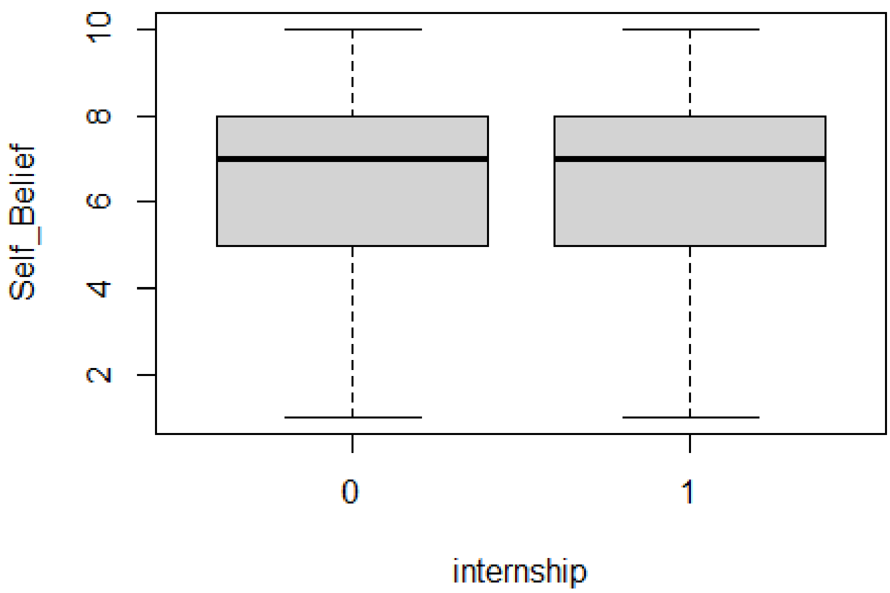


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Social_Dominance by internship
## W = 25396, p-value = 0.9965
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Social_Dominance by internship
## t = 0.22065, df = 380.43, p-value = 0.8255
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3435370  0.4303856
## sample estimates:
## mean in group 0 mean in group 1
##        6.769231        6.725806
```

Self-belief by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
##    1.00    5.00    7.00    6.59    8.00   10.00 
## 
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
##   1.000   5.000   7.000   6.505   7.750  10.000
```

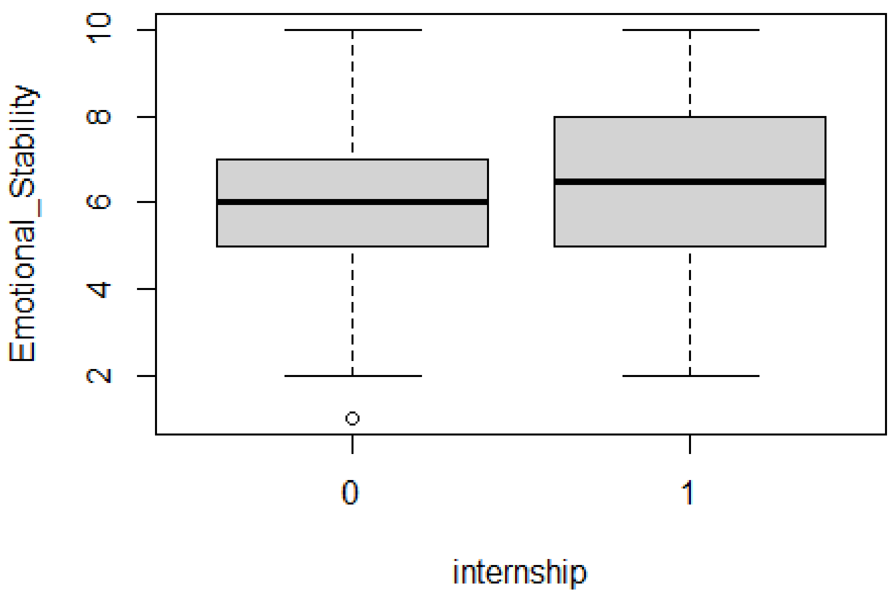


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
## 
## data:  Self_Belief by internship
## W = 26073, p-value = 0.619
## alternative hypothesis: true location shift is not equal to 0

## 
##  Welch Two Sample t-test
## 
## data:  Self_Belief by internship
## t = 0.46688, df = 403.12, p-value = 0.6408
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2708727  0.4396072
## sample estimates:
## mean in group 0 mean in group 1 
##        6.589744        6.505376
```

Emotional Stability by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.916   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   6.500   6.489   8.000  10.000
```



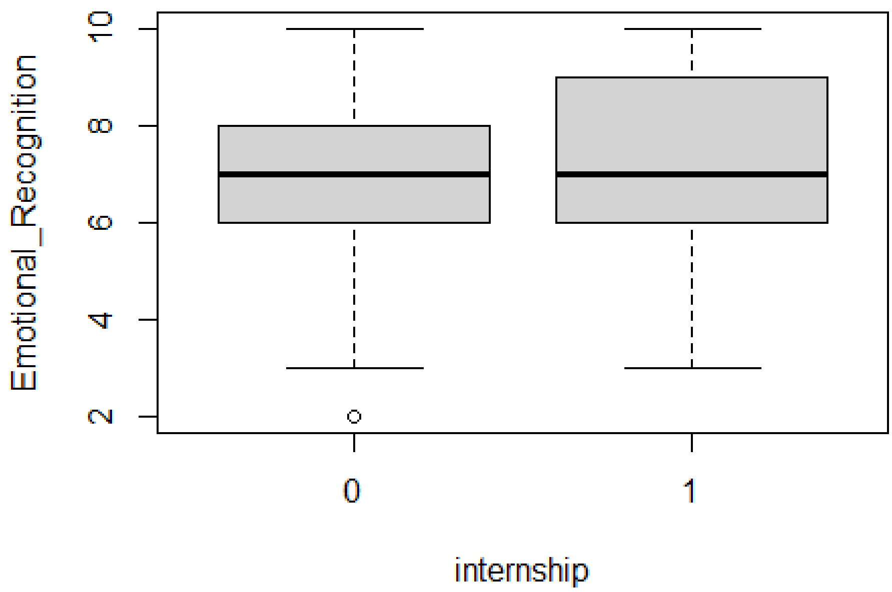
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Emotional_Stability by internship
## W = 21118, p-value = 0.001921
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Emotional_Stability by internship
## t = -3.1722, df = 416.9, p-value = 0.001625
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.9288648 -0.2181280
## sample estimates:
## mean in group 0 mean in group 1
##        5.915751        6.489247
```

Emotional Recognition by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   6.000   7.000   7.114   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   3.000   6.250   7.000   7.355   9.000  10.000
```



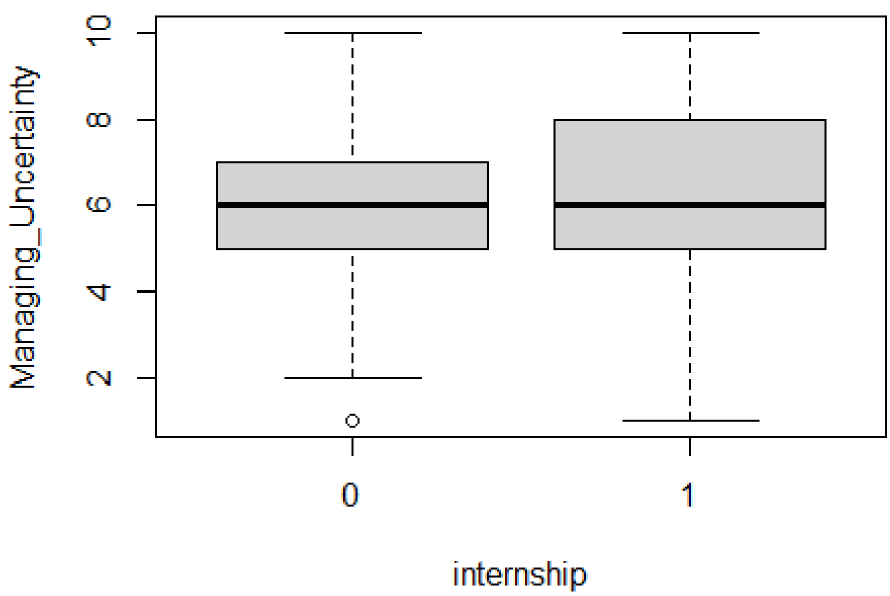
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Emotional_Recognition by internship
```

```
## W = 23278, p-value = 0.124
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Emotional_Recognition by internship
## t = -1.4755, df = 402.57, p-value = 0.1409
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.56276227  0.08019108
## sample estimates:
## mean in group 0 mean in group 1
##        7.113553        7.354839
```

Managing Uncertainty by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.205   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1.00    5.00    6.00    6.43    8.00   10.00
```

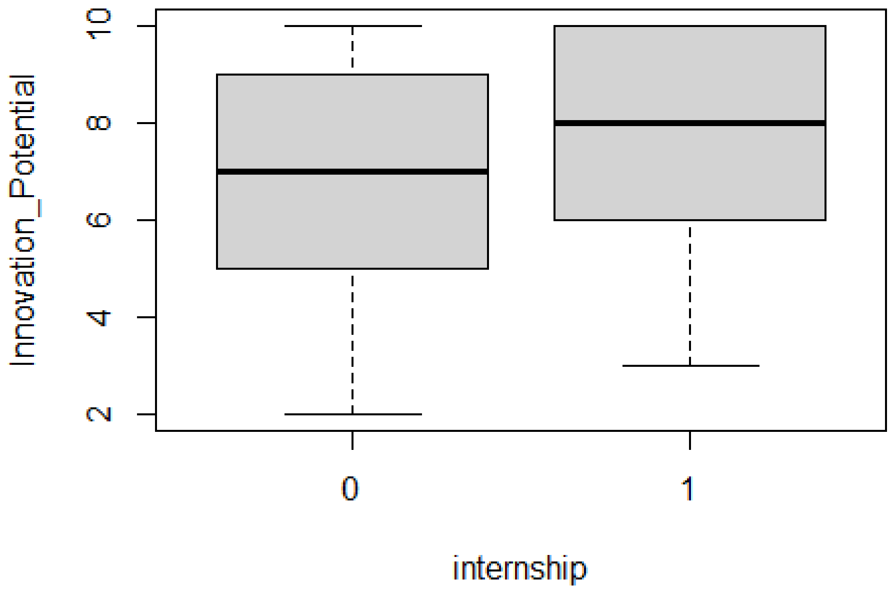


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Managing_Uncertainty by internship
## W = 24052, p-value = 0.3312
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Managing_Uncertainty by internship
## t = -1.1899, df = 405.3, p-value = 0.2348
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5966570  0.1466984
## sample estimates:
## mean in group 0 mean in group 1
##        6.205128        6.430108
```

Innovation Potential by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   7.000   7.128   9.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   3.000   6.000   8.000   7.812  10.000  10.000
```

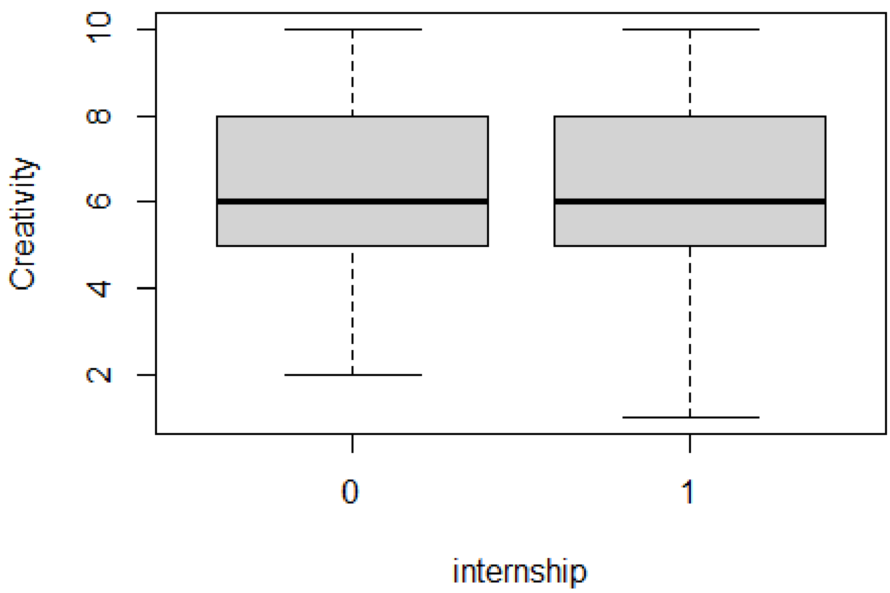


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
##  Wilcoxon rank sum test with continuity correction
##
## data:  Innovation_Potential by internship
## W = 21076, p-value = 0.001692
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Innovation_Potential by internship
## t = -3.4836, df = 426.48, p-value = 0.0005458
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.0693382 -0.2979075
## sample estimates:
## mean in group 0 mean in group 1
##        7.128205        7.811828
```

Creativity by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   5.000   6.000   6.443   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.371   8.000  10.000
```

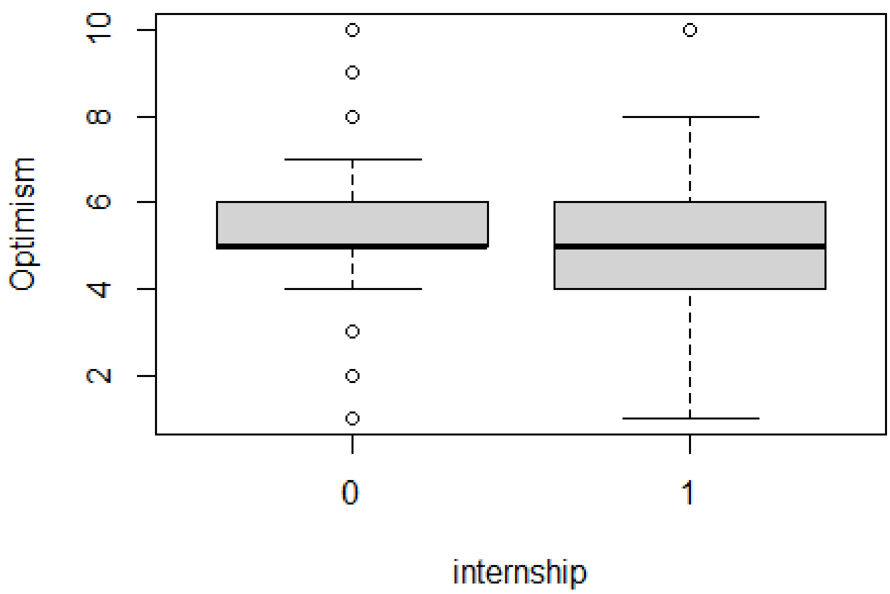


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Creativity by internship
## W = 25563, p-value = 0.8997
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Creativity by internship
## t = 0.39866, df = 382.02, p-value = 0.6904
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2841075  0.4286189
## sample estimates:
## mean in group 0 mean in group 1
##        6.443223        6.370968
```

Optimism by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   5.000   5.432   6.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   4.000   5.000   5.484   6.000  10.000
```



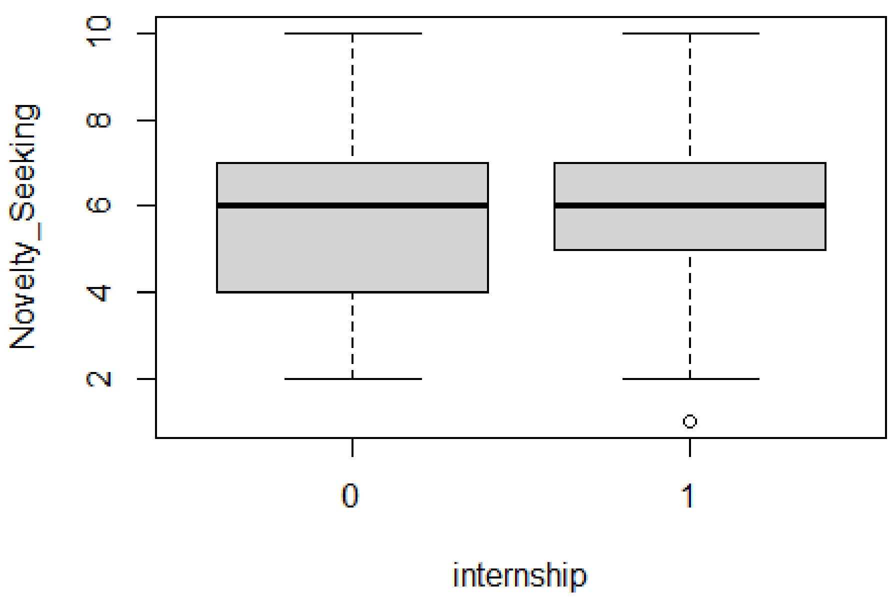
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Optimism by internship
## W = 24831, p-value = 0.6826
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Optimism by internship
## t = -0.34033, df = 409.91, p-value = 0.7338
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3498899  0.2466169
## sample estimates:
## mean in group 0 mean in group 1
##        5.432234        5.483871
```

Novelty Seeking by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   4.000   6.000   5.659   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.806   7.000  10.000
```



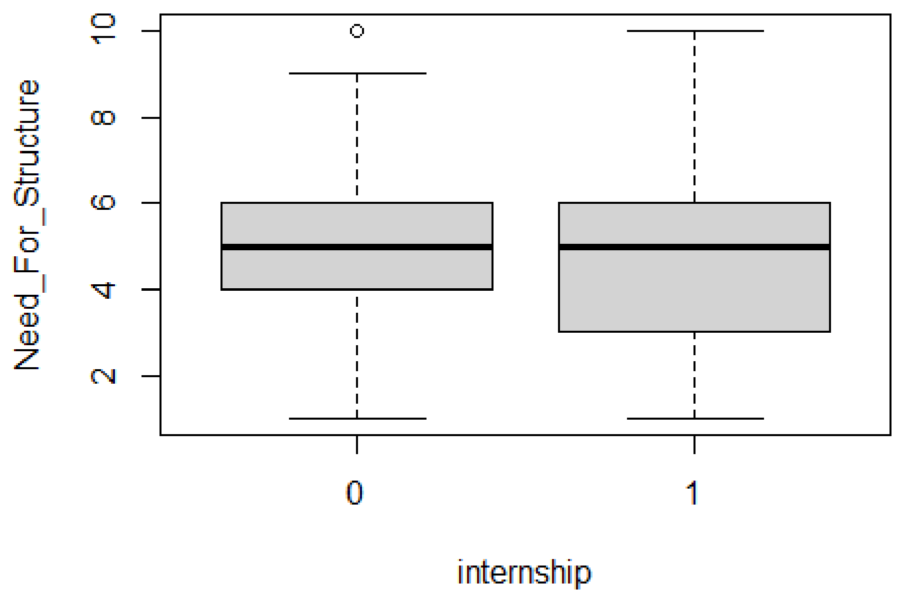
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Novelty_Seeking by internship
```

```
## W = 24175, p-value = 0.3778
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Novelty_Seeking by internship
## t = -0.81884, df = 412.34, p-value = 0.4134
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5002704  0.2060485
## sample estimates:
## mean in group 0 mean in group 1
##        5.659341        5.806452
```

Need for Structure by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   4.000   5.000   5.125   6.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   3.000   5.000   4.699   6.000  10.000
```

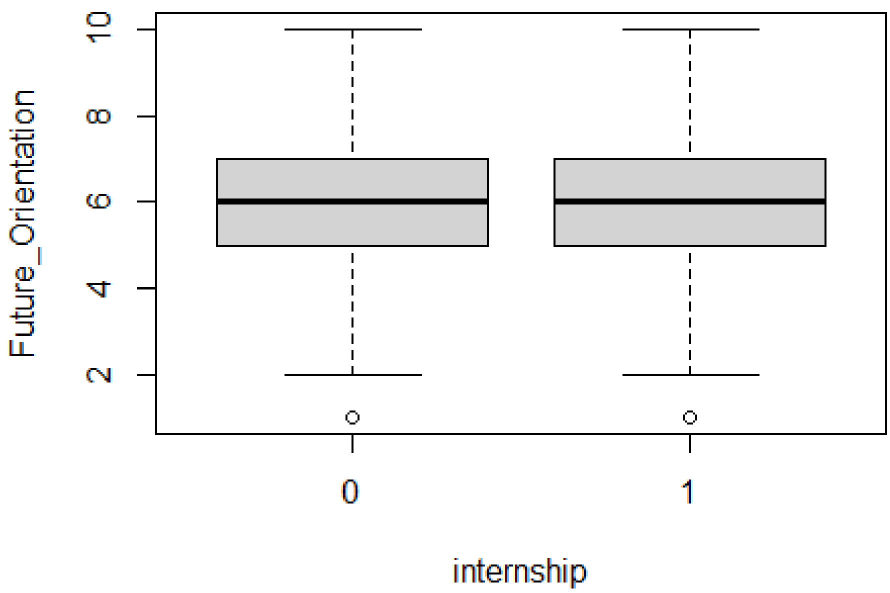


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Need_For_Structure by internship
## W = 28486, p-value = 0.02467
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Need_For_Structure by internship
## t = 2.2493, df = 377.1, p-value = 0.02507
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.05354923 0.79768556
## sample estimates:
## mean in group 0 mean in group 1
##        5.124542        4.698925
```

Future Orientation by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.769   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   5.801   7.000  10.000
```

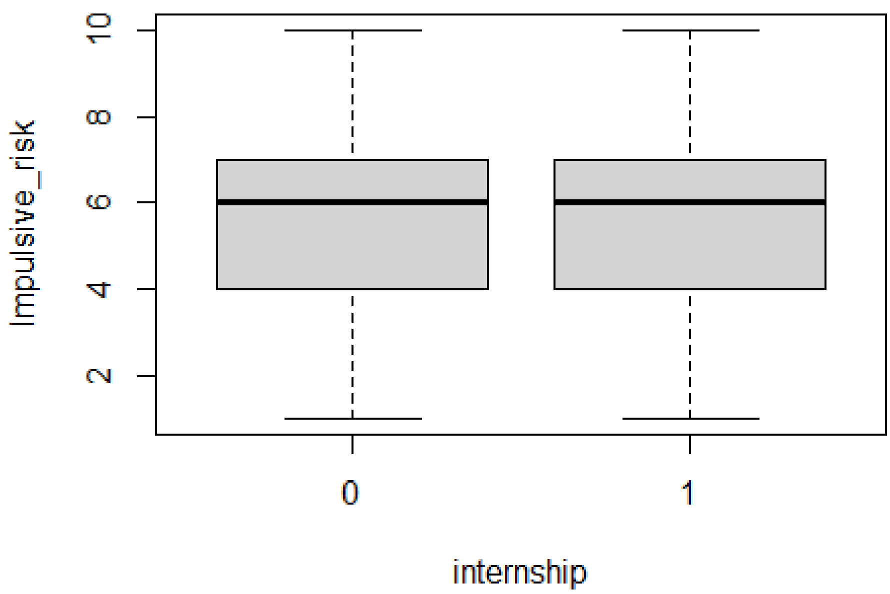


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Future_Orientation by internship
## W = 24489, p-value = 0.5131
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Future_Orientation by internship
## t = -0.1735, df = 401.11, p-value = 0.8623
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3926627  0.3289737
## sample estimates:
## mean in group 0 mean in group 1
##        5.769231        5.801075
```

Impulsive Risk by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     1.0     4.0     6.0     5.7     7.0    10.0
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   4.000   6.000   5.548   7.000  10.000
```



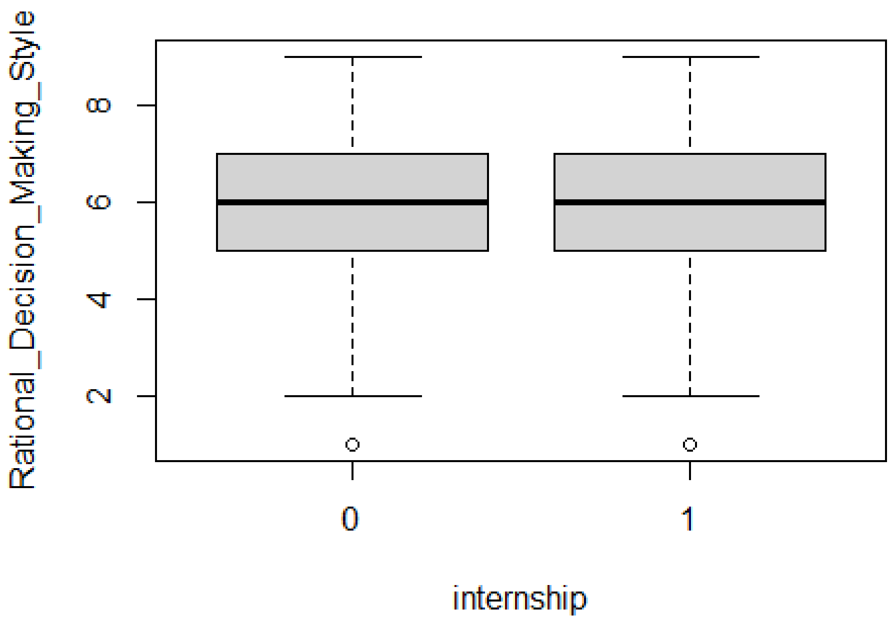
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Impulsive_risk by internship
## W = 26088, p-value = 0.6132
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Impulsive_risk by internship
## t = 0.73315, df = 380.13, p-value = 0.4639
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2543793  0.5568725
## sample estimates:
## mean in group 0 mean in group 1
##        5.699634        5.548387
```

Rational Decision-Making Style by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.011   7.000   9.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.102   7.000   9.000
```



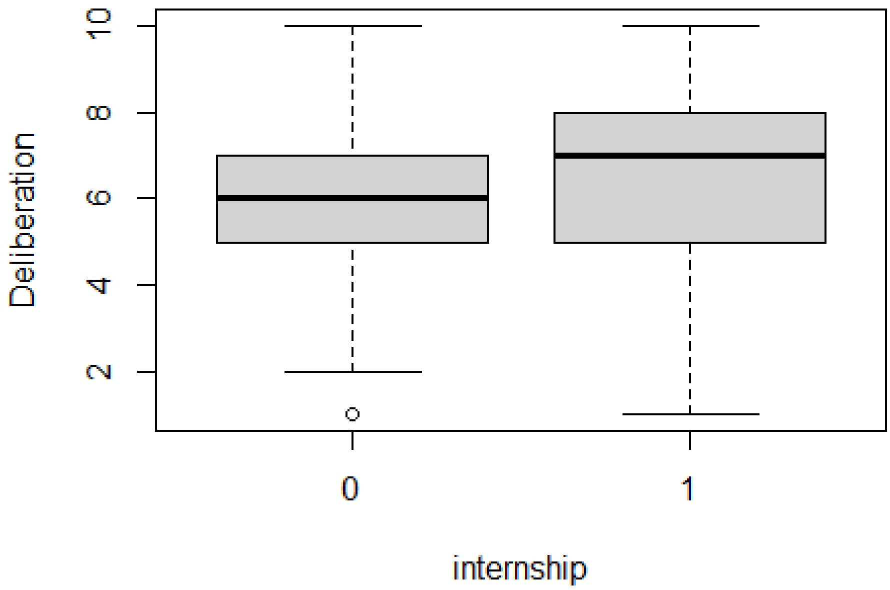
Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
##  Wilcoxon rank sum test with continuity correction
##
## data:  Rational_Decision_Making_Style by internship
```

```
## W = 24539, p-value = 0.5313
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Rational_Decision_Making_Style by internship
## t = -0.63745, df = 400.17, p-value = 0.5242
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.3723046  0.1899816
## sample estimates:
## mean in group 0 mean in group 1
##        6.010989        6.102151
```

Deliberation by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   6.000   6.132   7.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   5.000   7.000   6.849   8.000  10.000
```

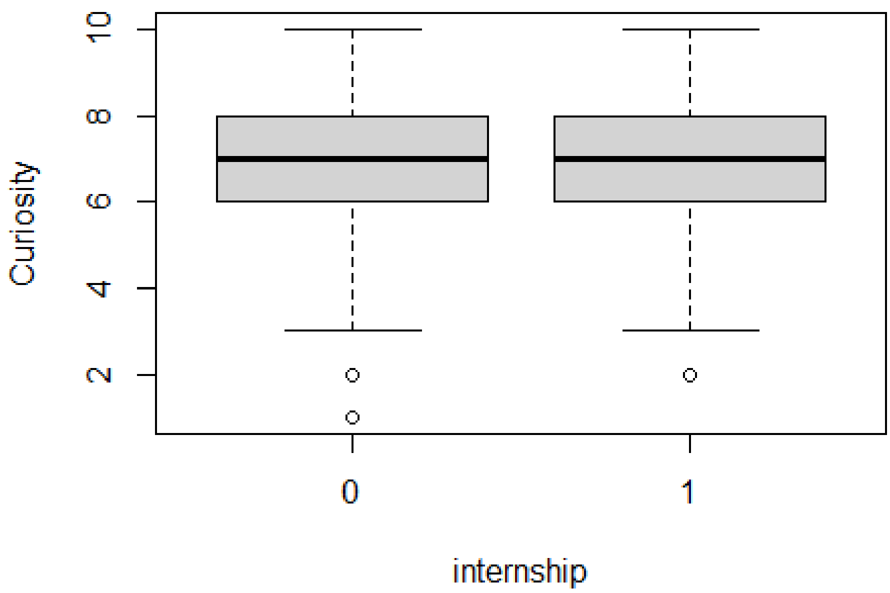


Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Deliberation by internship
## W = 20665, p-value = 0.0006047
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Deliberation by internship
## t = -3.8759, df = 398.28, p-value = 0.0001242
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.0815761 -0.3536124
## sample estimates:
## mean in group 0 mean in group 1
##        6.131868        6.849462
```

Curiosity by program-related internship experience, students who attended both program-related international and domestic internship (coded as 1), and students who exclusively attended a program-related domestic internship (coded as 0).

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   1.000   6.000   7.000   6.832   8.000  10.000
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   2.000   6.000   7.000   6.919   8.000  10.000
```



Mean differences in scores between the two groups were analyzed by the non-parametric Mann-Whitney U test and the unpaired two-samples t-test.

```
## Wilcoxon rank sum test with continuity correction
##
## data:  Curiosity by internship
## W = 24927, p-value = 0.7376
## alternative hypothesis: true location shift is not equal to 0

##
##  Welch Two Sample t-test
##
## data:  Curiosity by internship
## t = -0.50179, df = 406.34, p-value = 0.6161
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4320281  0.2563221
## sample estimates:
## mean in group 0 mean in group 1
##        6.831502        6.919355
```

APPENDIX A.3: 2019 Data Set - Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) and regression analysis of 2019 dataset

FACTOR ANALYSIS DATASET 2019

The broad purpose of factor analysis is to summarize data so that relationships and patterns can be easily interpreted an understood. It is normally used to regroup variables into a limited set of clusters based on shared variance. Hence, it helps to isolate constructs and concepts. Factor analysis uses mathematical procedures for the simplification of interrelated measures to discover patterns in a set of variables. Attempting to discover the simplest method of interpretation of observed data is known as parsimony, and this is essentially the aim of factor analysis.

Factor analysis operates on the notion that measurable and observable variables can be reduced to fewer latent variables that share a common variance and are unobservable, which is known as reducing dimensionality. These unobservable factors are not directly measured but are essentially hypothetical constructs that are used to represent variables.

Large datasets that consist of several variables can be reduced by observing 'groups' of variables (i.e., factors) – that is, factor analysis assembles common variables into descriptive categories. Factor analysis is useful for studies that involve a few or hundreds of variables, items from questionnaires, or a battery of tests which can be reduced to a smaller set, to get at an underlying concept, and to facilitate interpretations. It is easier to focus on some key factors rather than having to consider too many variables that may be trivial, and so factor analysis is useful for placing variables into meaningful categories. Many other uses of factor analysis include data transformation, hypothesis-testing, mapping, and scaling.

Loading the useful R packages
Packages are a collection of R functions, complied code and sample data. They are stored under a directory called "library" in the R environment. By default, R installs a set of packages during installation. More packages are added later, when they are needed for some specific purpose.

readr R package. The goal of 'readr' is to provide a fast and friendly way to read rectangular data (like 'csv,' 'tsv,' and 'fwf'). It is designed to flexibly parse many types of data found in the wild, while still cleanly failing when data unexpectedly

corpcor R package. Efficient Estimation of Covariance and (Partial) Correlation.

GPArotation R package. Gradient Projection Algorithm Rotation for Factor Analysis. See GPArotation intro for more details.

psych R package. A general-purpose toolbox for personality, psychometric theory, and experimental psychology. Functions are primarily for multivariate analysis and scale construction using factor analysis, principal component analysis, cluster analysis and reliability analysis, although others provide basic descriptive statistics. Item Response Theory is done using factor analysis of tetrachoric and polychromic correlations.

corrplot R package

```
library(readr)
library(corpcor)
library(GPArotation)
library(psych)
library(corrplot)

## corrplot 0.84 loaded
```

1-LOAD THE DATASET 2019

```
## Parsed with column specification:
## cols(
##   .default = col_double(),
##   Gender = col_character(),
##   Major = col_character(),
##   Major_class = col_character()
## )

## See spec(...) for full column specifications.
```

2-SUMMARIZE DATASET

Dimension of the dataset

```
dim(dataset2019)

## [1] 459  40
```

The dataset includes 459 observations and 40 variables

PEEK AT THE DATA
First lines of the dataset

```
head(dataset2019)

## # A tibble: 6 x 40
##      ID Gender   YOB Major Major_class Dom_Int_WR Int_Int_WR Dom_Int_C
Int_Int_C
##   <dbl> <chr>  <dbl> <chr> <chr>            <dbl>      <dbl>     <dbl>
<dbl>
## 1     1 Female  1994 Huma~ social_hum~          1          0         0
0
## 2     2 Female  1995 Econ~ social_hum~          1          1         0
0
## 3     3 Female  1996 Econ~ social_hum~          1          1         0
0
## 4     4 Female  1994 Engi~ Engineering          1          1         0
0
## 5     5 Female  1992 Econ~ social_hum~          1          1         0
1
## 6     6 Female  1995 Econ~ social_hum~          1          0         0
```

```
0
## # ... with 31 more variables: Study_Abroad <dbl>, Altruism <dbl>,
## #   Concentration <dbl>, Creativity <dbl>, Deliberation <dbl>,
## #   Determination <dbl>, Emotional_Recognition <dbl>,
## #   Emotional_Stability <dbl>, Processing_Speed <dbl>,
## #   Future_Orientation <dbl>, Impulsive_risk <dbl>, Innovation_Potentia
l <dbl>,
## #   Learning_Agility <dbl>, Sensitivity_To_Loss <dbl>,
## #   Need_For_Structure <dbl>, Novelty_Seeking <dbl>, Curiosity <dbl>,
## #   Optimism <dbl>, Ownership_and_Responsibility <dbl>,
## #   Rational_Decision_Making_Style <dbl>, Performance_Under_Pressure <d
bl>,
## #   Executive_Functioning <dbl>, Resilience <dbl>, Sensitivity_To_Rewar
d <dbl>,
## #   Self_discipline <dbl>, Self_Belief <dbl>, Self_Monitoring <dbl>,
## #   Sociability <dbl>, Social_Dominance <dbl>, Managing_Uncertainty <db
l>,
## #   Processing_Capacity <dbl>
```

NAMES OF THE COLUMN
The names of the columns (variables) of the dataset

```
names(dataset2019)

##  [1] "ID"                             "Gender"
##  [3] "YOB"                            "Major"
##  [5] "Major_class"                    "Dom_Int_WR"
##  [7] "Int_Int_WR"                     "Dom_Int_C"
##  [9] "Int_Int_C"                      "Study_Abroad"
## [11] "Altruism"                       "Concentration"
## [13] "Creativity"                     "Deliberation"
## [15] "Determination"                  "Emotional_Recognition"
## [17] "Emotional_Stability"            "Processing_Speed"
## [19] "Future_Orientation"             "Impulsive_risk"
## [21] "Innovation_Potential"           "Learning_Agility"
## [23] "Sensitivity_To_Loss"            "Need_For_Structure"
## [25] "Novelty_Seeking"                "Curiosity"
## [27] "Optimism"                       "Ownership_and_Responsibility"
## [29] "Rational_Decision_Making_Style" "Performance_Under_Pressure"
## [31] "Executive_Functioning"          "Resilience"
## [33] "Sensitivity_To_Reward"          "Self_discipline"
## [35] "Self_Belief"                    "Self_Monitoring"
## [37] "Sociability"                    "Social_Dominance"
## [39] "Managing_Uncertainty"           "Processing_Capacity"
```

FOCUSING ON SCORES FOR EFA ANALYSIS AND PEEK AT THE DATA
In this step, the researcher is interested only in the Arctic Shore digital game-based assessment, and therefore a new dataset is created which includes only the columns (variables) relevant for the research.

```
EFA_2019<-dataset2019[,11:40]
head(EFA_2019)

## # A tibble: 6 x 30
##   Altruism Concentration Creativity Deliberation Determination Emotiona
```

```
l_Recog~
##     <dbl>         <dbl>      <dbl>        <dbl>         <dbl>
<dbl>
## 1       4             7          5            6             6
7
## 2       8             8          5            6             5
7
## 3       7             5          3            7             7
6
## 4       6            10          9           10             5
8
## 5       9             3          7            6             3
8
## 6       7             5          9            5             6
6
## # ... with 24 more variables: Emotional_Stability <dbl>,
## #   Processing_Speed <dbl>, Future_Orientation <dbl>, Impulsive_risk <d
bl>,
## #   Innovation_Potential <dbl>, Learning_Agility <dbl>,
## #   Sensitivity_To_Loss <dbl>, Need_For_Structure <dbl>, Novelty_Seekin
g <dbl>,
## #   Curiosity <dbl>, Optimism <dbl>, Ownership_and_Responsibility <dbl>
,
## #   Rational_Decision_Making_Style <dbl>, Performance_Under_Pressure <d
bl>,
## #   Executive_Functioning <dbl>, Resilience <dbl>, Sensitivity_To_Rewar
d <dbl>,
## #   Self_discipline <dbl>, Self_Belief <dbl>, Self_Monitoring <dbl>,
## #   Sociability <dbl>, Social_Dominance <dbl>, Managing_Uncertainty <db
l>,
## #   Processing_Capacity <dbl>
```

EXPLORATORY FACTOR ANALYSIS (EFA)

The first thing to do when conducting a factor analysis is to look at the correlations of the variables.

There are essentially two potential problems: (1) correlations that are not high enough; and (2) correlations that are too high.

The first problem can be tested by visually scanning the correlation matrix and looking for correlations below about .3: if any variables have lots of correlations below this value then it should be consider excluding them.

For the second problem, if there is any reason to believe that the correlation matrix has multicollinearity then it should look through the correlation matrix for variables that correlate very highly (R > .8) and consider eliminating one of the variables (or more) before proceeding.

The **correlation matrix** of 30 scores of the Arctic Shores tool is calculated and assessed to evaluate the factorability. Below, the first rows and columns of the correlation matrix for the 30 scores:

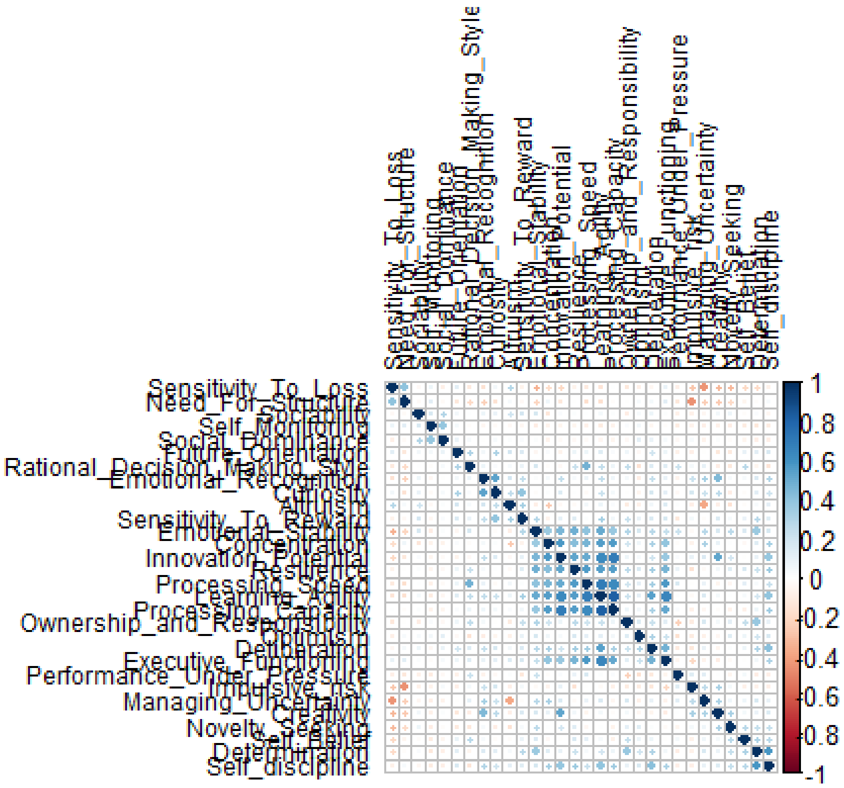
```
##                         Altruism Concentration  Creativity Deliberatio
n
## Altruism               1.00000000   -0.26698471 -0.08230294   0.0581028
9
## Concentration         -0.26698471    1.00000000  0.09037077   0.3242172
4
## Creativity            -0.08230294    0.09037077  1.00000000  -0.0546716
1
## Deliberation           0.05810289    0.32421724 -0.05467161   1.0000000
0
## Determination          0.03877286    0.13946223  0.08884319   0.3083606
3
## Emotional_Recognition  0.18539346    0.04082392  0.44645598   0.2356333
9
##                       Determination Emotional_Recognition Emotional_Sta
bility
## Altruism                 0.03877286            0.18539346          -0.08
834914
## Concentration            0.13946223            0.04082392           0.36
856320
## Creativity               0.08884319            0.44645598           0.16
412953
## Deliberation             0.30836063            0.23563339           0.27
213887
## Determination            1.00000000            0.15147055           0.36
590173
## Emotional_Recognition    0.15147055            1.00000000           0.01
143155
##                       Processing_Speed Future_Orientation Impulsive_ris
k
## Altruism                    0.05697839         0.18018291    -0.0870913
8
## Concentration               0.46087205         0.02187774    -0.0696504
6
## Creativity                 -0.05834266        -0.12384820     0.3222937
9
## Deliberation                0.34490298         0.19025770    -0.1204853
5
## Determination               0.03259575         0.12216567    -0.0721602
0
## Emotional_Recognition       0.08760331         0.05169583     0.2176135
3
##                       Innovation_Potential Learning_Agility Sensitivity
_To_Loss
## Altruism                        -0.03033119       0.07932657           0.
28311628
## Concentration                    0.57453851       0.55234021          -0.
18782384
## Creativity                       0.52538086       0.04876610          -0.
33192431
## Deliberation                     0.20437174       0.54086431          -0.
04404745
## Determination                    0.09617754       0.18809652          -0.
19810112
```

```
## Emotional_Recognition          0.24646936       0.24558538         -0.
15774549
##                         Need_For_Structure Novelty_Seeking Curiosity    O
ptimism
## Altruism                      0.03044542    -0.154755916 0.2498794 -0.0
7960714
## Concentration                 0.06371027     0.002245196 0.0165036  0.0
6667008
## Creativity                   -0.26163807     0.322471869 0.2636292 -0.0
4329196
## Deliberation                  0.04609363     0.018795951 0.1703304  0.3
1219775
## Determination                -0.01278403     0.230503204 0.1242729  0.1
9842597
## Emotional_Recognition        -0.23095190     0.037869065 0.5305458 -0.0
9573855
##                         Ownership_and_Responsibility
## Altruism                                 -0.10811756
## Concentration                             0.19282512
## Creativity                                0.04649732
## Deliberation                              0.21704610
## Determination                             0.37545737
## Emotional_Recognition                     0.04712293
##                         Rational_Decision_Making_Style Performance_Under_
Pressure
## Altruism                                    0.03793348                0.0
18137249
## Concentration                              -0.01041691               -0.0
14346259
## Creativity                                 -0.09935255                0.0
02583788
## Deliberation                                0.14928919               -0.1
11065793
## Determination                              -0.05409446               -0.0
97951188
## Emotional_Recognition                       0.07409542               -0.0
60720048
##                         Executive_Functioning  Resilience Sensitivity_To_
Reward
## Altruism                           0.14879978 -0.02420630                0.3
301626
## Concentration                      0.39769948  0.42692420               -0.0
633933
## Creativity                        -0.09815596  0.05130326                0.1
510529
## Deliberation                       0.47807354  0.34278393                0.1
577577
## Determination                      0.05161062  0.21814775                0.2
710959
## Emotional_Recognition              0.09001059  0.03192643                0.2
435958
##                         Self_discipline Self_Belief Self_Monitoring Socia
bility
## Altruism                     0.1169243 -0.01551814     -0.03475619  0.19
```

```
394214
## Concentration               0.3390404 -0.03091349     -0.06226850 -0.13
283489
## Creativity                  0.1484669  0.04707238     -0.07144701  0.05
385652
## Deliberation                0.4159850  0.07248719     -0.04399444  0.07
712097
## Determination               0.5813637  0.31733990     -0.12890704  0.02
246709
## Emotional_Recognition       0.2980859  0.03849338     -0.04827707  0.07
795352
##                         Social_Dominance Managing_Uncertainty Processing_
Capacity
## Altruism                   0.018489180          -0.38243647           0.
02823281
## Concentration             -0.064645481           0.32853517           0.
56976010
## Creativity                 0.010319055           0.31957130          -0.
01310953
## Deliberation               0.085463758           0.09627364           0.
32602078
## Determination             -0.086462195           0.16496450           0.
07074620
## Emotional_Recognition     -0.004271227           0.33473499           0.
06224391
```

The below figure shows that there are some “clumps” of items that are positively correlated - evidence of some common factors. Indeed, the below picture clearly shows that most items have some correlation with each other meaning that they are connected. This implies that as one score varies, either up or down, the other score varies concurrently in the same (positive correlation in blue) or opposite (negative correlation in red) direction. For instance, social dominance, self-belief, sociability, managing uncertainty, self-monitoring and, processing capacity are closely related and can be explained through a common underlying factor not directly measurable. Therefore, the variability that characterized the scores measured over the sample can be represented by a common variance that is the amount of variance shared among the items and a unique variance that is specific to a particular item. The extracted factors make up common variance. In other words, the EFA allows us to understand what latent variables better contribute to represent employability measured by Arctic Shores scores.

```
corrplot(cor(EFA_2019), order="hclust",tl.col="black",tl.cex=.75)
```



The determinant of the matrix is calculated to assess for multicollinearity.

```
det(raqMatrix)

## [1] 2.923639e-07
```

The determinant of the matrix is **less than 0.00001**, then multicollinearity is present.

Then, Bartlett's test is run on the correlation matrix. The result is highly significant meaning that factor analysis is appropriate.

```
cortest.bartlett(EFA_2019)

## R was not square, finding R from data

## $chisq
## [1] 6727.742
##
## $p.value
## [1] 0
##
## $df
## [1] 435
```

NEW MATRIX

After the inspection of the correlation matrix and relationships among the scores, a new reduced matrix was selected to identify the latent factors.

```
EFA_2019_red<-EFA_2019[,c("Concentration",
                          "Executive_Functioning",
                          "Learning_Agility", "Processing_Speed",
```

```
                            "Resilience","Social_Dominance","Sociability",
                            "Self_Monitoring")]
raqMatrix_EFA_2019_red<-cor(EFA_2019_red)
head(raqMatrix_EFA_2019_red)
```

```
##                        Concentration Executive_Functioning Learning_Agil
ity
## Concentration             1.00000000            0.39769948       0.55234
021
## Executive_Functioning     0.39769948            1.00000000       0.65986
299
## Learning_Agility          0.55234021            0.65986299       1.00000
000
## Processing_Speed          0.46087205            0.57981067       0.69465
677
## Resilience                0.42692420            0.46082410       0.55984
496
## Social_Dominance         -0.06464548            0.03790947      -0.04481
401
##                        Processing_Speed  Resilience Social_Dominance
## Concentration                0.46087205  0.42692420      -0.06464548
## Executive_Functioning        0.57981067  0.46082410       0.03790947
## Learning_Agility             0.69465677  0.55984496      -0.04481401
## Processing_Speed             1.00000000  0.56995838      -0.02672732
## Resilience                   0.56995838  1.00000000      -0.03293821
## Social_Dominance            -0.02672732 -0.03293821       1.00000000
##                         Sociability Self_Monitoring
## Concentration          -0.132834894     -0.06226850
## Executive_Functioning   0.015958985     -0.01390583
## Learning_Agility        0.042605107     -0.10125990
## Processing_Speed        0.003911444     -0.07274731
## Resilience              0.016033003     -0.05153042
## Social_Dominance        0.294050181      0.38781700
```

Factor analysis was iteratively performed, and the final model included the following variables: Self-monitoring, Sociability, Social Dominance, Resilience, Concentration, Executive Functioning, Learning Agility, Processing speed. For these data, the determinant of the correlation matrix including these variables were equals to 0.083435, it is above the rule of thumb of 0.00001 meaning no multicollinearity.

```
det(raqMatrix_EFA_2019_red)
```

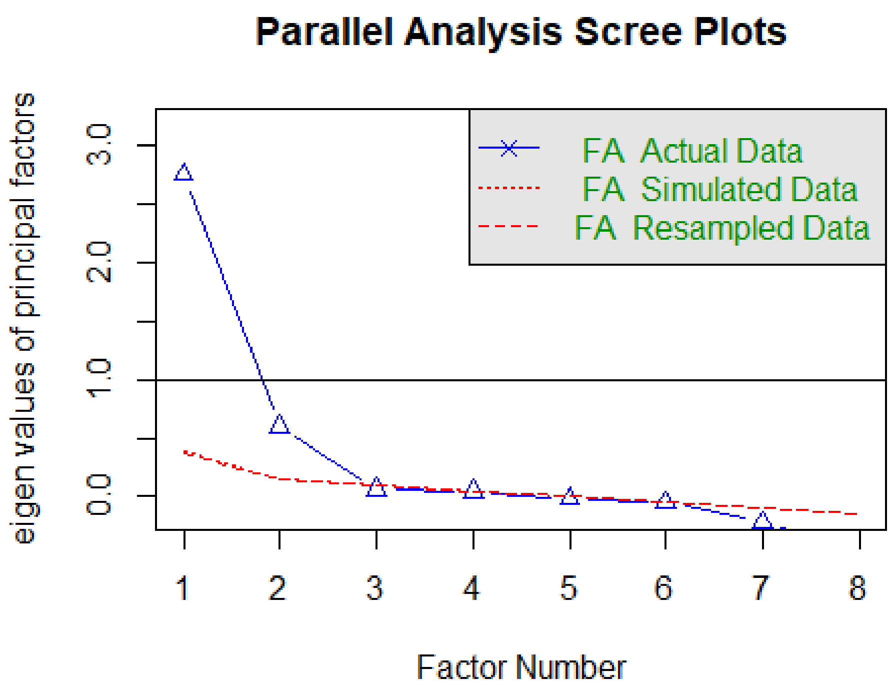
```
## [1] 0.08343507

## R was not square, finding R from data

## $chisq
## [1] 1128.836
##
## $p.value
## [1] 7.296402e-220
##
## $df
## [1] 28
```

FACTOR EXTRACTION

Factor analysis is based on the 'common factor model' which is a theoretical model. This model postulates that observed measures are affected by underlying common factors and unique factors, and the correlation patterns need to be determined.

The Principal Axis Factor method is based on the notion that all variables belong to the first group and when the factor is extracted, a residual matrix is calculated. Factors are then extracted successively until there is a large enough of variance accounted for in the correlation matrix. Principal Axis Factor is recommended when the data violate the assumption of multivariate normality.

```
fa.parallel(EFA_2019_red, fm = 'pa', fa = 'fa')
```




```
## Parallel analysis suggests that the number of factors =  2  and the num
ber of components =  NA
```

EXTRACTION OF TWO FACTORS AND PROMAX ROTATION

Rotated eigenvalues and scree plot are then used to determine the number of significant factors. The scree plot displays two factors that have actual eigenvalues (blue line) greater than the eigenvalues from randomly generated variables (red dotted line). The scree test consists of eigenvalues and factors. The number of factors to be retained is the data points that there are above the break (i.e., point of inflexion). To determine the 'break,' a comparison with observed and randomized eigenvalues is done. Therefore, two factors were used for the EFA.

Factors are rotated for better interpretation since unrotated factors are ambiguous. The goal of rotation is to attain an optimal simple structure which attempts to have each variable load on as few factors as possible, but maximizes the number of high loadings on each variable. Ultimately, the simple structure attempts to have each factor define a distinct cluster of interrelated variables so that interpretation is easier. Broadly speaking, there are orthogonal rotation and oblique rotation. Orthogonal rotation is when the factors are rotated 90° from each other, and it is assumed that the factors are uncorrelated. This is less realistic since factors generally are correlated with each other to some degree. Two common orthogonal techniques are Quartimax and Varimax rotation. Quartimax involves the minimization of the number of factors needed to explain each variable. Varimax minimizes the number of variables that have high loadings on each factor and works to make small loadings even smaller. Oblique rotation is when the factors are not rotated 90° from each other, and the factors are correlated. Oblique rotation is more complex than orthogonal rotation, since it can involve one of two coordinate systems: a system of primary axes or a system of reference axes (Rummel, 1970). Additionally, oblique rotation produces a pattern matrix that contains the factor or item loadings and factor correlation matrix that includes the correlations between the factors. The common oblique rotation techniques are Direct Oblimin and Promax. Direct Oblimin attempts to simplify the structure and the mathematics of the output, while Promax is expedient because of its speed in larger datasets. PromaX involves raising the loadings to a power of four which ultimately results in greater correlations among the factors and achieves a simple structure.

```
twofactor<-fa(EFA_2019_red,nfactors = 2,rotate = "Promax",fm="pa")
print(twofactor)
```

```
## Factor Analysis using method =  pa
## Call: fa(r = EFA_2019_red, nfactors = 2, rotate = "Promax", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                         PA1   PA2   h2   u2 com
## Concentration          0.59 -0.09 0.37 0.63   1
## Executive_Functioning  0.72  0.09 0.52 0.48   1
## Learning_Agility       0.88  0.00 0.78 0.22   1
## Processing_Speed       0.80  0.01 0.64 0.36   1
## Resilience             0.67  0.00 0.45 0.55   1
## Social_Dominance       0.03  0.79 0.62 0.38   1
## Sociability            0.03  0.38 0.14 0.86   1
## Self_Monitoring       -0.04  0.48 0.23 0.77   1
##
##                        PA1  PA2
## SS loadings           2.75 1.01
## Proportion Var        0.34 0.13
## Cumulative Var        0.34 0.47
## Proportion Explained  0.73 0.27
## Cumulative Proportion 0.73 1.00
##
##  With factor correlations of
##       PA1   PA2
## PA1  1.00 -0.09
## PA2 -0.09  1.00
##
## Mean item complexity =  1
## Test of the hypothesis that 2 factors are sufficient.
##
## The degrees of freedom for the null model are  28  and the objective fu
```

```
nction was  2.48 with Chi Square of  1128.84
## The degrees of freedom for the model are 13  and the objective function
was  0.07
##
## The root mean square of the residuals (RMSR) is  0.03
## The df corrected root mean square of the residuals is  0.04
##
## The harmonic number of observations is  459 with the empirical chi squa
re  18.93  with prob <  0.13
## The total number of observations was  459  with Likelihood Chi Square =
33.69  with prob <  0.0013
##
## Tucker Lewis Index of factoring reliability =  0.959
## RMSEA index =  0.059  and the 90 % confidence intervals are  0.035 0.08
4
## BIC =  -45.99
## Fit based upon off diagonal values = 0.99
## Measures of factor score adequacy
##                                                    PA1  PA2
## Correlation of (regression) scores with factors   0.94 0.83
## Multiple R square of scores with factors          0.89 0.68
## Minimum correlation of possible factor scores     0.78 0.37
```

INTERPRETATION OF FACTOR LOADINGS

When interpreting the factors, you need to look at the loadings to determine the strength of the relationships. The largest loadings can identify factors, but it is also important to examine the zero and low loadings to confirm the identification of the factors.

A crossloading is when an item loads at .32 or higher on two or more factors. Depending on the design of the study, a complex variable (i.e., an item that is in the situation of crossloading) can be retained with the assumption that it is the latent nature of the variable, or the complex variable can be dropped when the interpretation is difficult. Another option is to choose a significant loading cut-off to make interpretation easier. The signs of the loadings show the direction of the correlation and do not affect the interpretation of the magnitude of the factor loading or the number of factors to retain.

```
print(twofactor$loadings,cutoff = 0.32)
```

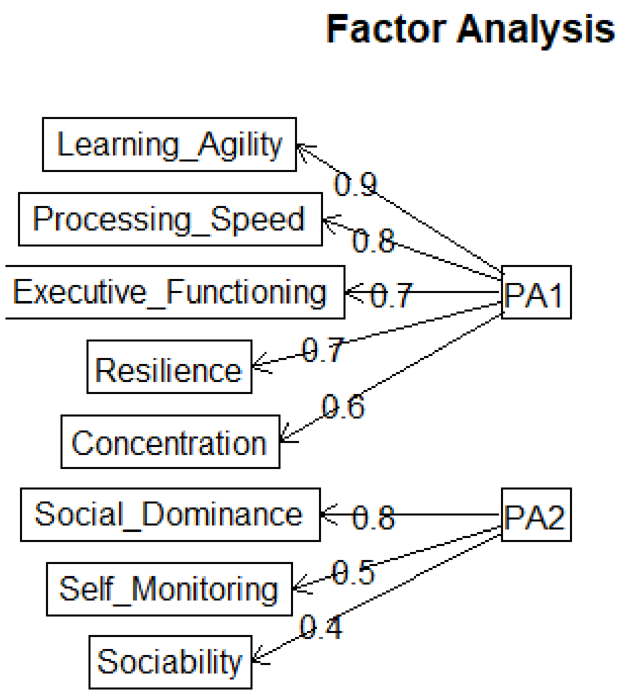
```
##
## Loadings:
##                        PA1    PA2
## Concentration          0.592
## Executive_Functioning  0.724
## Learning_Agility       0.885
## Processing_Speed       0.804
## Resilience             0.669
## Social_Dominance              0.791
## Sociability                   0.376
## Self_Monitoring               0.478
##
##                  PA1   PA2
## SS loadings    2.754 1.011
```

```
## Proportion Var 0.344 0.126
## Cumulative Var 0.344 0.471
```

In the output: h2 = communality; u2 = unique variance; com = complexity as Hoffman's index. The root mean square of residuals (RMSR) should be closer to 0. Next, MSEA (root mean square error of approximation) index in case of good model fit is below 0.05 Finally, the Tucker-Lewis Index (TLI) is acceptable value when is over 0.9.

Factor 1 or **Cognitive factor** includes 5 variables: Concentration, Executive functioning, Learning agility, Processing Speed and Resilience. **Factor 2** or **Social factor** includes three variables: Social dominance, Sociability, Self-monitoring.

```
fa.diagram(twofactor)
```




```
cognitive<-EFA_2019_red[,c(1:5)]
social<-EFA_2019_red[,c(6:8)]
```

RELIABILITY

Reliability means that a measure (or in this case questionnaire) should consistently reflect the construct that it is measuring. Reliability is measured through **Cronbach's alpha**. The guidelines suggested by George and Mallery (2016) where > .9 excellent, > .8 good, > .7 acceptable, > .6 questionable, > .5 poor, and < .5 unacceptable.

Cognitive factor

```
alpha(cognitive)

##
## Reliability analysis
## Call: alpha(x = cognitive)
```

```
##
##   raw_alpha std.alpha G6(smc) average_r S/N   ase mean  sd median_r
##       0.85      0.85    0.83      0.54 5.8 0.011  6.9 1.6     0.56
##
##  lower alpha upper     95% confidence boundaries
## 0.83 0.85 0.87
##
##  Reliability if an item is dropped:
##                         raw_alpha std.alpha G6(smc) average_r S/N alpha s
e  var.r
## Concentration               0.85      0.85    0.82      0.59 5.7    0.01
1 0.0068
## Executive_Functioning      0.82      0.83    0.79      0.54 4.8    0.01
3 0.0089
## Learning_Agility           0.79      0.79    0.74      0.48 3.7    0.01
6 0.0057
## Processing_Speed           0.80      0.81    0.77      0.51 4.2    0.01
5 0.0097
## Resilience                 0.83      0.83    0.81      0.56 5.0    0.01
3 0.0129
##                         med.r
## Concentration            0.57
## Executive_Functioning    0.56
## Learning_Agility         0.46
## Processing_Speed         0.51
## Resilience               0.57
##
##  Item statistics
##                           n raw.r std.r r.cor r.drop mean  sd
## Concentration          459  0.72  0.72  0.60   0.55  7.0 2.1
## Executive_Functioning 459  0.78  0.78  0.71   0.64  6.5 2.0
## Learning_Agility       459  0.87  0.87  0.86   0.79  7.6 2.0
## Processing_Speed       459  0.83  0.83  0.79   0.72  6.9 1.8
## Resilience             459  0.75  0.76  0.67   0.62  6.8 1.9
##
## Non missing response frequency for each item
##                           1    2    3    4    5    6    7    8    9   10
miss
## Concentration          0.00 0.02 0.03 0.07 0.12 0.20 0.16 0.15 0.09 0.17
0
## Executive_Functioning 0.01 0.02 0.04 0.09 0.16 0.20 0.17 0.16 0.05 0.10
0
## Learning_Agility       0.00 0.01 0.02 0.03 0.08 0.17 0.19 0.14 0.09 0.26
0
## Processing_Speed       0.01 0.01 0.02 0.05 0.10 0.19 0.22 0.19 0.11 0.09
0
## Resilience             0.01 0.01 0.02 0.07 0.12 0.25 0.19 0.15 0.09 0.10
0
```

Social factor

```
alpha(social)
```

```
##
## Reliability analysis
## Call: alpha(x = social)
##
##   raw_alpha std.alpha G6(smc) average_r S/N   ase mean  sd median_r
##       0.54      0.54    0.46      0.28 1.2 0.037  6.2 1.5     0.29
##
##  lower alpha upper     95% confidence boundaries
## 0.47 0.54 0.61
##
##  Reliability if an item is dropped:
##                 raw_alpha std.alpha G6(smc) average_r  S/N alpha se va
r.r
## Social_Dominance      0.28      0.28    0.16      0.16 0.39    0.067
NA
## Sociability           0.56      0.56    0.39      0.39 1.27    0.041
NA
## Self_Monitoring       0.45      0.45    0.29      0.29 0.83    0.051
NA
##                 med.r
## Social_Dominance  0.16
## Sociability       0.39
## Self_Monitoring   0.29
##
##  Item statistics
##                   n raw.r std.r r.cor r.drop mean sd
## Social_Dominance 459  0.78  0.78  0.61   0.45  6.8  2
## Sociability      459  0.67  0.67  0.37   0.28  6.0  2
## Self_Monitoring  459  0.72  0.72  0.48   0.34  6.0  2
##
## Non missing response frequency for each item
##                     1    2    3    4    5    6    7    8    9   10 miss
## Social_Dominance 0.01 0.02 0.03 0.07 0.12 0.17 0.15 0.19 0.18 0.05    0
## Sociability      0.01 0.03 0.07 0.14 0.16 0.17 0.18 0.12 0.08 0.03    0
## Self_Monitoring  0.02 0.03 0.08 0.12 0.15 0.17 0.16 0.17 0.09 0.01    0
```

REGRESSIVE MODELS FOR FACTOR 1 (COGNITIVE) AND 2 (SOCIAL)

Regression analysis is used for explaining or modeling the relationship between a single variable Y, called the response, output or dependent variable, and one or more predictor, input, independent or explanatory variables, X1, …, Xp. When p = 1, it is called simple regression but when p > 1 it is called multiple regression or sometimes multivariate regression.

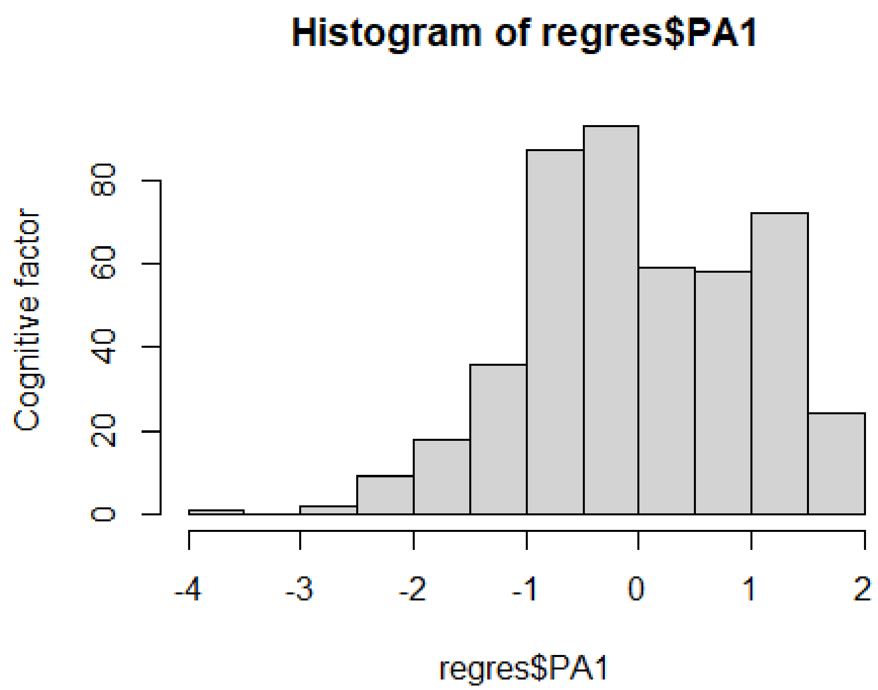
Before performing regression models the two factors were extracted and their distribution assessed.

```
fattori<-factor.scores(EFA_2019_red,twofactor)
regres<-cbind(fattori$scores,dataset2019)
```

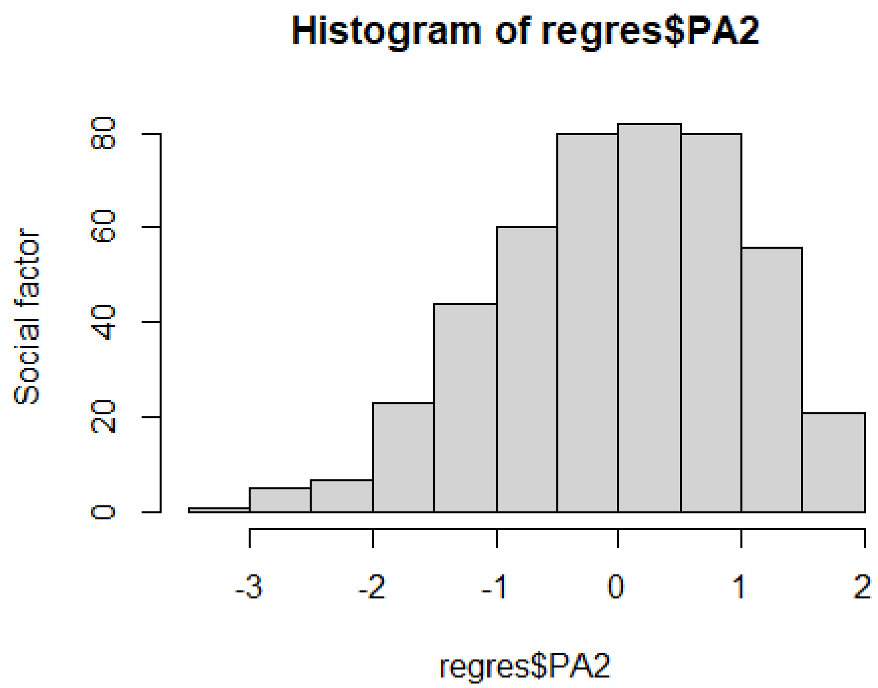
To investigate the distribution of the two factor a graphical approach was conducted.

Histograms

```
hist(regres$PA1,ylab='Cognitive factor')
```



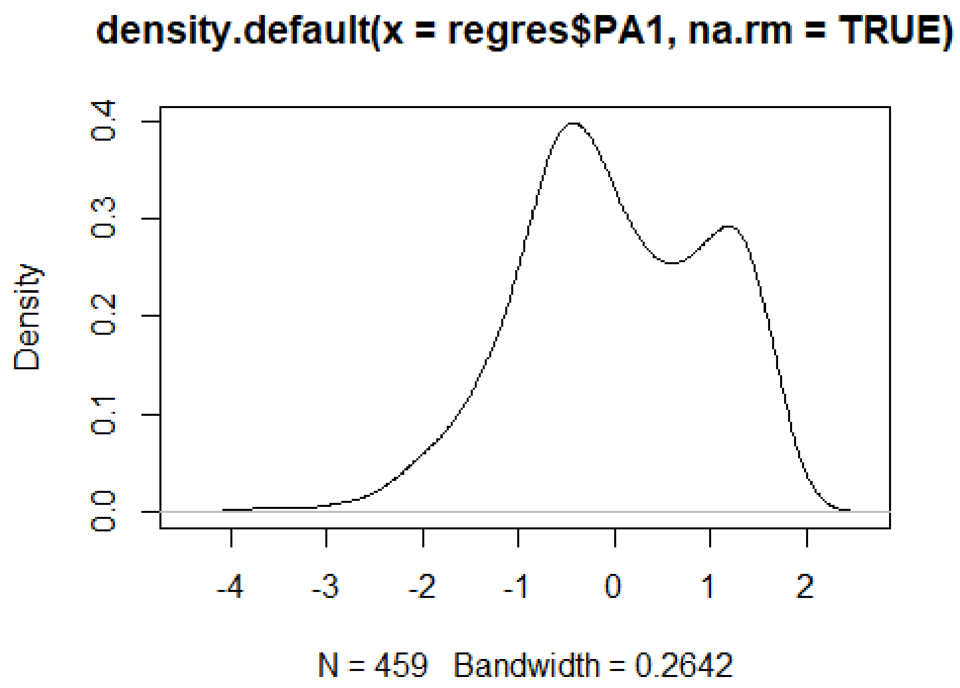

```
hist(regres$PA2,ylab='Social factor')
```



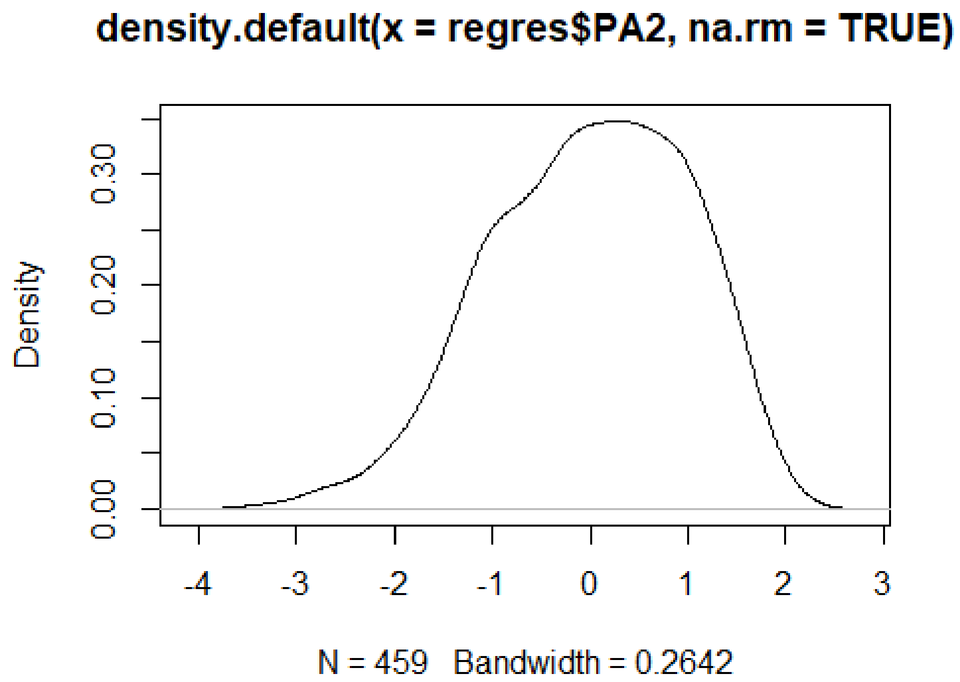
Kernel Density Estimates

It is a smoothed version of the of the histogram

```
plot(density(regres$PA1,na.rm=TRUE))
```

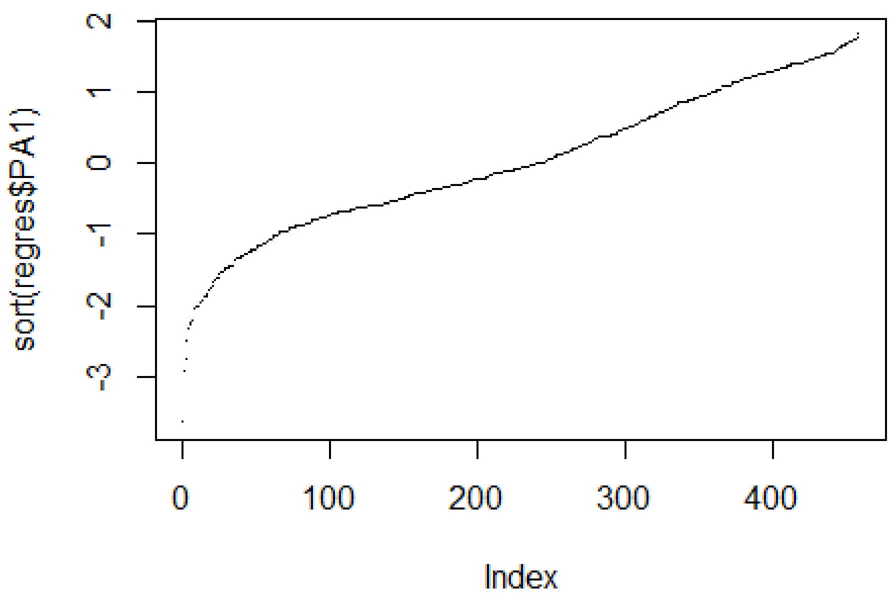



```
plot(density(regres$PA2,na.rm=TRUE))
```

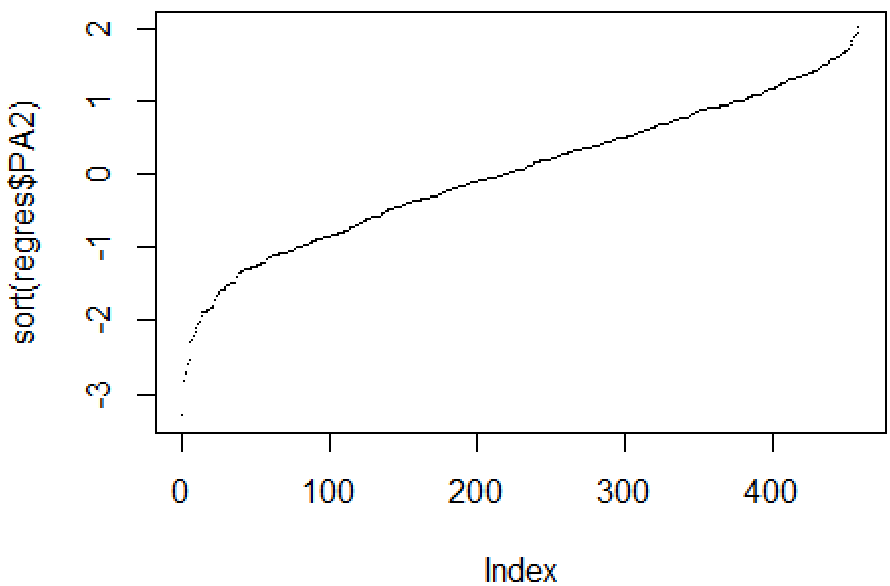


TAll the data points themselves The distribution and possible outliers can be seen

```
plot(sort(regres$PA1),pch=".")
```



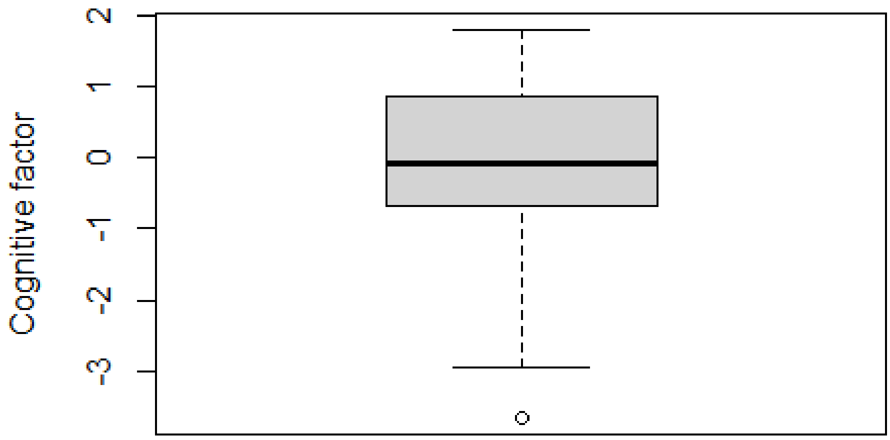

```
plot(sort(regres$PA2),pch=".")
```



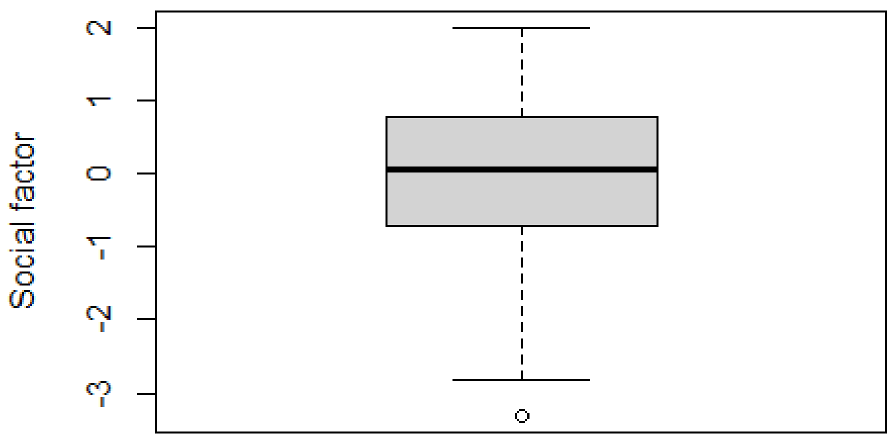
Boxplot

In descriptive statistics, a boxplot is a method for graphically depicting groups of numerical data through their quartiles. Box plots may also have lines extending from the boxes (whiskers) indicating variability outside the upper and lower quartiles, hence the terms box-and-whisker plot and box-and-whisker diagram. Outliers may be plotted as individual points.

```
boxplot(regres$PA1,ylab='Cognitive factor')
```




```
boxplot(regres$PA2,ylab='Social factor')
```



Identifying outliers

Outliers are defined as a data point that is abnormally distant from a set of observations.

```
outlier<-function(dati){
  d.i.<-quantile(dati,0.75)-quantile(dati,0.25)
  for(i in 1:length(dati)){
    if(dati[i]>quantile(dati,0.75)+1.5*d.i.
       |dati[i]<quantile(dati,0.25)-1.5*d.i.)
  print(paste(i,"is outlier"))
  }}
```

Cognitive factor outliers

```
outlier(regres$PA1)

## [1] "93 is outlier"
```

Social factor outliers

```
outlier(regres$PA2)

## [1] "329 is outlier"

regresPA1<-regres[-93,]
regresPA2<-regres[-329,]
```

Regression model for cognitive factor

A regression analysis was conducted to assess whether having done an international internship add something to the experiential learning of a domestic internship in terms of graduate employability measured through the Cognitive factor. Also, the effect of potentially control variables as international or domestic casual work, study abroad, gender, and age was evaluated. To specifically answer to the research question only the students with at least domestic internship experience or both domestic and international internship were included in the model.

All variables

```
modelF1_0<-lm(PA1~YOB+as.factor(Major_class)+as.factor(Gender)*as.factor(I
nt_Int_WR)
                +as.factor(Dom_Int_C)+as.factor(Int_Int_C)+
                  as.factor(Study_Abroad),data=subset(regresPA1, Dom_Int_W
R != 0))
summary(modelF1_0)

##
## Call:
## lm(formula = PA1 ~ YOB + as.factor(Major_class) + as.factor(Gender) *
##     as.factor(Int_Int_WR) + as.factor(Dom_Int_C) + as.factor(Int_Int_C)
+
##     as.factor(Study_Abroad), data = subset(regresPA1, Dom_Int_WR !=
##     0))
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.62143 -0.62132 -0.04209  0.74322  1.94412
##
## Coefficients:
##                                              Estimate Std. Error t val
ue
## (Intercept)                                 -3.010134   9.503798  -0.3
17
## YOB                                          0.001223   0.004770   0.2
57
## as.factor(Major_class)health_scientific     -0.012848   0.293955  -0.0
44
## as.factor(Major_class)social_humanistic     -0.018028   0.107820  -0.1
67
## as.factor(Gender)Male                        0.694987   0.111867   6.2
13
## as.factor(Int_Int_WR)1                       0.672611   0.144401   4.6
58
## as.factor(Dom_Int_C)1                        0.069807   0.098024   0.7
12
## as.factor(Int_Int_C)1                        0.134355   0.153911   0.8
73
## as.factor(Study_Abroad)1                     0.019599   0.103613   0.1
89
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.438688   0.186721  -2.3
49
##                                             Pr(>|t|)
## (Intercept)                                   0.7516
## YOB                                           0.7977
## as.factor(Major_class)health_scientific       0.9652
## as.factor(Major_class)social_humanistic       0.8673
## as.factor(Gender)Male                       1.24e-09 ***
## as.factor(Int_Int_WR)1                      4.28e-06 ***
## as.factor(Dom_Int_C)1                         0.4768
## as.factor(Int_Int_C)1                         0.3832
## as.factor(Study_Abroad)1                      0.8501
## as.factor(Gender)Male:as.factor(Int_Int_WR)1   0.0193 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9185 on 425 degrees of freedom
## Multiple R-squared:  0.1463, Adjusted R-squared:  0.1282
## F-statistic: 8.092 on 9 and 425 DF,  p-value: 4.165e-11
```

```
confint(modelF1_0)
```

```
##                                                      2.5 %      97.5 %
## (Intercept)                                 -21.690432914 15.67016534
## YOB                                          -0.008151408  0.01059833
## as.factor(Major_class)health_scientific      -0.590634766  0.56493966
## as.factor(Major_class)social_humanistic      -0.229954594  0.19389890
## as.factor(Gender)Male                         0.475105666  0.91486933
```

```
## as.factor(Int_Int_WR)1                            0.388781432  0.95643982
## as.factor(Dom_Int_C)1                            -0.122866031  0.26248018
## as.factor(Int_Int_C)1                            -0.168166001  0.43687599
## as.factor(Study_Abroad)1                         -0.184057856  0.22325590
## as.factor(Gender)Male:as.factor(Int_Int_WR)1  -0.805700783 -0.07167585
```

ASSESSING FOR MULTICOLLINEARITY
Multicollinearity results from two independent variables that are highly correlated. When multicollinearity is present the regression coefficient might become insignificant because of the large size of standard errors. Variance inflation factor (VIF) is a measure of the correlation between two predictors and multicollinearity is suspected for values greater than 10.

```
library(car)

## Loading required package: carData

##
## Attaching package: 'car'

## The following object is masked from 'package:psych':
##
##     logit

vif(modelF1_0)

##                                                   GVIF Df GVIF^(1/(2*Df))
## YOB                                           1.007893  1        1.003939
## as.factor(Major_class)                        1.032481  2        1.008023
## as.factor(Gender)                             1.603702  1        1.266374
## as.factor(Int_Int_WR)                         2.518859  1        1.587091
## as.factor(Dom_Int_C)                          1.028783  1        1.014289
## as.factor(Int_Int_C)                          1.019768  1        1.009836
## as.factor(Study_Abroad)                       1.128011  1        1.062079
## as.factor(Gender):as.factor(Int_Int_WR) 3.204518  1        1.790117
```

STEPWISE ALGORITHM for choosing variables to be included in the model (Akaike Information Criterion)

The evaluation of the control variables included in a model can follow automatic procedures. In this research backward selection was used. This is the simplest of all variable selection procedures and can be easily implemented without special software. In situations where there is a complex hierarchy, backward elimination can be run manually while taking account of what variables are eligible for removal. This technique involves starting with all candidate control variables, testing the deletion of each variable using a certain model fit criterion, and repeating this process until no further variables can be deleted without a statistically insignificant loss of fit. Criteria for comparing various candidate subsets are based on the lack of fit of a model and its complexity. The most common criterion that is useful in multiple linear regression and many other problems where model comparison is at issue is the Akaike Information Criterion, or AIC (Sakamoto, Ishiguro, and Kitagawa, 1987). Small values of AIC are preferred, so better candidate sets will have smaller amount of variance that is not explain by the regression model and a smaller number of control variables.

```r
library(MASS)
step.model_F1 <- stepAIC(modelF1_0, direction = "both",trace = FALSE)
summary(step.model_F1)
```

```
##
## Call:
## lm(formula = PA1 ~ as.factor(Gender) + as.factor(Int_Int_WR) +
##     as.factor(Gender):as.factor(Int_Int_WR), data = subset(regresPA1,
##     Dom_Int_WR != 0))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.64932 -0.65121 -0.04112  0.78242  1.91116
##
## Coefficients:
##                                          Estimate Std. Error t valu
e
## (Intercept)                              -0.53760    0.07751  -6.93
6
## as.factor(Gender)Male                     0.68782    0.11084   6.20
5
## as.factor(Int_Int_WR)1                    0.68137    0.13956   4.88
2
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.43664    0.18445  -2.36
7
##                                          Pr(>|t|)
## (Intercept)                              1.48e-11 ***
## as.factor(Gender)Male                    1.28e-09 ***
## as.factor(Int_Int_WR)1                   1.48e-06 ***
## as.factor(Gender)Male:as.factor(Int_Int_WR)1   0.0184 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9138 on 431 degrees of freedom
## Multiple R-squared:  0.1432, Adjusted R-squared:  0.1372
## F-statistic:    24 on 3 and 431 DF,  p-value: 2.211e-14
```

95% confidence intervals

```r
confint(step.model_F1)
```

```
##                                                2.5 %     97.5 %
## (Intercept)                              -0.6899399 -0.3852567
## as.factor(Gender)Male                     0.4699592  0.9056789
## as.factor(Int_Int_WR)1                    0.4070704  0.9556640
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.7991814 -0.0741067
```

Program-related international internship considerably affected the Cognitive factors. Based on the Akaike Information Criterion (AIC), age (0.001+0.005, t=0.257, p=0.798), major (health/science vs engineering, -0.013+/-0.294, t=-0.044, p=0.965; social/humanistic vs engineering, -0.018+/-0.108, t=-0.167, p=0.867), study abroad (-0.020+/-0.104, t=0.189, p=0.850), and international (0.134+/-0.154, t=0.873, p= 0.383) or domestic (0.070+/-0.098, t=-0.712, p=0.477) casual work resulted no relevant as control variables while gender and its interaction with international internship were retained in the model. The gender resulted an effect modifier affecting the employability along with the investigated predictor meaning that two effect sizes are calculated, one for each gender.

ASSESSING CONFOUNDING

confounding effect was investigated without the use of statistical testing. The procedure involves determining whether the estimated effect of the main predictor meaningfully changes (e.g., by more than 10%) when potentially control variables are dropped from the model. Removing non control variables should lead to a gain in precision from examining confidence intervals.

No year of birth (YOB)

```
modelF1_1<-lm(PA1~as.factor(Major_class)+as.factor(Gender)*as.factor(Int_I
nt_WR)
                +as.factor(Dom_Int_C)+as.factor(Int_Int_C)+
                  as.factor(Study_Abroad),data=subset(regresPA1,Dom_Int_WR
!= 0))
summary(modelF1_1)
```

```
##
## Call:
## lm(formula = PA1 ~ as.factor(Major_class) + as.factor(Gender) *
##     as.factor(Int_Int_WR) + as.factor(Dom_Int_C) + as.factor(Int_Int_C)
+
##     as.factor(Study_Abroad), data = subset(regresPA1, Dom_Int_WR !=
##     0))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.62463 -0.62064 -0.04058  0.74251  1.94607
##
## Coefficients:
##                                               Estimate Std. Error t valu
e
## (Intercept)                                   -0.57251    0.13043  -4.38
9
## as.factor(Major_class)health_scientific      -0.01140    0.29358  -0.03
9
## as.factor(Major_class)social_humanistic      -0.01761    0.10769  -0.16
4
## as.factor(Gender)Male                         0.69514    0.11174   6.22
1
## as.factor(Int_Int_WR)1                        0.67419    0.14411   4.67
8
## as.factor(Dom_Int_C)1                         0.07034    0.09790   0.71
8
## as.factor(Int_Int_C)1                         0.13461    0.15374   0.87
6
## as.factor(Study_Abroad)1                      0.02051    0.10344   0.19
8
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.43887    0.18652  -2.35
3
```

```
##                                                Pr(>|t|)
## (Intercept)                                    1.44e-05 ***
## as.factor(Major_class)health_scientific          0.9690
## as.factor(Major_class)social_humanistic          0.8702
## as.factor(Gender)Male                          1.18e-09 ***
## as.factor(Int_Int_WR)1                         3.89e-06 ***
## as.factor(Dom_Int_C)1                            0.4729
## as.factor(Int_Int_C)1                            0.3817
## as.factor(Study_Abroad)1                         0.8429
## as.factor(Gender)Male:as.factor(Int_Int_WR)1   0.0191 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9175 on 426 degrees of freedom
## Multiple R-squared:  0.1462, Adjusted R-squared:  0.1301
## F-statistic: 9.116 on 8 and 426 DF,  p-value: 1.357e-11
```

```
confint(modelF1_1)
```

```
##                                                   2.5 %      97.5 %
## (Intercept)                                  -0.8288754 -0.31613815
## as.factor(Major_class)health_scientific      -0.5884413  0.56564446
## as.factor(Major_class)social_humanistic      -0.2292762  0.19406059
## as.factor(Gender)Male                         0.4755028  0.91477494
## as.factor(Int_Int_WR)1                        0.3909371  0.95745068
## as.factor(Dom_Int_C)1                        -0.1220812  0.26275432
## as.factor(Int_Int_C)1                        -0.1675689  0.43679250
## as.factor(Study_Abroad)1                     -0.1827972  0.22382565
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.8054775 -0.07226822
```

No year of birth (YOB), major

```
modelF1_2<-lm(PA1~as.factor(Gender)*as.factor(Int_Int_WR)
                +as.factor(Dom_Int_C)+as.factor(Int_Int_C)+
                  as.factor(Study_Abroad),data=subset(regresPA1,Dom_Int_WR
!= 0))
summary(modelF1_2)
```

```
##
## Call:
## lm(formula = PA1 ~ as.factor(Gender) * as.factor(Int_Int_WR) +
##     as.factor(Dom_Int_C) + as.factor(Int_Int_C) + as.factor(Study_Abroa
d),
##     data = subset(regresPA1, Dom_Int_WR != 0))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.62708 -0.61671 -0.04529  0.74585  1.95877
##
## Coefficients:
##                                                Estimate Std. Error t valu
e
## (Intercept)                                    -0.58521    0.10441  -5.60
5
## as.factor(Gender)Male                           0.69380    0.11115   6.24
```

```
2
## as.factor(Int_Int_WR)1                         0.67310    0.14360   4.68
7
## as.factor(Dom_Int_C)1                          0.07155    0.09724   0.73
6
## as.factor(Int_Int_C)1                          0.13385    0.15308   0.87
4
## as.factor(Study_Abroad)1                       0.01940    0.10288   0.18
9
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.43552    0.18485  -2.35
6
##                                              Pr(>|t|)
## (Intercept)                                  3.74e-08 ***
## as.factor(Gender)Male                        1.04e-09 ***
## as.factor(Int_Int_WR)1                       3.72e-06 ***
## as.factor(Dom_Int_C)1                          0.4622
## as.factor(Int_Int_C)1                          0.3824
## as.factor(Study_Abroad)1                       0.8505
## as.factor(Gender)Male:as.factor(Int_Int_WR)1   0.0189 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9154 on 428 degrees of freedom
## Multiple R-squared:  0.1461, Adjusted R-squared:  0.1341
## F-statistic: 12.21 on 6 and 428 DF,  p-value: 1.094e-12
```

```
confint(modelF1_2)
```

```
##                                                   2.5 %      97.5 %
## (Intercept)                                  -0.7904309 -0.37998755
## as.factor(Gender)Male                         0.4753307  0.91226854
## as.factor(Int_Int_WR)1                        0.3908566  0.95534613
## as.factor(Dom_Int_C)1                        -0.1195765  0.26268444
## as.factor(Int_Int_C)1                        -0.1670351  0.43472516
## as.factor(Study_Abroad)1                     -0.1828215  0.22161547
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.7988411 -0.07220032
```

No year of birth (YOB), major, study abroad

```
modelF1_3<-lm(PA1~as.factor(Gender)*as.factor(Int_Int_WR)
                +as.factor(Dom_Int_C)+as.factor(Int_Int_C),data=subset(reg
resPA1,Dom_Int_WR != 0))
summary(modelF1_3)
```

```
##
## Call:
## lm(formula = PA1 ~ as.factor(Gender) * as.factor(Int_Int_WR) +
##     as.factor(Dom_Int_C) + as.factor(Int_Int_C), data = subset(regresPA
1,
##     Dom_Int_WR != 0))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.61885 -0.62470 -0.04285  0.75019  1.94732
##
```

```
## Coefficients:
##                                              Estimate Std. Error t valu
e
## (Intercept)                                  -0.57376    0.08483  -6.76
4
## as.factor(Gender)Male                         0.69351    0.11102   6.24
7
## as.factor(Int_Int_WR)1                        0.67908    0.13989   4.85
4
## as.factor(Dom_Int_C)1                         0.07254    0.09699   0.74
8
## as.factor(Int_Int_C)1                         0.13472    0.15284   0.88
1
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.43570    0.18464  -2.36
0
##                                              Pr(>|t|)
## (Intercept)                                  4.42e-11 ***
## as.factor(Gender)Male                        1.01e-09 ***
## as.factor(Int_Int_WR)1                       1.69e-06 ***
## as.factor(Dom_Int_C)1                          0.4549
## as.factor(Int_Int_C)1                          0.3785
## as.factor(Gender)Male:as.factor(Int_Int_WR)1   0.0187 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9144 on 429 degrees of freedom
## Multiple R-squared:  0.146,  Adjusted R-squared:  0.1361
## F-statistic: 14.67 on 5 and 429 DF,  p-value: 2.723e-13
```

```
confint(modelF1_3)
```

```
##                                                   2.5 %      97.5 %
## (Intercept)                                  -0.7404858 -0.40702828
## as.factor(Gender)Male                         0.4753109  0.91171333
## as.factor(Int_Int_WR)1                        0.4041224  0.95404217
## as.factor(Dom_Int_C)1                        -0.1180978  0.26317797
## as.factor(Int_Int_C)1                        -0.1656772  0.43512389
## as.factor(Gender)Male:as.factor(Int_Int_WR)1 -0.7986055 -0.07279649
```

The comparison between the gold standard model which includes all potential control variables and the reduced models did not highlight any effect. Indeed, the estimate of the predictor in the reduced models is 'essentially' the same as the gold standard (model including all the potentially control variables), when potentially control variables are dropped from the model. Removing non control variables led to a slight gain in precision from examining confidence intervals.

The final regression model for Cognitive factor explains employability through program-related cognitive factor, gender, and the interaction term

CHECK FOR REGRESSION MODEL ASSUMPTIONS

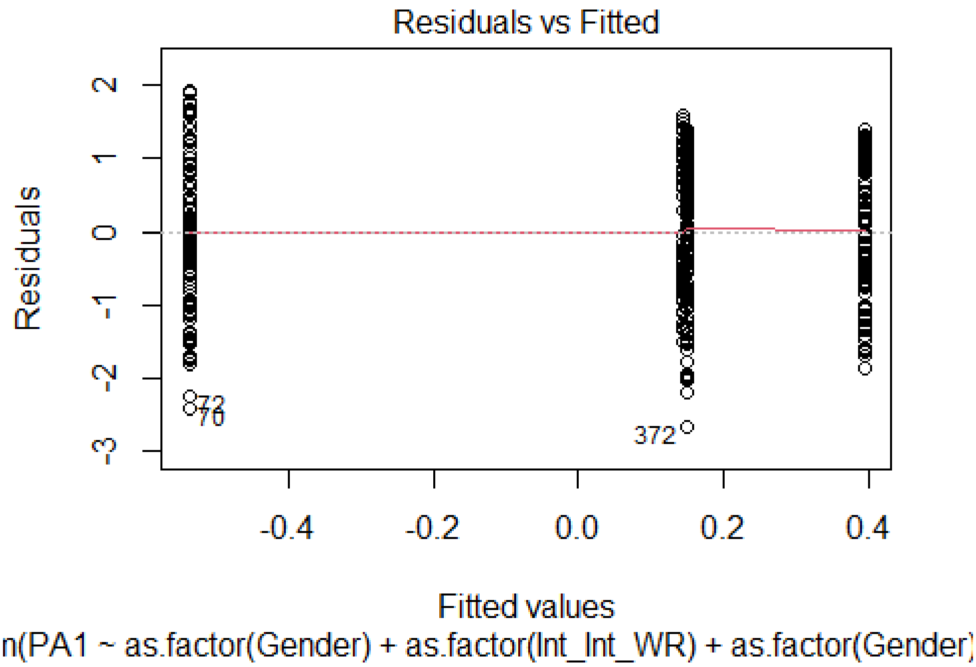
The first plot is the residual plot, a comparison of the residuals of the regression model against the fitted values produced by the regression model, and is the most important plot because it can demonstrate residual trends, evidence of heteroskedasticity and possible outliers. The plot for this model indicates that the model equally predicts the lower and the higher values of employability. For a “good” model, a symmetric scatter of points around the horizontal line at zero should appear. The residuals seem to be evenly spread around 0 for all fitted values, and the range of the residuals at each fitted value appears to be roughly the same, so it is possible to conclude that there is no evidence of heteroscedasticity. Finally, this plot indicates that there are likely three potential outliers (the points on the plot slightly separated from the rest).

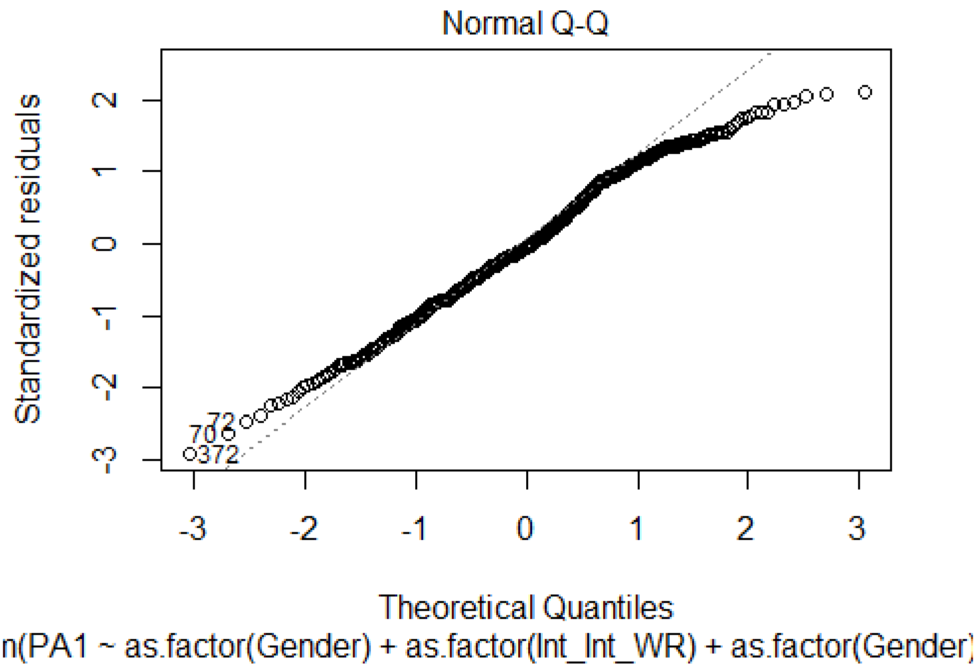
The next plot is the QQ-plot. Though most of the points seem to fall on the line which indicates that our residuals come from a normal distribution, there are some points that stray from the line in the lower and upper quantiles of the plot. It is possible that these points do not come from a normal distribution, but most of our points seem to come from a normal distribution so there is not a lot to worry about here.

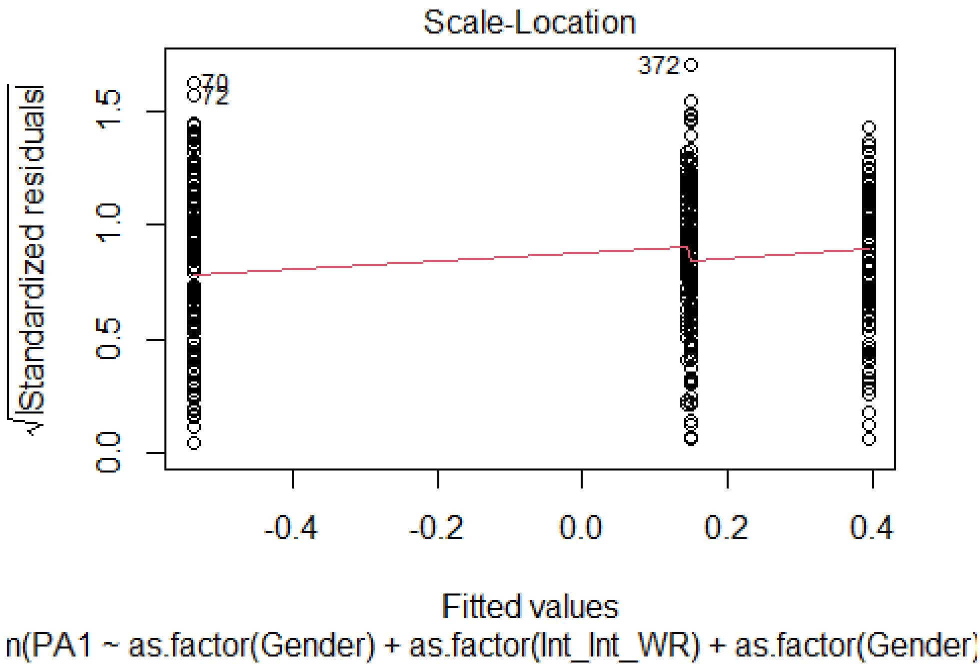
The third plot created is the scale-location plot. This plot is similar to the residual plot, but uses the square root of the standardized residuals instead of the residuals themselves. This makes trends in residuals more evident; once again it is possible to conclude that there is no evidence of heteroscedasticity.

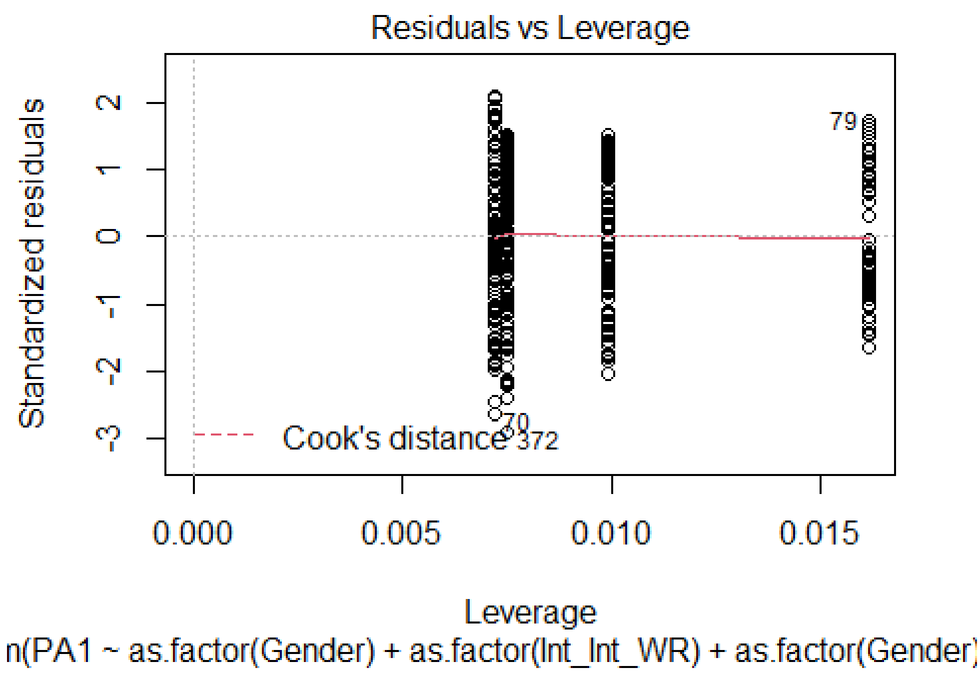
Finally, the last plot is the leverage plot. This plot graphs the standardized residuals against their leverage. It also includes the Cook’s distance boundaries. Any point outside of those boundaries would be an outlier in the x direction. Since there are no boundaries on the plot, it is possible to conclude that there are no influential observations.

```
plot(step.model_F1)
```


Residuals vs Fitted
Residuals
2
1
0
-1
-2
-3
72
70
372
-0.4
-0.2
0.0
0.2
0.4
Fitted values
n(PA1 ~ as.factor(Gender) + as.factor(Int_Int_WR) + as.factor(Gender)

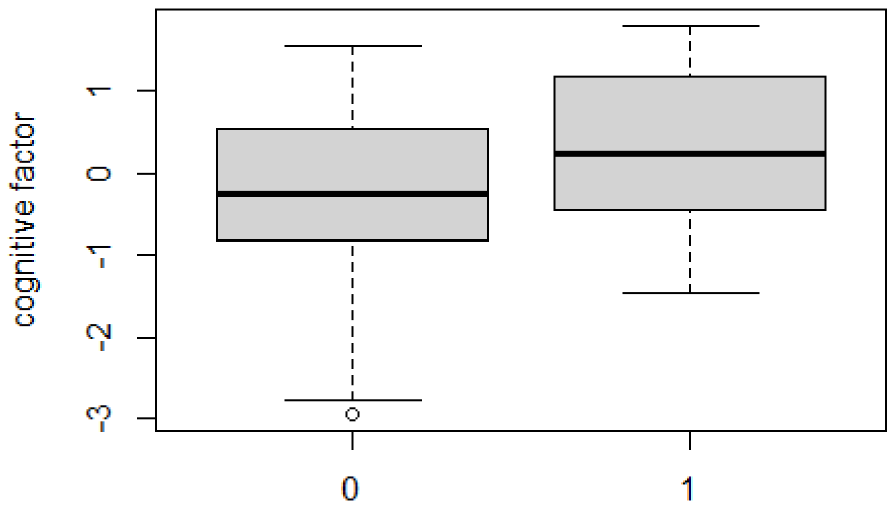

Normal Q-Q
Standardized residuals
2
1
0
-1
-2
-3
72
70
372
-3
-2
-1
0
1
2
3
Theoretical Quantiles
n(PA1 ~ as.factor(Gender) + as.factor(Int_Int_WR) + as.factor(Gender)



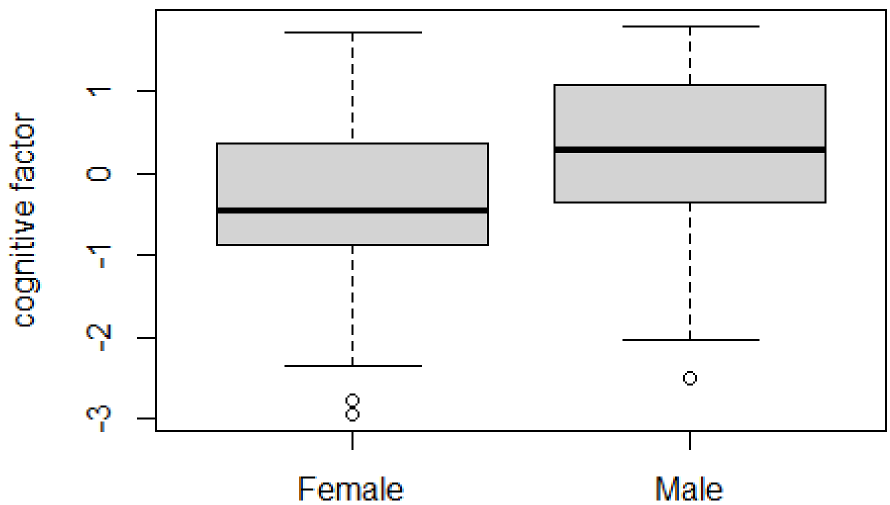


Boxplot of cognitive factor distribution by gender and program-related international internship

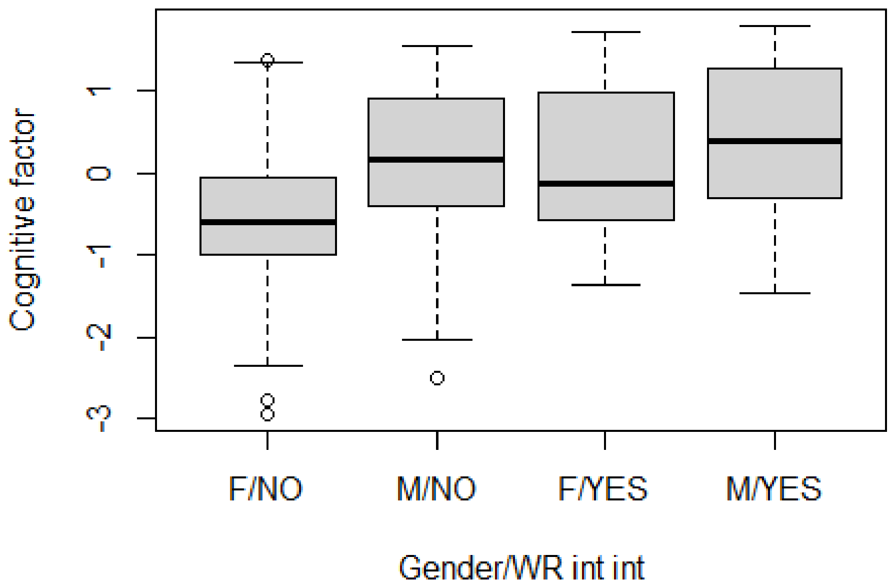
```
boxplot(PA1~Int_Int_WR,data=subset(regresPA1,
    Dom_Int_WR != 0),xlab="",ylab="cognitive factor")
```




```r
boxplot(PA1~Gender,data=subset(regresPA1,
    Dom_Int_WR != 0),xlab="",ylab="cognitive factor")
```




```r
boxplot(PA1~Gender+Int_Int_WR,data=subset(regresPA1,
    Dom_Int_WR != 0),ylab="Cognitive factor",xlab="Gender/WR int int",name
s=c("F/NO","M/NO","F/YES","M/YES"))
```




```
df_red<-subset(regresPA1,Dom_Int_WR!=0)

summary(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)])

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
## -2.4991 -0.3946  0.1547  0.1502  0.9039  1.5389

sqrt(var(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)]))

## [1] 0.9241433

summary(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)])

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
## -1.4566 -0.3163  0.3918  0.3949  1.2697  1.7944

sqrt(var(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)]))

## [1] 0.904982

summary(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==0)])

##     Min.   1st Qu.    Median      Mean   3rd Qu.      Max. 
## -2.94025 -0.99751 -0.59318 -0.53760 -0.05722  1.37356

sqrt(var(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==0)]
))

## [1] 0.9228808

summary(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)])

##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
## -1.3522 -0.5720 -0.1327  0.1438  0.9700  1.7283
```

```
sqrt(var(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)]
))

## [1] 0.8846468

wilcox.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)
],df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)])

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
0)] and df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR == 1)
]
## W = 5787, p-value = 0.0701
## alternative hypothesis: true location shift is not equal to 0

t.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)],df_
red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)])

##
##  Welch Two Sample t-test
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
0)] and df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR == 1)
]
## t = -2.0302, df = 217.68, p-value = 0.04355
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.482300581 -0.007145732
## sample estimates:
## mean of x mean of y
## 0.1502207 0.3949439

wilcox.test(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==
0)],df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)])

##
##  Wilcoxon rank sum test with continuity correction
##
## data:  df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR =
= 0)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR =
= 1)]
## W = 2630, p-value = 1.049e-05
## alternative hypothesis: true location shift is not equal to 0

t.test(df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==0)],d
f_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)])

##
##  Welch Two Sample t-test
##
## data:  df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR =
= 0)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR =
= 1)]
## t = -4.976, df = 121.9, p-value = 2.156e-06
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.9524372 -0.4102972
## sample estimates:
##  mean of x  mean of y
## -0.5375983  0.1437689
```

```
wilcox.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)
],df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==0)])
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
0)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR ==
0)]
## W = 13159, p-value = 1.572e-09
## alternative hypothesis: true location shift is not equal to 0
```

```
t.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==0)],df_
red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==0)])
```

```
##
##  Welch Two Sample t-test
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
0)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR ==
0)]
## t = 6.1401, df = 269.44, p-value = 2.943e-09
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.4672707 0.9083673
## sample estimates:
##  mean of x  mean of y
##  0.1502207 -0.5375983
```

```
wilcox.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)
],df_red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)])
```

```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
1)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR ==
1)]
## W = 3666, p-value = 0.06769
## alternative hypothesis: true location shift is not equal to 0
```

```
t.test(df_red$PA1[which(df_red$Gender=="Male" & df_red$Int_Int_WR==1)],df_
red$PA1[which(df_red$Gender=="Female" & df_red$Int_Int_WR==1)])
```

```
##
##  Welch Two Sample t-test
##
## data:  df_red$PA1[which(df_red$Gender == "Male" & df_red$Int_Int_WR ==
```

```
1)] and df_red$PA1[which(df_red$Gender == "Female" & df_red$Int_Int_WR ==
1)]
## t = 1.7445, df = 131.46, p-value = 0.08342
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.03365069  0.53600063
## sample estimates:
## mean of x mean of y
## 0.3949439 0.1437689
```

Model for social factor

```
modelF2_0<-lm(PA2~YOB+as.factor(Major_class)+as.factor(Gender)*as.factor(I
nt_Int_WR)
                +as.factor(Dom_Int_C)+as.factor(Int_Int_C)+
                  as.factor(Study_Abroad),data=subset(regresPA2,Dom_Int_WR
!= 0))
summary(modelF2_0)
```

```
##
## Call:
## lm(formula = PA2 ~ YOB + as.factor(Major_class) + as.factor(Gender) *
##     as.factor(Int_Int_WR) + as.factor(Dom_Int_C) + as.factor(Int_Int_C)
+
##     as.factor(Study_Abroad), data = subset(regresPA2, Dom_Int_WR !=
##     0))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.9951 -0.7283  0.1035  0.7785  1.9116
##
## Coefficients:
##                                                Estimate Std. Error t va
lue
## (Intercept)                                   1.7249257 10.3002020   0.
167
## YOB                                          -0.0007415  0.0051692  -0.
143
## as.factor(Major_class)health_scientific       0.1412523  0.3185997   0.
443
## as.factor(Major_class)social_humanistic      -0.0783745  0.1168013  -0.
671
## as.factor(Gender)Male                        -0.1904195  0.1210054  -1.
574
## as.factor(Int_Int_WR)1                       -0.0065206  0.1564227  -0.
042
## as.factor(Dom_Int_C)1                        -0.0798595  0.1062017  -0.
752
## as.factor(Int_Int_C)1                         0.1195161  0.1668083   0.
716
## as.factor(Study_Abroad)1                     -0.1023349  0.1120405  -0.
913
## as.factor(Gender)Male:as.factor(Int_Int_WR)1  0.0323075  0.2022355   0.
160
```

```
##                                                     Pr(>|t|)
## (Intercept)                                            0.867
## YOB                                                    0.886
## as.factor(Major_class)health_scientific                0.658
## as.factor(Major_class)social_humanistic                0.503
## as.factor(Gender)Male                                  0.116
## as.factor(Int_Int_WR)1                                 0.967
## as.factor(Dom_Int_C)1                                  0.452
## as.factor(Int_Int_C)1                                  0.474
## as.factor(Study_Abroad)1                               0.362
## as.factor(Gender)Male:as.factor(Int_Int_WR)1           0.873
##
## Residual standard error: 0.9956 on 426 degrees of freedom
## Multiple R-squared:  0.01421,    Adjusted R-squared:  -0.006615
## F-statistic: 0.6824 on 9 and 426 DF,  p-value: 0.7251
```

```
confint(modelF2_0)
```

```
##                                                      2.5 %       97.5 %
## (Intercept)                                   -18.52061868 21.970470051
## YOB                                            -0.01090174  0.009418833
## as.factor(Major_class)health_scientific        -0.48497079  0.767475417
## as.factor(Major_class)social_humanistic        -0.30795301  0.151204016
## as.factor(Gender)Male                          -0.42826134  0.047422416
## as.factor(Int_Int_WR)1                         -0.31397709  0.300935808
## as.factor(Dom_Int_C)1                          -0.28860412  0.128885169
## as.factor(Int_Int_C)1                          -0.20835365  0.447385894
## as.factor(Study_Abroad)1                       -0.32255586  0.117886015
## as.factor(Gender)Male:as.factor(Int_Int_WR)1  -0.36519624  0.429811206
```

assessing for multicollinearity

```
library(car)
vif(modelF2_0)
```

```
##                                                GVIF Df GVIF^(1/(2*Df))
## YOB                                        1.007790  1        1.003887
## as.factor(Major_class)                     1.032176  2        1.007949
## as.factor(Gender)                          1.601547  1        1.265522
## as.factor(Int_Int_WR)                      2.519493  1        1.587291
## as.factor(Dom_Int_C)                       1.028933  1        1.014363
## as.factor(Int_Int_C)                       1.019891  1        1.009896
## as.factor(Study_Abroad)                    1.129232  1        1.062653
## as.factor(Gender):as.factor(Int_Int_WR) 3.202169  1        1.789461
```

Stepwise algorithm for choosing variables to be included in the model

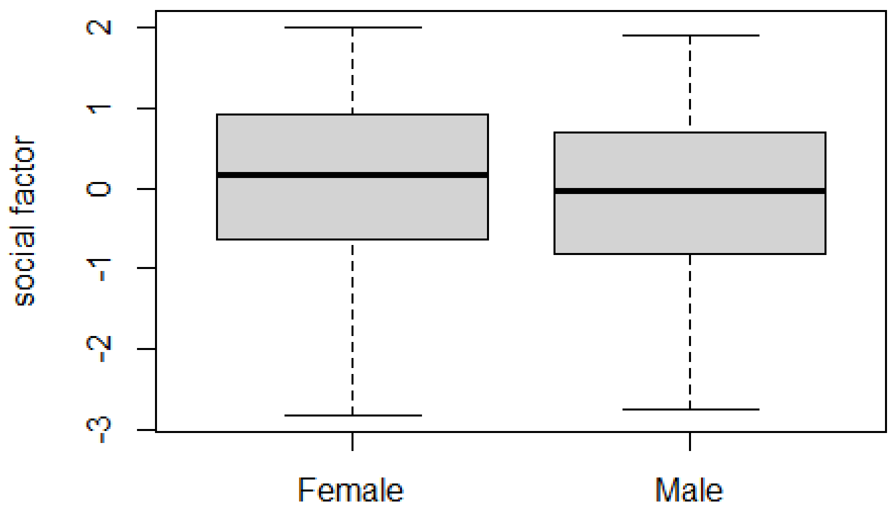
```
library(MASS)
step.model_F2 <- stepAIC(modelF2_0, direction = "both",trace = FALSE)
summary(step.model_F2)
```

```
##
## Call:
## lm(formula = PA2 ~ as.factor(Gender), data = subset(regresPA2,
##     Dom_Int_WR != 0))
```

```
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.92192 -0.74330  0.08292  0.79685  1.97867
##
## Coefficients:
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)           0.10334    0.06962   1.484   0.1385
## as.factor(Gender)Male -0.17701    0.09503  -1.863   0.0632 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9895 on 434 degrees of freedom
## Multiple R-squared:  0.007931,   Adjusted R-squared:  0.005645
## F-statistic: 3.469 on 1 and 434 DF,  p-value: 0.06319
```

95% confidence intervals

```
##                             2.5 %      97.5 %
## (Intercept)           -0.03349744 0.240174093
## as.factor(Gender)Male -0.36379269 0.009771242
```



Effect of study abroad

To evaluate whether an international experience in general could increase the employability, the relationship between studying abroad and program-related international internship was investigated. The 2018/2019 dataset included 329 students who studied abroad. Among them, 165 also had a program-related international internship.

```
## [1] 329  42
```

```
##
##   0   1
## 164 165
```

```
##
##       0   1
##   0 164   0
##   1   0 165
```

```
##
##       1
##   0 164
##   1 165
```

```
tapply(abroad$PA1,abroad$abroad_only,summary)
```

```
## $`0`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -2.7779 -0.7791 -0.2034 -0.1822  0.6198  1.5111
##
## $`1`
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
## -1.4566 -0.4790  0.1886  0.2761  1.1330  1.7944
```

```
wilcox.test(abroad$PA1,abroad$abroad_only)
```

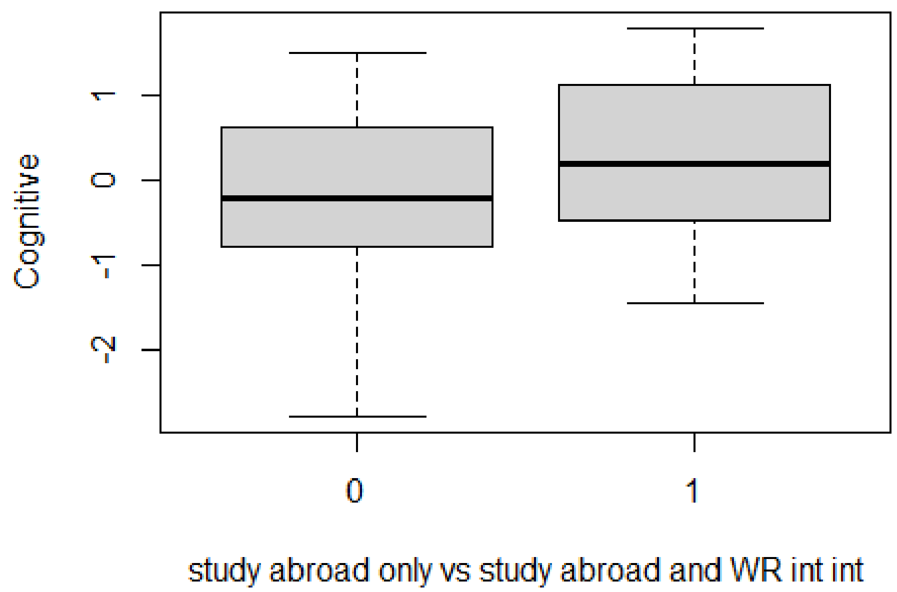
```
##
##  Wilcoxon rank sum test with continuity correction
##
## data:  abroad$PA1 and abroad$abroad_only
## W = 37626, p-value = 6.269e-12
## alternative hypothesis: true location shift is not equal to 0
```

```
t.test(abroad$PA1,abroad$abroad_only)
```

```
##
##  Welch Two Sample t-test
##
## data:  abroad$PA1 and abroad$abroad_only
## t = -7.5738, df = 492.76, p-value = 1.804e-13
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5716434 -0.3361447
## sample estimates:
##  mean of x  mean of y
## 0.04762569 0.50151976
```

The figure below shows the distribution of the cognitive factor based on the student's experience. Noteworthy, having done an international internship add something to the experiential learning of studying abroad in terms of graduate employability measured through the Cognitive factor. Indeed, the value of Cognitive factor in the students who experienced a program-related international internship was significantly greater than in the students who did not experienced it (0.276 vs -0.182 , t = -7.573, df = 492.76, p < .0001).

```
boxplot(PA1 ~ abroad_only,abroad,ylab='Cognitive',xlab='study abroad only
vs study abroad and WR int int')
```



APPENDIX B: Glossaries of Statistical Terms

GLOSSARIES of statistical terms listed for main topics

Descriptive Statistics

Descriptive statistics are typically used to describe or summarize the data. It is used as an exploratory method to examine the variables of interest, potentially before conducting inferential statistics on them. They provide summaries of the data and are used to answer descriptive research questions.

Mean. For a data set, the arithmetic mean, also called the expected value or average, is the central value of a discrete set of numbers; specifically, the sum of the values divided by the number of values.

Standard Deviation (SD). It is a measure of the amount of variation or dispersion of a set of values. A low standard deviation indicates that the values tend to be close to the mean (also called the expected value) of the set, while a high standard deviation indicates that the values are spread out over a wider range.

Median. The middle number in a sorted, ascending or descending, list of numbers and can be more descriptive of that data set than the average. The median is sometimes used as opposed to the mean when there are outliers in the sequence that might skew the average of the values. It is also called the 2^{nd} quartile or the 50^{th} percentile.

Quartiles. It is a type of quantile which divides the number of data points into four more or less equal parts, or quarters. The first quartile (Q1) is defined as the middle number between the smallest number and the median of the data set. It is also known as the lower quartile or the 25^{th} empirical quartile and it marks where 25% of the data is below or to the left of it (if data is ordered on a timeline from smallest to largest). The second quartile (Q2) is the median of a data set and 50% of the data lies below this point. The third quartile (Q3) is the middle value between the median and the highest value of the data set. It is also known as the upper quartile or the 75^{th} empirical quartile and 75% of the data lies below this point.

Percentage (%). The percentage of the frequency or count of a nominal or ordinal category.

Sample Minimum (Min). The smallest numeric value in a given sample.

Sample Maximum (Max). The largest numeric value in a given sample.

Boxplot. In descriptive statistics, a boxplot is a method for graphically depicting groups of numerical data through their quartiles. Box plots may also have lines extending from the boxes (whiskers) indicating variability outside the upper and lower quartiles, hence the terms box-and-whisker plot and box-and-whisker diagram. Outliers may be plotted as individual points.

Outlier. A data point that is abnormally distant from a set of observations.

Cohen's *d*. Measure of effect size; determines the strength of the differences between two conditions.

Correlation Coefficient (*r*). A correlation expresses the strength of linkage or co-occurrence between two variables in a single value between -1 and +1. This value that measures the strength of linkage is called correlation coefficient, which is represented typically as the letter r. The correlation coefficient between two continuous-level variables is also called Pearson's *r* or Pearson product-moment correlation coefficient. A positive *r*-value expresses a positive relationship between the two variables (the larger A becomes, the larger B becomes) while a negative *r*-value indicates a negative relationship (the larger A becomes, the smaller B becomes). A correlation coefficient of zero indicates no relationship between the variables. However, correlations are limited to linear relationships between variables. Even if the correlation coefficient is zero, a non-linear relationship might exist.

Spearman rank correlation. A non-parametric test used to measure the degree of association between two variables. Spearman rank correlation test does not make any assumptions about the distribution of the data and is the appropriate correlation analysis when the variables are measured on a scale that is at least ordinal level.

Parametric statistics

It is a branch of statistics which assumes that sample data comes from a population that can be adequately modeled by a probability distribution that has a fixed set of parameters. The normal family of distributions all have the same general shape and are parameterized by mean and standard deviation. That means that if the mean and standard deviation are known and if the distribution is normal, the probability of any future observation lying in a given range is known.

Non-parametric statistics

It is the branch of statistics that is not based solely on parametrized families of probability distributions (common examples of parameters are the mean and variance). Nonparametric statistics is based on either being distribution-free or having a specified distribution but with the distribution's parameters unspecified. Nonparametric statistics includes both descriptive statistics and statistical inference. Nonparametric tests are often used when the assumptions of parametric tests are violated

Hypothesis testing

A statistical hypothesis is a hypothesis that is testable based on observed data. Hypothesis testing in statistics is a way to test the results of a survey or experiment to see if the results are meaningful. Therefore, a statistical hypothesis test is a method of statistical inference to test a statistical hypothesis. The procedure tests whether the results are valid by figuring out the odds that the results have happened by chance. If the results may have happened by chance, the experiment will not be repeatable and so has little use. In the hypothesis testing approach of Jerzy Neyman and Egon Pearson, a null hypothesis is contrasted with an alternative hypothesis, and the two hypotheses are distinguished based on data, with certain error rates. It is used in formulating answers in research.

Null Hypothesis. It is a general statement or default position that there is no difference between two measured phenomena or that two samples derive from the same general population.

Independent Samples t-Test. The independent samples *t*-test is used to determine if there is a significant difference between two groups (e.g., male vs. female gender) on a scale-level dependent variable. This test uses the difference between the average scores of the two groups to compute the *t*-statistic, which is used with the *df* to compute the *p*-value (i.e., significance level). A significant result indicates the observed test statistic would be unlikely under the null hypothesis.

Mann-Whitney U test. It is a nonparametric test of the null hypothesis that, for randomly selected values X and Y from two populations, the probability of X being greater than Y is equal to the probability of Y being greater than X.

Chi-Squared Statistic (χ^2). A test statistic based on the χ^2 distribution. Used with the *df* to calculate a *p*-value.

95% Confidence Interval (95% CI). An interval that estimates the range one would expect B to lie in 95% of the time given the samples tested comes from the same distribution.

***p*-value (*p*).** In null hypothesis significance testing, the *p*-value is the probability of obtaining test results at least as extreme as the results actually observed, under the assumption that the null hypothesis is correct. A very small *p*-value means that such an extreme observed outcome would be very unlikely under the null hypothesis.

Degrees of Freedom (*df*). Refers to the number of values used to compute a statistic; used in conjunction with a test-statistic to calculate the *p*-value.

Bonferroni Correction. If one conducts more than one hypothesis test, some relationships will occur by chance. To mitigate this, Bonferroni correction is applied. It reduces the alpha level for the analysis, thus reducing the likelihood of making a Type I error (false positive); it is based on the number of times each variable is used.

Multiple Linear Regression

The multiple linear regression is the most common form of linear regression analysis. As a predictive analysis, the multiple linear regression is used to explain the relationship between one continuous dependent variable from two or more independent variables. It does this by creating a linear combination of all the independent variables to predict the dependent variable. The independent variables can be continuous or categorical (dummy coded as appropriate). The R^2 statistic is used to assess how well the regression predicted the dependent variable. While the beta coefficient (β) describes the increase or decrease of the independent variable(s) with the dependent variable. Nominal or ordinal independent variable are added into a regression model as dummy variables; the dummy procedure turns the one variable into a series of dichotomous "yes/no" variables, one for each category; one of the categories are left out of the regression as the reference group that all other categories are compared to.

Predictor. Predictor variable is the name given to an independent variable used in regression analyses. The predictor variable provides information on an associated dependent variable regarding a particular outcome.

Covariate. In general terms, covariates are characteristics (excluding the main predictor) of the participants in an experiment.

Confounder. variable that is associated with both predictor and outcome and cause a non-causal association between predictor and outcome. An extensive definition of confounder and confounding effect is explained in Chapter 3.

Beta coefficient (β). The slope of the predictor with the dependent variable.

Standard Error (*SE*). The amount of expected variance in the β coefficient.

***F*-statistics (*F*).** In a regression model is used to determine the significance of the overall model. The *F*-test of overall significance indicates whether the linear regression model provides a better fit to the data than a model that contains no independent variables.

***t*-Test Statistic (*t*).** In a regression model is used with the df to determine the significance of the individual parameters of a regression model; also, it can show the direction of the relationship between the predictor and dependent variable.

***R*-Squared Statistic (R^2):** Tells how much variance in the dependent variable is explained by only the predictor variables.

Akaike information Criterion (AIC). The most common criterion that is useful in multiple linear regression and many other problems where model comparison is at issue. This criterion is used to comparing various candidate subsets in a model and it measure the lack of fit of a model and its complexity.

Exploratory Factor Analysis

Exploratory factor analysis (EFA) is a statistical technique to identify underlying relationships between scale variables. It is commonly used to reduce a dataset to a smaller set of summary variables. This is an investigative analysis that allows the researcher to explore theoretical structures (factors) that are represented by a set of variables. There are a several important decisions a researcher needs to make for EFA including: the method used for choosing the number of factors to retain, the rotation method utilized for the factor analysis, and a reasonable cutoff point to determine which variables to include for a given factor.

Factor. A set of observed variables that have strong relationships with one another or have a similar pattern.

Factor Loadings. Demonstrates the relationship each variable has to a given factor. Loadings can also be interpreted as a Pearson correlation coefficient with the factor it represents.

Factorability. The assumption that there is at least some level of correlation among the variables so that coherent factors can be identified.

Multicollinearity. A state of very high intercorrelations or inter-associations among a set of variables.

Determinant. A value calculated from a square (n × n) matrix with useful mathematical properties.

Eigenvalue. The variance that is accounted for by a given factor.

Communality. The percent of explained variance for a variable for all the factors combined. It is used to help determine the reliability of the factor structure.

Crossloading. A variable that has loadings above a given cutoff (> .32) across multiple factors. Crossloadings can make factors difficult to interpret.

Parallel Analysis. A method for determining the number of factors to be retained. It compares the observed eigenvalues for some given data with the eigenvalues of some randomly generated normal uncorrelated data. The number of factors with a higher observed eigenvalue determines how many factors should be kept for the factor analysis.

Promax Rotation. A rotation method for factor analysis that allows for correlated factors. This rotation method can help prevent crossloadings and is recommended for factor analysis.

Scree Plot. A plot that shows the explained variance (eigenvalue) by each factor. It is commonly used for determining the number of factors to include in factor analysis.

Chronbach's Alpha. Reliability testing is done to assess the consistency of responses among a group of questions. This is also referred to as internal consistency or inter-item reliability. Cronbach's alpha coefficient is commonly used to measure reliability. The purpose of this test is to determine if a group of questions all measure the same construct, concept, or idea. This test is used when creating a composite score to ensure that all the items that make up the composite score are consistent with each other. The Cronbach reliability test calculates the reliability coefficient alpha (α), which indicates the degree of consistency among the items. George and Mallery (2010) suggest the following guidelines for evaluating α values: > .9 excellent, > .8 good, > .7 acceptable, > .6 questionable, > .5 poor, ≤ .5 unacceptable. The Cronbach reliability test assumes that the items being tested measure a single construct (i.e., the construct is unidimensional), and that observations are independent of each other.

APPENDIX C: UCSC Ethics Committee Approval

Gemelli

Comitato Etico

FONDAZIONE POLICLINICO GEMELLI
PROTOCOLLO UNICO

Tipo Atti: In Uscita
Prot N. 0029886/18 - Del 16/07/2018
.SEGRETERIA COMITATO ETICO

Prot. 18352/18

Gent.ma Prof.ssa Amanda Murphy
Centre for Higher Education Internationalisation (CHEI)
UCSC MILANO

Oggetto: Progetti di ricerca studenti del CHEI: Dolly Predovic, Jerome Rickmann e Liudmila Pliner

Gentilissima Professoressa,

con riferimento alla comunicazione inviata con mail del 2 maggio u.s., relativa alla presentazione dei progetti di ricerca di: Dolly Predovic, Jerome Rickmann e Liudmila Pliner e vista la documentazione integrativa richiesta da codesto Comitato Etico in data 17/5/2018 relativa ai progetti di Rickmann e Predovic, si comunica che il Comitato Etico prende atto e approva le tre richieste in oggetto.

Cordiali saluti

Il Presidente del Comitato Etico

Prof. Salvatore Mancuso

Fondazione Policlinico Universitario Agostino Gemelli IRCCS
Università Cattolica del Sacro Cuore

Largo Agostino Gemelli 8, 00168 Roma
T +39 06 3015 6124 - 5556
comitato.etico@policlinicogemelli.it
PEC: comitatoetico.gemelli@pec.it
www.policlinicogemelli.it

Sede Legale
Largo Francesco Vito 1, 00168 Roma
Sede Operativa
Largo Agostino Gemelli 8, 00168 Roma

Codice Fiscale e Partita IVA 13109681000

APPENDIX D.1: Knack Sample Report

Knack

53

John Smith

PROBLEM SOLVING 65

People with a knack for Problem Solving:

- enjoy solving challenging problems
- are quick to learn
- easily adapt to new situations
- can look at problems from multiple angles
- have the mental flexibility to thrive in environments that are new or unfamiliar

QUICK THINKING 56

People with a knack for Quick Thinking:

- can take in information quickly
- thrive in fast-paced environments
- can think on their feet
- make accurate decisions under time pressure
- are efficient in accomplishing tasks

LOGICAL REASONING 72

People with strong Logical Reasoning:

- spot patterns
- can apply their knowledge to solve new problems
- look for order in new information
- use a systematic approach to solving problems
- draw conclusions based on established rules

SOCIAL INTELLIGENCE 67

People with strong Social Intelligence:

- understand other people
- easily navigate social situations
- collaborate well with others
- work effectively in teams
- can quickly learn new cultures or customs

SELF CONTROL 1

People with a knack for Self Control:

- consider all of the angles before they act
- remain level-headed and can keep their cool
- help put the brakes on rash decisions
- stay focused on the task at hand
- may miss out on exciting new opportunities

OPEN MINDEDNESS 42

Highly Open-Minded people:

- appreciate new ideas or information
- thrive in creative endeavors
- are curious and enjoy exploring
- are open to new experiences
- can bring ideas together in new ways

DILIGENCE 72

Highly Diligent people:
- are organized
- have self-discipline
- get things done on time
- carefully follow procedures
- aim for perfection

CONSENSUS BUILDING 22

People with a knack for Consensus Building:
- enjoy working on teams where everyone gets along well
- excel at getting a group in agreement
- prefer to address disagreements without conflict
- take satisfaction in the happiness of others
- may find it difficult to express an unpopular viewpoint or disagree with others

SELF-CONFIDENCE 38

People with a knack for Self-Confidence:
- strongly believe they will achieve their goals
- pursue success with enthusiasm
- believe in themselves despite setbacks
- can help inspire teams to accomplish goals
- believe in their ability to make things happen

RESOURCEFULNESS 53

Highly Resourceful people:
- excel at identifying the steps to success
- understand what they need for success and go get it
- believe in their ability to overcome obstacles
- are highly effective at accomplishing goals
- can get around any roadblocks in their path

LEADERSHIP INITIATIVE 48

People with a knack for Leadership Initiative:
- take the initiative to lead a group or team
- like to take charge
- can lead others toward accomplishing goals
- excel at setting the direction for a group
- may bite off more than they can chew

INSPIRATIONAL LEADERSHIP 46

Highly Inspirational Leaders:
- lead by inspiring others
- share their passion
- energize and support their teams
- motivate others to get things done
- have a clear vision that they share with others

NUMBERS 71

People with a knack for Numbers:
- excel at math
- are comfortable with quantitative information
- tend to use data to guide decisions
- use numbers to understand the world
- may have a good memory for important numbers and formulas

LEARNING AGILITY 40

People with strong Learning Agility:
- learn new skills easily
- enjoy an intellectual challenge
- adapt to new environments quickly
- are open to new ideas
- may get bored more easily

TEAMWORK 78

People with strong Teamwork ability:
- enjoy working with different types of people
- understand group dynamics
- strive to successfully accomplish tasks
- prefer to build team consensus, but will disagree when needed
- keep team goals in mind and stay on task

LEADERSHIP 55

Individuals with strong Leadership ability:

- inspire others and lead by example
- take the initiative to achieve results
- have high integrity and are trustworthy
- think strategically
- believe in the power of people working together

PLANNING & EXECUTION 50

People with a knack for Planning and Execution:

- plan ahead and follow through to achieve results
- are careful and thorough
- come prepared and prefer sticking to a plan
- stay focused and avoid distractions
- are reliable and don't cut corners

GRIT 37

Gritty people:

- have the toughness to achieve long-term goals
- persevere when faced with a challenge
- find ways around roadblocks
- believe that hard work reaps rewards
- are confident in their own abilities

ATTENTION TO DETAIL 51

People with high Attention to Detail:

- are careful and thorough
- thoughtfully plan work
- take the time to check and double check
- have a great capacity to stay focused on the task at hand
- can process a lot of information quickly

INTELLECTUAL CURIOSITY 49

People with a knack for Intellectual Curiosity:

- seek out new ideas
- embrace different experiences
- have an appetite for the unknown
- tend to be creative
- like to find and solve puzzles

CUSTOMER FOCUS 75

People with strong Customer Focus:

- understand the customer's point of view
- anticipate reactions to products and services
- devise creative solutions to accommodate customers' changing needs
- are open to feedback from customers
- look for new ways to please customers

TENACITY 50

People with strong Tenacity:

- have sustained drive and motivation to accomplish long-term goals
- pursue their passion with determination
- have the mental toughness to overcome any challenge that may arise
- aren't discouraged by setbacks
- stay the course and aren't easily distracted

SYSTEMS THINKING 86

People with a knack for Systems Thinking:

- understand how components work together
- enjoy analyzing and building systems
- notice the details in how objects are constructed
- understand how changing a part impacts the whole system
- tend to think about different scenarios when making decisions

MANAGING AMBIGUITY 28

People with a knack for Managing Ambiguity:

- thrive when uncertainty is high
- can make decisions with limited information
- balance instincts with data
- can help others move forward under uncertainty
- enjoy navigating new territory

EXECUTIVE PRESENCE 63

People with Executive Presence:
- have the confidence to command attention
- are decisive
- gain respect through action
- can disagree with poise and composure
- may use their charm to lead and inspire others

DATA FLUENCY 59

People strong in Data Fluency:
- like working with numbers
- excel at thinking through tough problems
- enjoy planning data analyses
- are thorough and detail-oriented
- are open to data revealing new ideas

ACTION ORIENTATION 64

People who are strongly Action-Oriented:
- have a preference for action over thinking
- seize unexpected opportunities
- excel at thinking on their feet
- enjoy making decisions quickly
- are comfortable taking action and making decisions under time pressure

TAKING OWNERSHIP 50

People who Take Ownership:
- are self-confident and believe that they can achieve success
- take the reins and make things happen
- work well with others to fulfill goals
- have high integrity
- can weather a storm

GROWTH MINDSET 85

People with a knack for Growth Mindset:
- believe in their ability to learn and change
- are energized, not intimidated, by a challenge
- believe in developing talents through hard work
- think of mistakes as opportunities to learn
- enjoy the process of learning

CREATIVE PROBLEM SOLVING 61

People with a knack for Creative Problem Solving:
- use their creativity to solve problems in new ways
- are open to new ideas
- keep a cool head even when solving tough problems
- see roadblocks as opportunities
- are determined to find solutions

DRIVE 10

People with a knack for Drive:
- believe that hard work will help them succeed
- view their goals as opportunities to succeed
- pursue their passion with determination
- prefer taking action and seizing unexpected opportunities
- can overcome disappointments and setbacks

COACHABILITY 28

People with a knack for Coachability:
- are open to new ideas and ways of doing things
- are modest and humble
- can handle the stress and challenge of learning new things
- take satisfaction in doing things well
- believe in their ability to succeed

CREATIVE INSIGHT 61

People with Creative Insight:
- may experience "aha!" or "eureka!" moments of insight
- make connections between seemingly unrelated ideas
- can see problems differently
- come up with novel solutions
- can see and use patterns across different fields

APPENDIX D.2: Arctic Shores Sample Report

ARCTICSHORES

Profile Report created for:
George Clooney

Date of assessment: Sep 18, 2017

Generated by:

Arctic Shores Ltd

Up to four kinds of information may be contained within this report:

- **Fit Score.** The candidate's match against your target profile relative to the comparison group.
- **Trait Stens.** Where the candidate falls on each trait included in the target profile.
- **Aptitude Requirement.** The proportion of aptitude tests the candidate has met the minimum requirement for.
- **Aptitude Percentiles.** The candidate's rank for aptitude relative to the comparison group.

The Fit Score

The Fit Score is based on a target profile of traits which has been configured through a job analysis undertaken by Arctic Shores or a partner organisation.

The traits are organised into the following 5 groups:

- **Cognition.** How an individual processes and uses information to perform mental operations.
- **Drive.** An individual's drive to finish a task through to completion.
- **Interpersonal Style.** An individual's preferred approach to interacting with other people.
- **Personal Style.** An individuals' approach to recognising and handling their own emotions and the emotions of others.
- **Thinking Style.** How an individual tends to approach and appraise problems and make decisions.

After completing the Game-Based Assessment(s) the candidate receives a sten score for each trait and this value is compared against the target profile. For each trait, the selection algorithm considers how close the candidate's sten score is to the target range and also importance of the trait for the role. This process is repeated for all of the traits in the target profile to arrive at the Fit Score. Note that the Fit Score is normalised which means it is compared against all of the Fit Scores in a job-relevant norm group in order to determine the candidate's relative suitability for the role.

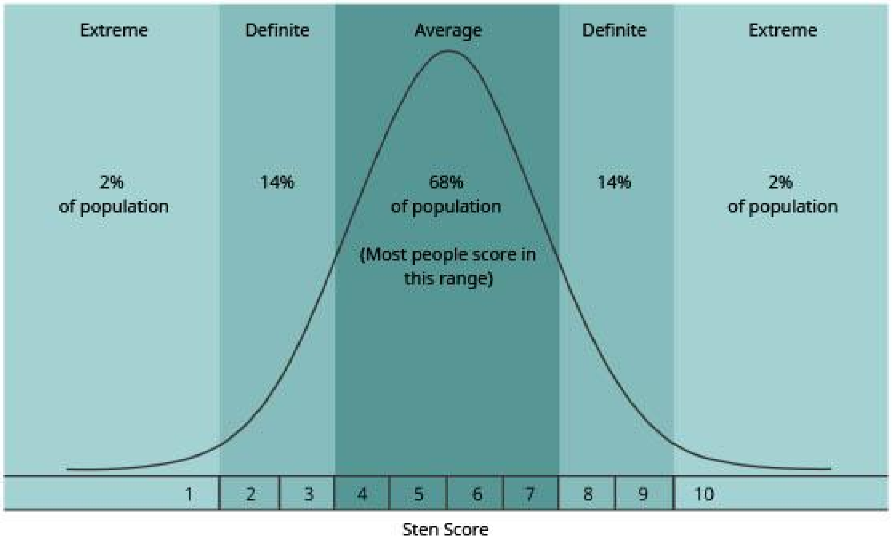
A Fit Score in the 75th percentile indicates that the applicant is a better fit for the organisation than 75% of the comparison group. This also means that the candidate is within the top 25% of the comparison group for fit.

Aptitude Requirement

The "Aptitude Requirement" displays the proportion of subtests for which the candidate met the minimum score requirement. For example, if the candidate has attempted three tests but only met the requirement for one of them, they will score 1/3. The proportion of correct/attempted tests will be reported in green or red depending on whether the full requirement has been met or not.

Interpreting Sten Scores

The traits and abilities included in the Fit Score are presented as stens on a scale of 1 to 10. Each trait is equipped with left and right side behavioural indicators to help you understand the relevance of the trait in the workplace. The stens represent the strength and intensity of the abilities, tendencies, or preferences that are measured, and range from average to definite to extreme. As the normally distributed curve below shows, the majority of the population have average tendencies and abilities and fall within the middle stens and only 4% of people fall at the extreme ends.

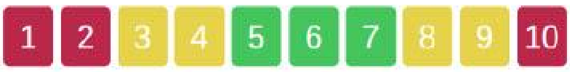


Interpreting Target Ranges

The "target range" displays the desired level of a trait in order for adequate job performance and also any "danger zones" associated with traits when they interact with certain job roles, working environments and cultures. Importantly, this means a sten of 10 is not always the best and a sten of 1 is not always the worst.

Example 1: For safety-critical organisations, extreme sten scores on Risk Appetite and Innovation tend to be considered as danger zones because they are associated with a flexible view of rule-following which would not be a good fit with the environment. Therefore, a higher sten does not necessarily indicate better fit.

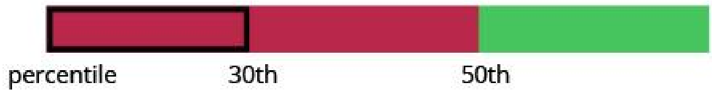
Example 2: For sales roles, extreme sten scores for social confidence could be detrimental to performance. More mid-level preferences tend to be ideal as they allow the individual to take an approach that is adaptive to the needs of the prospect.



- Green: Indicates the sten is within the target range assigned for the trait or ability.
- Yellow: Indicates the sten is slightly outside of the target range assigned for the trait or ability.
- Red: Indicates the sten is completely outside of the target range assigned for the trait or ability.

Interpreting Aptitude Percentiles

Like the Fit Score, the individual Numerical, Verbal and Abstract reasoning scores are presented as a percentile. The applicant's percentile score, represented by a black border, is placed within 3 distinct categories: <30th, 30th-50th and >50th . For example, an individual scoring below the 30th percentile has a well below average ability that is worse than 70% of the comparison group, in contrast, an applicant who scores above the 50th percentile has an above average ability that is better than 50% of the comparison group.



As the assessment is intended for sifting a certain percentage of the population, the three categories provide enough information about the candidate while preventing the risk of basing hiring decisions on small non-significant differences in test performance.

Things to Remember

- The overall Fit Score is intended to help employers sift out unsuitable candidates from a high volume of applications and is not recommended to look for differences between a shortlist of suitable candidates.
- The information in this report should be used in combination with other assessment and application data before making any employment related decisions.
- As with all psychometrics, this report is not infallible and Arctic Shores do not accept any liability for actions taken from the interpretation of the information contained in this report.
- This report is likely to remain a good reflection of the individual's potential for 12 months, depending upon personal circumstances.

There are no profiles defined for this report. Fit Score, "ideal ranges" and "danger zones" have been omitted.

If you feel that you need any guidance on interpretation, please contact:
support@arcticshores.com

	Behavioural Indicators	Sten Score	Behavioural Indicators
Cognition	Tends to be less confident than peers when mentally working with large amounts of information. Prefers to break down information into smaller chunks.	Processing Capacity 1 2 3 **4** 5 6 7 8 9 10	Tends to be more confident than peers when mentally working with large amounts of information. Likely to tackle analyses well.
Cognition	Tends to retain information more gradually than others. Likely to need more time than others before learning is applied to practice.	Learning Agility 1 2 3 4 5 **6** 7 8 9 10	Tends to retain information rapidly. Likely to pick up new skills faster than peers to adapt to the changing demands of role.
Cognition	Tends to process information more slowly than others. Likely to prefer a flexible role with more time to consider information.	Processing Speed 1 2 3 4 5 6 **7** 8 9 10	Tends to process information more quickly than others. Likely to do well when rapid comprehension of information is required.
Cognition	Tends to have looser control over their attention and is more likely to struggle to switch between tasks and/or efficiently adjust to unforeseen circumstances.	Executive Functioning 1 2 3 4 5 **6** 7 8 9 10	Tends to have a greater capacity to plan tasks and adjust actions to unforeseen circumstances. Likely to manage and analyse complex information with more ease.
Cognition	Tends to lose focus in distracting environments. More likely to have difficulty maintaining optimal mental performance for an extended period of time.	Concentration 1 2 3 4 **5** 6 7 8 9 10	Tends to maintain focus in distracting environments and can perform at an optimal level for an extended period of time.
Drive	Tends to take longer to recover from set-backs and is likely to find it more difficult to remain focused on a goal under adverse circumstances.	Resilience 1 2 3 4 5 **6** 7 8 9 10	Tends to recover more quickly from set-backs and is more likely to remain focused on a goal under adverse circumstances.
Drive	More likely to make errors under pressure and prefer a slower-paced environment.	Performance Under Pressure 1 2 3 4 5 6 **7** 8 9 10	More likely to remain accurate under pressure and cope with heavier workloads and strict targets.
Drive	Tends to be less willing to exert additional effort to accomplish a desired outcome in return for an intrinsic or extrinsic reward.	Sensitivity To Reward 1 2 3 4 **5** 6 7 8 9 10	Tends to be more willing to exert additional effort to accomplish a desired outcome in return for an intrinsic or extrinsic reward.
Drive	Less inclined to factor in potential negative outcomes when making a decision, tending not to become as stressed as others when receiving criticism or punishment for making a mistake.	Sensitivity To Loss 1 **2** 3 4 5 6 7 8 9 10	Tends to focus attention on the potential negative outcomes when making a decision, becoming more stressed than others when expecting or receiving criticism or punishment for making a mistake.
Drive	More likely to believe that outcomes are controlled by external factors rather than their own actions. Less likely to feel that they are responsible for the consequences of their own behaviour.	Ownership and Responsibility 1 2 3 4 5 **6** 7 8 9 10	More likely to believe that they have the power to influence events and their outcomes and that they are responsible for the consequences of their own behaviour.
Drive	More likely to struggle with personal organisation and managing deadlines.	Self-discipline 1 **2** 3 4 5 6 7 8 9 10	More likely to display a strong degree of personal organisation and to be disciplined with deadlines.
Drive	Less likely to remain driven over a period of time to complete projects to the best of their ability. Tends to be less self-motivated, persistent and achievement-striving.	Determination 1 2 3 **4** 5 6 7 8 9 10	More likely to remain driven over a period of time to complete projects to the best of their ability. Tends to be more self-motivated, persistent and achievement-striving.
Interpersonal Style	More likely to take action that is aligned with their own goals and interests.	Altruism 1 2 3 4 5 **6** 7 8 9 10	More likely to take action that is aligned with the needs of others rather than themselves.

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	Behavioural Indicators	Sten Score	Behavioural Indicators
Interpersonal Style	Less inclined to regulate their behaviour in response to social cues to accommodate the requirements of a particular situation or audience. Likely to consistently use their own style when interacting with different people.	Self Monitoring 1 **2** 3 4 5 6 7 8 9 10	More inclined to regulate their behaviour in response to social cues to accommodate the requirements of a particular situation or audience.
	Less inclined than peers to feel energised by social situations. More likely to prefer to complete work alone or on a one-to-one basis.	Sociability 1 2 3 4 5 6 **7** 8 9 10	More inclined to feel energised by social stimulation and enjoy spending a lot of time interacting with other people. Likely to become bored when lacking social interaction.
	More likely to be reserved and democratic when interacting with others.	Social Dominance 1 2 3 4 5 6 **7** 8 9 10	More likely to be self-assured, assertive and confident when interacting with others.
	Less likely to feel confident in their own abilities and may need more regular positive affirmation.	Self-Belief 1 2 3 4 **5** 6 7 8 9 10	More likely to believe in their own capabilities and naturally feel confident to take on challenges.
Personal Style	Tends to have a less stable mood and be more disposed to experiencing negative emotions. May find stressful situations more challenging to manage.	Emotional Stability 1 2 3 4 5 6 7 **8** 9 10	Tends to have a more consistent and stable mood and is more disposed to experience positive emotions. More likely to calmly manage stressful situations.
	Tends to recognise emotions less accurately than others. Likely to have lower emotional competence when interacting with others.	Emotional Recognition 1 2 3 4 **5** 6 7 8 9 10	Tends to recognise emotions more accurately than others. Likely to have greater emotional competence when interacting with others.
Thinking Style	Tends to need more certainty than peers when decision-making. Likely to feel more comfortable when the future is predictable and answers are definitive.	Managing Uncertainty 1 2 3 4 5 6 **7** 8 9 10	Inclined to tolerate more uncertainty when decision-making and tends to feel more comfortable than others when the future is unpredictable. Likely to tackle ambiguity well.
	Prefers tried and tested approaches. Likely to have a more cautious attitude towards novelty and change.	Innovation Potential 1 2 3 4 5 6 7 **8** 9 10	Prefers novel and experimental approaches. Likely to have a greater affinity for change.
	More disposed towards a precise thinking process that tends to result in more conventional and concrete ideas.	Creativity 1 2 3 4 5 6 7 8 9 **10**	More disposed to think "outside the box" and have a more free-flowing and abstract trail of thought. Likely to become bored and underperform with repetitive work.
	Tends to have a more critical and realistic perception of the world and future. May appear more pessimistic than other candidates because they tend to expect bad outcomes to happen more often than good.	Optimism 1 2 3 **4** 5 6 7 8 9 10	Tends to have a more positive outlook on the world and future. More inclined to engage and stay engaged in goal directed effort because they expect good outcomes to happen more often than bad.
	More likely to prefer familiarity and order, and may feel more comfortable in consistent roles.	Novelty Seeking 1 2 3 4 5 6 **7** 8 9 10	Tends to prefer variety and regular change in a role as well as trying new things. Likely to become bored and make erratic decisions if they feel under stimulated at work.
	Tends to respond more effectively to change and to thrive with a low level of structure at work.	Need For Structure 1 2 **3** 4 5 6 7 8 9 10	Prefers more structure and is most effective when work is predictable, stable and consistent.
	Tends to have a short-term orientation in decision-making where the impacts of choices are considered in terms of their more immediate outcomes.	Future Orientation 1 2 3 4 5 **6** 7 8 9 10	Tends to have a long-term orientation in decision-making where the impacts of choices are considered in terms of their future outcomes.

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	Behavioural Indicators	Sten Score	Behavioural Indicators
Thinking Style	More likely to carefully consider the risk to benefit ratio before making decisions that involve a degree of risk.	Impulsive risk 1 2 3 4 5 6 **7** 8 9 10	Tends to make fast decisions involving risk based on emotional and physiological cues as opposed to deliberate risk to benefit evaluations.
	Tends to prefer an intuitive decision-making style and is likely to make faster decisions based on subjective emotional responses to a situation.	Rational Decision Making Style 1 2 3 4 5 6 **7** 8 9 10	Tends to prefer a rational decision-making style and is likely to be thoughtful, objective and critical when making decisions.
	Tends to have a lower degree of intellectual curiosity and prefer things that are more familiar. Less inclined to manage abstract ideas well but likely to perform in tasks that are more conventional and repetitive.	Curiosity 1 2 3 **4** 5 6 7 8 9 10	Tends to have a higher degree of intellectual curiosity, a preference for variety, and an active imagination. More likely to manage abstract ideas well but may underperform in tasks that require a conventional and repetitive approach.

Chapter 11 APPENDIX E: Publications Arising from this Study

APPENDIX E.1: Understanding How International Experiences Engage Employability [Pre-publication version]

Predovic, D., & Dennis, J. L. (2020). Understanding how international experiences engage employability. A game-based analytics approach. In R. Coelen & C. Gribble (Eds.), *Internationalization and Employability in Higher Education* (pp. 92–98). Routledge.

Understanding how international experiences engage employability: A game-based analytics approach

Dolly Predovic and John Dennis

Graduate employability is a key issue for higher education institutions. Industry recruiting strategies have evolved in recent years and the focus has shifted from graduates who have sound academic knowledge to graduates who can also demonstrate how they apply knowledge and other transferable skills in the workplace.

International experiences matter for employers but only if graduates can transform skills acquired into behaviours that are observable and translatable into value-adding workplace performance. We used game-based analytics to gain insight into hidden behaviours associated with skills that are valued most by employers. In doing so, this gave us an opportunity to think more creatively about employability development through international experiences.

In order to understand whether international experiences enhance graduate employability, it is necessary to reduce conceptual ambiguity and define employability. In fact, the operationalisation of employability from a theoretical concept to a measurable index is not a small undertaking. This chapter represents a tentative answer: game-based analytics. Most literature concentrates on the perception of different stakeholders on the development of employability skills, and our study tries to capture how well students can transform these skills into behaviours. We adopt a theoretical concept of employability under the processual perspective of ability to apply knowledge and skill, and we measured it by analysing behaviours with game-based analytics.

Employability definition[1]

The most widely investigated definition of employability is linked to a possession perspective, based on the assumption that employability is defined by skills and personal attributes that make graduates more likely to gain employment and successfully keep it (Yorke, 2006). Holmes, starting with his seminal work in 2001 (Holmes, 2001), challenged the possessive perspective on employability and based on skills, and built a "graduate identity" approach with a conceptual distinction between three explanations of graduate employability: skills "possession," social/cultural capital "position," and the "process" graduates use to present their claim on being a graduate worthy of employment (Holmes, 2013a).

Several recent perspectives on employability are consistent with Holmes's idea of employability as a process. For example, Reid (2016) argues that employability must account for the social, political, and personal context of the recent graduates, while Jackson's (2016) concept of pre-professional identity is the result of a sense-making process where a "student makes sense of his/her intended profession through multiple memberships and differing levels of engagement with various communities." Similarly, Finch, Peacock, Levallet, & Foster's (2016) idea of an integrated dynamic capabilities view where a graduate's intellectual, personality, meta-skills, and job-specific resources are developed over time to give the graduate a competitive advantage and employability.

Measuring employability

Operationalising employability and finding an adequate assessment tool have been big challenges, and, generally speaking, employability assessments fall into three main categories: self-assessment, quizzes, and serious games (Employment Ontario, 2015).

Self-assessments have strong limitations, such as scoring accuracy and "content accuracy" (Panadero, Brown, & Strijbos, 2016), as well as social desirability bias, and, in fact, Kormos and Gifford (2014) find that 79% of the variance in the relationship between self-reported and objective behaviour remains unexplained.

Quizzes allow one to judge the quiz-taker's ability to demonstrate the skills being analysed (Darling-Hammond, 2014). Online, there are many such quizzes (mettl.com, centraltest.com, testofy.com) but very often they are simply poorly disguised self-assessment questionnaires (Employment Ontario, 2015).

Gaming is a new trend in psychometric testing and has been defined as "the use of game design elements in non-game contexts" (Deterding et al., 2011), and most employability related academic research in the field of gaming focuses on learning and developing employability skills through games – for example, the European Modes project (Haselberger et al., 2012).

Game-based learning and assessment

The largest body of research on game-based learning (GBL) investigates the learning potential of games (Boyle et al., 2016). Numerous studies analyse the impact of serious gaming on the development of employability skills: communication skills (Reinders & Wattana, 2014; Romero et al., 2015), critical thinking (Carolyn Yang & Chang, 2013), problem solving (Sung et al., 2015), conflict resolution (Cristóbal, 2015), decision making (Savard, 2015), cultural skills (Romero et al., 2015), and leadership (De Freitas & Routledge, 2013; Lin & Lin, 2014).

Our focus is instead on game-based assessment, which can be achieved in three ways: game scoring, external assessment, or embedded assessment (Ifenthaler et al., 2012). Game scoring focuses on the targets achieved during the game and is important for the player's motivation, which is a critical component of skill development and assessment (Keller, 1987). External assessments are not part of the game environment and are "real," through interviews, questionnaires, or essays (Chin et al., 2009). Embedded assessments, or stealth assessments, are part of the game play and do not interrupt the game. Rich data about the player's behaviour while playing is the basis for the assessment of the skills. Implementing assessment features in a digital game-based environment is done only in a rather early stage of development because it is a very time consuming to step into the design process, and it needs to be tested in order for it to be reliable (Chin et al., 2009).

The KNACK

The KNACK suite of tests are stealth assessments that have been tested extensively and have been proven to have, both, very high reliability and validity indicators (Gray et al., 2016). The United States Agency for Youth Development (USAID) has chosen the KNACK as being in the top 3% of the measurement tools they analysed (Galloway, Lippman, Burke, Diener, & Gates, 2017). Essentially, the KNACK, as a predictive analytic tool, helps employers find the right fit for employees by assessing the underlying processes that guide behaviour, thoughts, and emotions (basically one's psychology) and mapping that performance onto extremely well-known, well-tested, and scientifically sound measures (Galloway et al., 2017).

The KNACK as game-based talent analytics has been found to be a reliable and quantifiable predictor of workplace performance. Players' "micro-behaviours (e.g., the position and timing of screen gestures, user actions in relation to the state of the game, and so on) are logged at the millisecond level with such data density that we are able to recreate a given game session as the player made it happen." (Gray et al., 2016). From this data, within-game behavioural markers are generated that represent things such as how quickly a player processes information or how efficiently they attend to and see social cues, like facial emotional expressions, and then these markers are built upon to validate higher-level psychological constructs, such as intelligence or a growth mind-set. From these mappings, to numerous constructs, predictions to real-world outcomes are then generated for each individual player.

International experiences influence employability

The link between international mobility and graduate employability has been investigated from multiple perspectives: those of universities, employers, academics, and students (Crossman & Clarke, 2010; European Commission, 2014), students who have participated in learning abroad and alumni (Dwyer, 2004; Farrugia & Sanger, 2017; Norris & Gillespie, 2009; Davina Potts, 2015) employers (W. Archer & Davison, 2008), employers and universities (Diamond, Walkley, Forbes, Hughes, & Sheen, 2011), and signalling effect (i.e. students with international experiences are more likely to be called for an interview) (Petzold, 2017).

Jones argues that the benefits of internationalisation on employability, either through graduate mobility or through the internationalisation of the curriculum at home, are still not entirely understood by universities, employers, and even students (Jones, 2012, 2013, 2016). Discrepant perspectives on the value of international experiences among students, graduates, career development professionals, and employers are confirmed by Kinash, Crane, Judd, & Knight (2016).

Trooboff, Vande Berg, & Rayman's (2008) seminal paper finds that human resource professionals and non-senior management, contrary to common belief, place significant value on studying abroad. The main reason is that over 15% of the respondents have studied abroad themselves and by virtue of their own experience are positively disposed. Furthermore, among the different types of study abroad analysed in the research, findings show that employers have a strong preference for internships. More recently, the employers perspective on international study versus international internships in 31 European countries were analysed by Van Mol (2017) and this research confirms that employers seem to value internships abroad more than study abroad; however, this did vary across the countries in his study. For example, more than 40% of employers from Cyprus, Turkey, Luxembourg, Latvia, and Italy value international internships, while fewer than 10% of employers from Hungary, Croatia, Norway, Sweden, and the UK value international internships.

Present study

We conducted a study to determine how different international experiences affect employability. Considering our previous discussions, while we know that the KNACK measures employability, what we don't know is how the different international experiences translate into different KNACK scores and, therefore, into different measures of employability.

Data from 414 graduate students from 28 Italian universities was used and the study was conducted in conjunction with a project for a major multinational consulting company. The project's goal was to select 100 graduating students to be invited for a three-day talent program in the company's headquarters. The project was not a recruiting process for the consulting company, but a project aimed at identifying what tomorrow's top employable graduates should look like. Between November 2016 and February 2017, 28 Italian universities were visited. In order to participate in the selection process, students were asked to submit their resumes and motivation letters and to complete two KNACK games.

In all, 1973 resumes, motivations letters, and KNACK scores were received, and 414 candidates passed the first selection round and represent the sample used for the analysis. Of the sample group, 63% were male and the age distribution showed most participants (about 80%) were 23–25 years old. About two thirds of the participants studied economics, business, or management, while the remainder were enrolled in engineering (18%), managerial engineering (12%), and other fields (6%). Their previous experiences ranged from domestic internships (62%), domestic casual work (32%), international internships (23%), and international casual work (6%). Fifty-nine per cent had participated in study abroad prior to their participation.

Employability measures

Employability is measured by how students perform on 33 KNACKs, which result from playing the two KNACK assessment games, Meta Maze and Dash Dashi. The 33 KNACKs (see Table 1) are each measured on a scale, from 0 to 100, and they can be divided into five groups:

Engagement: how you engage with the world and demonstrate professionalism
Impact: how you make an impact on people and organisations
Learning: how you learn new information and skills, and your motivation to learn
Relationships: how you relate to other people and yourself
Thinking: how you perform knowledge work and solve problems

Table 7.1: Factors in employability and the KNACKs associated with them

Engagement	***Impact***	***Learning***	***Relationships***	***Thinking***
Diligence	Leadership	Learning Agility	Social Intelligence	Logical Reasoning
Tenacity	Drive	Quick Thinking	Teamwork	Numbers
Self Control	Self Confidence	Growth Mindset	Customer Focus	Creative Problem Solving
Open Mindedness	Taking Ownership	Coachability		Creative Insight
Managing Ambiguity	Leadership Initiative	Intellectual Curiosity		Systems Thinking
Problem Solving	Inspirational Leadership	Data Fluency		Resourcefulness
Attention to Detail	Consensus Building			
Action Orientation	Executive Presence			

Results

We conducted an analysis to assess whether KNACK scores differed as a function of demographic variables, (i.e., age and gender), internship experience (domestic or international), casual work experience (domestic or international), and study abroad experience.

By using an exploratory factor analysis, it was possible to explore the structure of the 33 KNACKS and determine if they grouped together in a coherent fashion in relation to our independent variables – that is, international and domestic internships, study abroad, international and domestic casual work, gender and age.

Our analysis grouped the KNACKs into two main factors, revealing the underlying relationships between the 33 KNACKs. Factor 1 we describe as a social/effort factor that relates to employability behaviours defined by engagement (how one engages with the world) and relationships (how one relates to other people). Factor 2 we describe, instead, as a more cognitive factor that relates to employability behaviours defined by how one learns new information and motivation to learn.

What emerges from our analysis is that only international internships significantly impact the ability to successfully apply cognitive skills – like quick thinking, learning agility, data fluency, and creative insight – into workplace behaviours – that is, Factor 2. From our data, we argue that international internships are associated with higher-order capabilities; specifically, an enhanced power of learning (Rospigliosi et al., 2011), which is related to the highest cognitive domain in Bloom's taxonomy (Bloom, 1956) and is also exactly what employers seem to value the most (Finch et al., 2013). None of our independent variables significantly impacted the social/effort employability behaviours – that is, Factor 1.

The effect of international experiences on graduate employability has been extensively investigated with varied outcomes. Among intrapersonal competencies developed by study abroad, previous research has demonstrated that students self-rate as being more flexible, adaptable, and self-aware and as having developed better intercultural skills, while being more curious and having more confidence, while interpersonal competencies, such as communication, teamwork, and leadership are not rated as higher post study abroad (Farrugia & Sanger, 2017). Consistent with these results, Trooboff et al. (2008), found that while employers value team work more highly than any other skill, they believe that this skill is least likely to be enhanced through study abroad. Our research demonstrates that perhaps this previous research might not have taken into account those cognitive abilities, such as quick thinking, learning agility, data fluency, and creative insight.

All stakeholders (employers, academics, and students) seem to agree that international experiences do, in general, enhance learning, the acquisition of competencies, and the development of critical soft skills (Crossman & Clarke, 2010). Jones (2013) offers a very comprehensive review of literature on the influence of key transferable employability skills on international experience, divided between self-sufficiency/self-efficacy skills and people skills, and concludes that “it seems evident that transferable skills and capabilities are developed through international mobility, equally it may be the case that international mobility programs appeal to students who already possess, or have an advantage in developing, these skills.”(Jones, 2013, p.8) In fact, one limitation of our research findings is that since we don’t have before and after snapshots of employability skills, we don’t know whether those students who scored higher on employability skills post international internship had those very skills before they engaged in their abroad employment experience.

Conclusions

International experience matters for employers, but only if graduates can transform skills acquired into behaviours that are observable and translatable into value-adding workplace performance.[2] Unexpectedly, our research finds that an international experience translates into behaviours involving the highest order cognitive skills (e.g., quick thinking, learning agility, and creative insight).

Game-based analytics allow us to gain insight into the hidden behaviours associated with those skills that employers value most and offer us an opportunity to think more creatively about employability skills development through internationalisation. Our current research goes a step further by demonstrating behaviours that have not been typically found to be the expected outcome of international experiences – that is, higher-order cognitive skills.

According to Cavanagh, Burston, Southcombe, & Bartram (2015), students rate high-order skills as the most difficult to develop and to relate to work contexts. International internships might help with just that. Perhaps, those skills develop “under the radar” – such that students don’t really know that they have developed them, and gaming analytics like the KNACK can help identify these hidden skill acquisitions.

There are also interesting prospects for internationalisation at home. Although collaborative online international learning is involved in an increasing number of programs, more could be done to actively simulate international workplace environments in virtual classrooms (Schech et al., 2017). This would enable educators to offer such experiences to the entirety of the student body, not just to the mobile minority. Designing “international” internship activities into the curricula at home could yield unexpected and exciting findings.

This study underlies the importance of looking at employability from a behavioural perspective and looking at international experiences not from a social perspective but rather from a cognitive perspective. Our study could lead, therefore, to a paradigm shift where self-report data must be evaluated in conjunction with behavioural data, and where, for international experiences, the role of cognitive skills is evaluated in conjunction with social skills.

Notes:

Other discussions about the definition or concept of employability can be found on pages **Error! Bookmark not defined.**, **Error! Bookmark not defined.**, **Error! Bookmark not defined.**, **Error! Bookmark not defined.**, **Error! Bookmark not defined.**, **Error! Bookmark not defined.**, **Error! Bookmark not defined.**.

[2] This appears to be so; see impact on career development of Japanese graduates with international study experiences on page **Error! Bookmark not defined.**.

APPENDIX E.2: International Internships & Hidden Employability Potential: A Game-Based Analytics Approach

International internships & hidden employability potential: a game-based analytic approach

Dolly Predovic, John L. Dennis and Elspeth Jones[1]

Ask educators what skills students gain from an international experience and most will cite social and interpersonal skills. What if they were wrong? What if international experiences enhance cognitive skills more than social skills? Our research found exactly that.

International experience matters for employers but only if graduates can transform skills into behaviours that are observable and translatable into value-adding workplace performance. Unexpectedly, our research finds that an international experience translates into behaviours involving the highest order cognitive skills (*eg* quick thinking, learning agility and creative insight).

Measuring the value of mobility

The benefits of mobility on employability are still only partly understood by universities, employers and even students, and often include discrepant perspectives. In fact, Trooboff, Vande Berg and Rayman's seminal paper finds that human resource professionals and non-senior management place significant value on studying abroad. Yet these findings were significantly influenced by a positive disposition, in that over 15% of the respondents had studied abroad themselves. While the benefits of mobility on employability may not be entirely understood, it is known that among the different types of study abroad experiences, employers show a strong preference for international internships.

Discrepant findings regarding the value of international experiences on employability could be due to research methodologies used in the field. Often, when conducting research on employers and academics, surveys are used. Surveys have their problems, and here are just two crucial cognitive biases that influence survey responding: the self-serving bias and social desirability bias. The self-serving bias is any thought, behaviour or feeling that is distorted by the need *to view oneself favourably*, while the social desirability bias is where, again, any thoughts, behaviours or feelings are distorted by the need *to be viewed by others favourably*. These cognitive biases can significantly influence self-reports in general, and specifically for questions about employability. The issue is that graduates need to feel confident that they can make an impact, that what they do is indeed important, and that past actions – like international experiences – are part of that process.

[1] Predovic, D., Dennis, J.L., & Jones, E. (2018, December 14). International internships & hidden employability potential: a game-based analytic approach. *European Association for International Education*. https://www.eaie.org/blog/developing-unexpected-skills-international-internships.html. (Reprinted with permission from the EAIE.)

Game-based analytics can help us to move beyond the problems associated with self-reporting, and help us look at hidden processes related to employability. The KNACK is just one of those game-based talent analytics that has been found to reliably predict workplace performance in terms of a range of cognitive abilities, personality traits, emotional and social abilities, mindsets and aptitudes. A player's micro-behaviours – for example, the position and timing of cursor movements, and actionable clicks – are logged at the millisecond level. From this data, behavioural markers are generated that represent higher-level psychological constructs like creative thinking or growth mindset. The United States Agency for Youth Development placed the KNACK in the top 4% of the 244 measurement tools analysed in terms of predictive performance.

Hidden potential for employability

We used the KNACK to help us better understand the influence of international internships on employability. Interestingly, we found that international internships helped graduates to master higher order cognitive skills specifically related to enhanced learning, *ie* quick thinking, learning agility and creative insight, which are related to the highest cognitive domain in Bloom's taxonomy and are exactly what employers seem to value the most. These skills are not typically regarded as the obvious outcome of an international internship. Instead, skills relating to self image, such as self confidence and social skills linked to effective team working, are often cited as those that can be positively impacted by this kind of experience.

Game-based analytics allows us to gain insight into the hidden behaviours associated with those skills that employers value most and offer us an opportunity to think more creatively about employability skills development through internationalisation. Our current research goes a step further by demonstrating behaviours that have not been typically found to be the expected outcome of international experiences, *ie* higher order cognitive skills.

We are excited at the prospect of the next phase of our research, learning more about how behaviours that constitute employability are defined, and how and why international work experiences can influence those skills deemed most valuable to employers. There are also interesting prospects for internationalisation at home. Although collaborative online international learning is involved in an increasing number of programmes, more could be done to actively simulate international workplace environments in virtual classrooms. This would enable educators to offer such experiences to the entirety of the student body, not just the mobile minority. Designing 'international' internship activities into curricula at home could present unexpected and exciting potential.

APPENDIX E.3: Education, Aspiration, Action: Solving the Job Skills Mismatch (Pre-publication version)

Predovic, D., Dennis J.L. (2020, September 17). *Education, Aspiration, Action: Solving the Job Skills Mismatch*, European Association for International Education. Retrieved from https://www.eaie.org/blog/solving-job-skills-mismatch.html

Education, aspiration, action:
Aligning skills needs and career interests for the future

Dolly Predovic and John L. Dennis

"That degree really won't get you anything"

Young people around the world are more educated than ever before but that's a potential problem. If markets are flooded with qualified or overqualified job applicants, and if most young people apply for only a narrow subset of jobs, then recent graduates will not find employment or they will be underemployed – i.e., relegated involuntarily to part-time work. In fact, involuntary part-time workers make up about 1.0% of all those employed in the United States, while the OECD average is about three times higher at 3.1%. In the EU, the underemployment rate is even higher at about 4.6%; however, there are significant differences by country. For example, underemployment stands at just 1.7% in Croatia, 4.6% in Montenegro, 8.3% in Spain, but 11.9% in Italy (OECD.Stat, 2020).

Underemployment is one side of a more complicated story: Employers are actually looking for employees, but are encountering a serious skills/job mismatch. For example, as recently as January 2020, Italian companies were reportedly looking to hire about one million new graduates, but about 30% of that demand was expected to go unmet. That unmet demand is greatest in the fields of physics and chemistry, where the skill/job mismatch is over 65%. In the fields of data science, data analysis, digital marketing and 4.0 engineering, the skill/job mismatch stands at about 40% (Pogliotti & Tucci, 2020).

Employability is an important issue for many, including international education professionals. Indeed, international students' satisfaction and propensity to recommend their institution is deeply influenced by things like the development of employability skills, work experience and career guidance (Ammigan, Dennis & Jones, under review). Therefore, the co-existence of unemployed university graduates and employers unable to fill vacancies not only indicates a significant divide between the education world and the employment world but has implications for the field of international education. Ultimately, while producing well-educated young people is a great achievement for the education community around the world, the skills mismatch present in many countries "shows that more education does not automatically mean better jobs and better lives" (Yidan, 2020, p. 3). So, how did we get here and what can be done?

Aspiration: a key variable

Globalisation has delivered transformative economic and social changes to the work landscape. And PISA – the OECD's Programme for International Student Assessment –was designed to look at how students from OECD countries were responding to that changing landscape by measuring literacy, mathematics, science and problem-solving performance. As Amanda Ripley (2013), author of *The Smartest Kids in the World: And How They Got That Way,* rightly states, the architect of

PISA, Andreas Schliecher, designed a test that "wasn't measuring memorization; it was measuring aspiration". In fact, "[e]conomists found an almost one-to-one match between PISA scores and a nation's long-term economic growth. Many other things influenced economic growth, of course, but the ability of a workforce to learn, think and adapt was the ultimate stimulus package" (Ripley, 2013, p. 24). Titans of innovation, such as Bill Gates, share the same perspective, noting "In the long run, your human capital is your main base of competition. Your leading indicator of where you're going to be 20 years from now is how well you're doing in your education system" (Gates, 2017, p. 249)

Importantly, PISA also collects information on the career aspirations expressed by the adolescents who participate in these testing exercises. Comparing data from the 2018 PISA career aspirations section to those from 2000 produces a very clear picture of how young people's career aspirations have changed and how they match (or not) to market demands. Specifically, the data indicates that adolescent expectations have become more concentrated in fewer occupations, such that 47% of adolescent boys and 53% of adolescent girls in 2018 – compared to 38% and 49%, respectively, in 2000 – expect to be employed in one of just ten professions by the time they reach age 30 (Mann, Denis, Schleicher, Ekhtiari, Forsyth, Liu, & Chambers, 2020).

These dynamics play out in striking ways, as we found in a recent project, we undertook that involved integrating the data from the OECD's PISA Dream Jobs study and the World Bank's Human Capital Project - i.e., the Human Capital Index (HCI). The Human Capital Project is a global effort led by the World Bank to look at how a country's investment in its youth via early health care and education can help children succeed and prosper as adults in a globalised work landscape.

An example comparing Germany and Indonesia illustrates our findings. The 2018 OECD PISA data indicate that 38% of German 15-year-olds expect to be employed in one of just ten jobs by the time they reach 30, compared to 68% of Indonesian 15-year-olds. Meanwhile, the World Bank's HCI data indicates that Germany invests 26% more than Indonesia in its human capital. Indeed, as investment in human capital increases, 15-year-olds are more likely to see a wider variety of jobs as possible for them.

National and regional insights

Employability and education dynamics play out differently in specific national and regional contexts. Italy, Croatia and Montenegro offer one set of insights into a particular corner of Europe. According to the 2018 PISA survey in Italy, 72% of students expect to work in a highly skilled occupation, such as a professional or a manager. However, 25% do not plan to complete tertiary education, with disadvantaged students disproportionately represented in this group. The situation in Croatia is quite similar to that in Italy, though less acute in Montenegro.

A variety of factors contributes to these dynamics. In Italy, for example, the Humboldtian model of university still prevails. In fact, its higher education system is almost entirely dominated by research type universities, while institutions that resemble northern Europe's universities of applied sciences enroll only about 16,000 students, or approximately 1% of the total university student body in Italy (Indire, 2020). By comparison, some 1 million students in Germany are enrolled at universities of applied sciences, which constitutes about 35% of the total university student body (Study in Germany, 2020).

Italy also has one of the lowest percentages of universities graduates in the EU – 27% versus a European average of about 40%. As a percentage of total population, enrolment in higher education is less than 3% in Italy versus 3.75% in Germany, almost 5% in Canada and 6% in the

US. Meanwhile, work integrated learning (WIL) or co-op programs in Italy are almost entirely absent (OECD, 2019).

The Croatian higher education system is not so different from the Italian one, however, in Montenegro, the situation differs for a number of reasons. It is a small country, with only about 600,000 citizens and there is only one public university, the University of Montenegro, where most departments have very close relationships with the industry and have embedded in their traditional curricula more vocational programs.

Where does that leave us?
We know that the structure of the higher/tertiary education system in a country is strongly linked to career expectations and the skills gap. In Northern European countries, where the vocational higher education system is effective and well developed, the skills gap is much smaller. So, elsewhere, finding creative ways to more closely align educational offerings and society's needs for economic development is vital. Just as important, however, is career guidance for young people, which has never been as important as it is now. There needs to be a symbiotic relationship between industry and universities in order to help young people understand job and career options, and to develop curricula that create a smooth transition from formal educational settings into the world of work.

International higher education professionals and specialists in our particular part of Europe, as in many other contexts, need to be aware that there is a skills mismatch between what the market is asking for and what students are prepared for by their tertiary education system. That mismatch in a globalised world means that career expectations are concentrated for many in an unimaginatively small range of employment possibilities. Greater investment by countries in the health and education of their young people; stronger commitment to improving vocational higher education systems; and high-quality career advising appropriate to this age of hyper-connectivity between local and global realities, can all drive down the skills mismatch. Creating the conditions that make these developments possible requires creative solutions and our sustained attention.

Conversation starter questions

1. To what extent do you perceive that there is a skills/job mismatch in your geographical area or country? What are some of the possible explanations for this situation? How can internationalization help mitigate such situations?
2. What role(s) do you see for universities of applied sciences, and/or vocational higher education institutions to help resolve skills/job mismatches, particularly in a globalised economy? What role do you think internationalization strategies have at these types of institutions to help resolve skills/job mismatches?
3. Do you think that a country's lack of investment in its human capital is a good explanation for the skills/job mismatch? If not, what else do you think can explain it?
4. What can universities do to help their students—domestic and international— consider their working lives more broadly and creatively?

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APPENDIX E.4: Game-Based Analytics for Measuring Employability (Pre-publication version)

Predovic, D. (2019, May 28). *Game-based analytics for measuring employability*, International Education Association of Australia. Retrieved from https://www.ieaa.org.au/blog/game-based-analytics-for-measuring-employability

How does an international internship increase students' employability? Do learning outcomes differ when compared to a domestic internship? The first step towards answering these questions is to measure employability, but operationalizing it from a theoretical concept to a measurable index is not a small undertaking. I have analyzed students' behaviors via digital game-based analytics and measured how international and domestic internships affect employability.

Game-based analytics for measuring employability

Pre- and post- internship questionnaires, weekly blog posts, journal keeping, are only some of the many tools developed and actively used by educators who successfully organize internships. These tools are designed to maximize the experiential learning element of internships. They teach students how to promote their skills, building up perceived employability, which in turn results in being able to better present one's graduate identity.

But how do employers assess employability? Industry recruiting strategies have evolved in recent years and the focus has shifted from graduates who have sound academic knowledge to those who can also demonstrate how they can apply knowledge and other transferable skills to the workplace. Understanding what really prompts the decision to hire is crucial to understanding what educators have to do to prepare graduates for the professional world. Numerous surveys have investigated which skills are most valued by employers. These surveys however do not tell us how employers assess the possession of those skills.

In-house assessment days as a first step in the hiring process were very common among companies. Thanks to artificial intelligence and the development of game-based analytics, many companies have now transitioned into using these tools to more reliably assess the skills of potential future employees.

Knack and *Artic Shores* are two examples of games developed to disclose hidden potential. These games are designed to measure individual behaviors in different situations. What is relevant is not the end score, but the tracking of the user's movement across the interface along with the timing of single gestures on the screen. This information is processed at a millisecond level. From this data, behavioral markers are generated and mapped onto a range of cognitive abilities, personality traits, social abilities and mindsets.

In the research I have used these digital game-based assessments to better understand how both international and domestic internships translate into employability. It is worth noting that through these games the focus is not on a self-reported measure of the possession of employability skills. What we get instead is a measure of how graduates are able to translate the possession of these skills into those behaviors that are most valued by employers.

Designing international internship elements into domestic curricula.

Before being able to provide all students with a learning experience akin to that of an international internship, we must more precisely understand what are the gains of an internship abroad.

The results of research suggest that students who have done an international internship use and translate into behaviors higher order cognitive skills more effectively then students who have done an internship at home. When facing the challenges during the games, the international internship group students have been able to learn more easily from their mistakes (learning agility), to think faster (quick thinking) by finding solutions more creatively (creative insight) while being able to use information more effectively (data fluency).

What is really interesting is that usually international experiences are associated with the development of more ‘social’ (self-confidence, team working and other people skills) rather than cognitive skills.

By using gaming analytics, I was able to identify the actual skill acquisitions rather than the self-reported one.

Students rate higher order cognitive skills the most difficult to develop and to relate to work contexts. The research shows that international internships might help with just that.

In my current research I am working on understanding how and if employability is also affected by the specific country where the internship takes place as opposed to a broader “domestic vs. international” approach.

Game-based analytics is an extremely powerful tool and should be used to gain a deep understanding of what exactly triggers the development of employability. This will lead to being able to replicate the learning outcomes of international internships in at home experiences designed for the non-mobile majority of students.

Intensive COIL modules, virtual internships, domestic internships in multinational and multicultural companies will all have to be designed accordingly in order to effectively simulate the international workplace.

APPENDIX E.5: International internships and employability: A game-based assessment approach (Accepted by HIGHER EDUCATION RESEARCH AND DEVELOPMENT and published online on March 22nd,2021)

Predovic, D., Dennis, J. L. & Jones, E. (2020). International internships and employability: A game-based assessment approach. Under review for *Higher Education Research and Development*.

International internships and employability: A game-based assessment approach

Abstract

This study examines how students transform employability skills into behaviors using a game based predictive analytics tool, the Knack. Exploratory Factor Analysis examined the underlying relationship between 33 behavioral descriptors, called Knacks, which measure skills such as diligence, leadership, learning agility, social intelligence, and logical reasoning. A two-factor structure emerged: A *Social* factor that centered on how people relate to each other and engage with the world, and a *Cognitive* factor indicating how new information is learned and the motivation to learn. Participation in an international internship predicted the *Cognitive*, but not the *Social* factor. This research is one of the first to use a game-based tool to measure employability and the first to demonstrate that cognitive skills are associated with international internship participation and not simply social and interpersonal skills. The cognitive skills the study found to be influenced by an international internship are associated with the highest cognitive domain in Bloom's taxonomy of educational learning objectives (1956), and are exactly what some employers value the most (Accenture, 2017).

Keywords

Employability, internships, international experience, game-based analytics, behaviors

Introduction

Higher education is more than a route to employment (for example, Collini, 2012), and yet employability is a key issue for higher education institutions (Kinash et al., 2016a; Sarkar et al., 2016) and governments around the world (Yorke, 2006). Coupled with this is the fact that industry recruiting strategies have shifted from graduates with sound academic knowledge to those who can demonstrate knowledge application and skills transfer in the workplace (D. Jackson, 2014b).

The current research examines whether domestic and international internships, as a type of experiential learning (Helyer, 2015), predict employability as measured by the Knack, a digital game-based analytics tool. Before discussing our results, we first discuss the influence of experiential learning, specifically, internships and international experiences, on employability. In the process, we consider definitions of employability, how to assess it, and our means of measurement for this article.

Internships and International Experiences Influence Employability

First we will define our terms, with the National Association of Colleges and Employers (National Association of Colleges and Employers (NACE), n.d.) as a guide. Internships are understood as a form of experiential learning directly related to one's field of study, that integrates knowledge and theory in the classroom with practical application and skill development in a professional setting. In contrast, casual work experience is not directly related to the student's field of study and therefore does not integrate classroom knowledge and theory. Domestic internships or casual work experience refer to activities carried out in the country where the student is studying. International experiences are those undertaken in any other country. Also referred to is study abroad which indicates a period of academic study in another country.

Experiential learning theory provides a solid framework for understanding how and why internships and international experiences could enhance employability. We argue that through these experiences, students develop technical and transferable skills and learn how to translate them into workplace behaviors and performances valued by employers. According to Kolb (1984), experiential learning is “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience.” (Kolb, 1984, p.41). But “Experience needs to be integrated into formal learning, intentionally and systematically, to enhance academic study.” (Woolf, 2018, p.85).

Domestic internships have a positive influence on employability skills development (D. Jackson, 2015; Rudiger, 2012) from both the employer (Hall, Higson, & Bullivant, 2010; Jaaffar, 2016; Stirling, Kerr, MacPherson, Banwell, Bandealy, & Battaglia, 2017) and student perspective (Edwards, 2014; Helyer & Lee, 2014; D. Jackson & Wilton, 2017b; Mahmood et al., 2014).

Student perceptions regarding the benefits of domestic internships have been investigated through pre- and post-experience interviews (Mahmood et al., 2014), and questionnaires (Edwards, 2014). This and other research indicates that, after an internship, students develop self-efficacy and the ability to identify their skills (Drysdale et al., 2016; Helyer & Lee, 2014), and employer perspectives confirm these findings (Gamble, Patrick, & Peach, 2010; Jaaffar, 2016).

The effect of international experiences on graduate employability has been extensively investigated (Archer & Davison, 2008; Crossman & Clarke, 2010; European Commission, 2014; Felton & Harrison, 2017; Jones, 2013). Farrugia & Sanger (2017) examined the influence of study abroad on soft skills and demonstrated that students self-report as being more flexible, adaptable, self-aware, and having developed better intercultural skills while being more curious and having more confidence. Consistent with these results, Trooboff, Vande Berg & Rayman (2008) found that while employers value teamwork, they believe this skill is least likely to be enhanced through study abroad.

The link between international mobility and graduate employability has been investigated from multiple perspectives, including universities, employers, academics and students (Dwyer, 2004; Norris & Gillespie, 2009; Davina Potts, 2015), study abroad students and alumni (Farrugia & Sanger, 2017), employers (Archer & Davison, 2008), both employers and universities (Diamond et al., 2011).

Van Mol (2017) analyzed employer perspectives on study abroad versus international internships in 31 European countries, finding that employers value international internships more than international study. However, results varied across countries, for example, over 40% of employers from Cyprus, Turkey, Luxembourg, Latvia, and Italy value international internships, yet in Hungary, Croatia, Norway, Sweden and the United Kingdom less than 10% did so (Van Mol, 2017).

While most previous research investigates post-experience gains in terms of employability skills and employment status (European Commission, 2019), our current and previous research (Authors 2018, 2019) provides empirical evidence on how international experiences translate into desirable workplace behaviors.

Defining and Measuring Employability

The most widely used and investigated definition of employability is, "a set of achievements – skills, understandings, and personal attributes – that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community, and the economy." (Yorke, 2005, p.8).

Holmes (2013a) argues for a process-based perspective which focuses on the concept of 'graduate identity' and the ability to present oneself as being a graduate worthy of employment. Both Yorke and Holmes see the possession of employability skills as a pre-requisite for employability. It is through achievements, enabled by such skills (Yorke, 2006) and successfully claiming a 'graduate identity' (Holmes, 2013b) that employability is defined.

For this research, we use Bennett's definition of employability, i.e., "the ability to find, create and sustain meaningful work across the career lifespan" (Bennett, 2018, p.iv). It is an individualistic and narrow definition as it is based on the individual's behaviors and skills, and because it does not reflect societal, political, or labor market factors.

What is valued in terms of graduate employability after gaining technical skills and displaying transferable skills, is how well a graduate can translate those technical skills, dispositions, and transferable skills into workplace behaviors that lead to measurable performance (Blackmore & Rahimi, 2019).

The challenge for Higher Education Institutions (HEIs) and employers, within the graduate employability discourse, has always been rendering the above in reliable, possibly quantitative, measures (see Jackson, 2014a) Using the power of behavioral science, artificial intelligence, and smart video games, a new generation of psychometric tests informed by neuroscience has been developed, digital game-based assessments (Galloway, Lippman, Burke, Diener, & Gates, 2017).

Through such assessments, psychometric tests gather up to 12,000 data points on each individual's natural areas of strength and potential. Tasks in the assessments are developed from experiments founded on psychological, cognitive neuroscience, and computational neuroscience principles of human behavior. These experiments have been replicated in app-like interfaces, ensuring they maintain scientific rigor. Research has shown that behavioral variations among individuals completing these tasks map to 'real-world' observable differences in personality traits and cognitive ability, which reflect workplace behaviors and are highly predictive of job performance (Galloway, Lippman, Burke, Diener, & Gates, 2017).

In the current study, a digital game-based tool was used to measure students' behaviors associated with the possession of transferable skills and to assign each student a numerical measure corresponding to their employability (Clapper, 2017). The digital game-based tools are believed to be an appropriate methodology to measure students' behavior in terms of employability and therefore provide answers to the research questions. The Knack assessment tool was chosen for this study, to associate a numerical, quantitative measure with employability.

The Knack is an embedded game-based assessment tool, administered via smartphone application. Embedded assessments are based on in-game behaviors that do not interrupt gameplay (Chin et al., 2009), where individual behaviors are measured in different situations. Of relevance is not the end score, but the tracking of the user's movement within the gaming interface and timing of gestures, processed at the millisecond level. From this data, behavioral markers are generated that represent, for example, how quickly a player processes information or how efficiently they see and attend to social cues e.g. emotional facial expressions. These markers are then integrated with higher-level psychological constructs such as intelligence or growth mindset which, taken together, are commonly regarded as basic graduate employability skills for securing and maintaining employment (D. Jackson, 2013a).

The Knack has been validated using a random subsample of over 1,400 people from more than 24,000 people in over 110 countries who played the game-based assessment tool. Their embedded performance was compared with standard psychological tests, e.g., Big-Five Personality Questionnaire (Goldberg, 1992), Eysenck Impulsiveness Questionnaire (Eysenck et al., 1984), Flanker Task (Eriksen & Eriksen, 1974), Frequency Accrual Speed Test (FAST) (Vickers, 1995), Choices Architect® (De Meuse et al., 2010), and the Teamwork, Knowledge, Skills, and Ability Test (M. J. Stevens & Campion, 1999).

A large-scale project funded by the United States Agency for International Development evaluated 74 employability assessment tools, from self-report questionnaires, performance evaluations, and game-based assessments. In that project, the Knack's validity was found to be high, as it met or exceeded r = .35, while its reliability was, at best, good, r = .4 to .82 (Galloway et al, 2017). To give some context, interviews conducted for the recruitment and selection of employees have been found to have lower validity than the Knack, r = .26 see, for example, O'Meara, & Petzall, (2013) and lower reliability, r = .34 to .67 (Conway et al., 1995).

These results indicate that the Knack is both highly reliable and highly valid for predicting workplace performance (Gray, Jerde, Prabhakaran, & Carroll, 2016; Grimmett, 2017; Or, Montefiori & Close, 2019). Game-based analytics tools help employers find the right employee fit, by assessing the underlying processes that guide behavior, thoughts and emotions and mapping that performance onto well-known, well-tested and scientifically sound measures (Galloway et al., 2017). Employers in many fields are using the Knack to identify and select potential candidates to match with specific employment opportunities (Georgiou et al., 2019; Povah et al., 2017).

The Current Study

The current study assessed whether the independent variables domestic versus international internship, gender, age, study abroad, and casual work experience (domestic or international) predicted the development of employability as measured by the Knack. These variables were included since previous research (D. Jackson & Chapman, 2012b) has demonstrated variation in employability skill acquisition for undergraduates in terms of gender and age, as well as international (Elspeth Jones, 2013, 2014) and domestic work experiences (Jaaffar, 2016; D. Jackson, 2015) and study abroad (Farrugia & Sanger, 2017; D. Potts, 2019).

Methods

The analysis was planned in three successive steps. First, a linear regression analysis assessed whether the independent variables predicted scores in the various Knacks, the 33 behavioral descriptors (see Table 4). Second, an Exploratory Factor Analysis (EFA) determined whether performance on the various Knacks grouped coherently. Third, we tested whether these independent variables (domestic or international internship, gender, age, study abroad, and casual work experience, domestic or international) predicted the factors that emerged from the EFA.

Procedure

Between November 2016 and February 2017, students from 28 Italian universities submitted resumes and cover letters and then completed two Knack games as part of a larger project with a multinational consulting company[1]. Data was made available to the lead author for analysis as part of her doctoral studies and a confidentiality agreement was signed.

Participants

The data from 414 students is presented below. Of these, 260 (63%) were male and Table 1 details age distribution. All participants gave written informed consent to participate, and anonymity was guaranteed before data analysis.

AGE	
>25	11.7%
25	20.5%
24	39.4%

[1] By request, information regarding the company is confidential, but the authors acknowledge, with gratitude, their willingness to share data for research purposes.

23	22.7%
<23	5.3%

Table 1: Participant age distribution

AGE	
>25	11.7%
25	20.5%
24	39.4%
23	22.7%
<23	5.3%

Fields of study are presented in Table 2 and previous experiences listed in Table 3.

Table 2: Participant degree major

Major	
Economics, business, management	64.3%
Engineering	29.7%
Sciences	2.2%
Humanities	1.4%
Other	2.4%

Table 3: Participant experience

Previous Experience	**% Yes**
International Internship	23%
International Casual Work	6%
Domestic Internship	62%
Domestic Casual Work	32%
Study Abroad	59%

Measures

Employability was measured via 33 Knacks, from two assessment games (Meta Maze and Dash Dashi), using the smartphone Knack application. Table 4 shows the 33 Knack descriptors, which are measured on a scale from 0 (lowest) to 100 (highest).

Table 4: Knack descriptors

Engagement	Impact	Learning	Relationships	Thinking
Diligence	Leadership	Learning Agility	Social Intelligence	Logical Reasoning
Tenacity	Drive	Quick Thinking	Teamwork	Numbers
Self-Control	Self Confidence	Growth Mindset	Customer Focus	Creative Problem Solving
Open-Mindedness	Taking Ownership	Coachability		Creative Insight
Managing Ambiguity	Leadership Initiative	Intellectual Curiosity		Systems Thinking
Problem Solving	Inspirational Leadership	Data Fluency		Resourcefulness
Attention to Detail	Consensus Building			
Action Orientation	Executive Presence			

Results

Step 1. Linear Regression

A linear regression was conducted to assess whether gender, age, internship (either international or domestic), study abroad, and casual work (either international or domestic) predicted Knack performance. Linear regression results were not significant, F (7,403) = 0.68, p = .693, R^2 = 0.01, indicating that none of the independent variables predicted employability skills as measured by the Knack.

Step 2. Exploratory Factor Analysis (EFA)

An EFA was performed to see if the 33 Knack descriptors could be reduced to a smaller number of summary descriptors, i.e., factors. The EFA, therefore, identifies an underlying structure between the Knack descriptors. Factor loadings were interpreted by taking the absolute value of each, and factor loadings less than .32 were suppressed (Tabachnik & Fidell, 2014), resulting in 16 Knack descriptors being included in the EFA.

This analysis resulted in two factors. The first is described as *Social*, because most of the Knack descriptors it includes relate to social capabilities. The second factor is termed *Cognitive* because most descriptors here centered around cognitive capabilities.

Table 5: Factor loadings from Exploratory Factor Analysis for 16 Knack Descriptors

	Factor loading		
Knack (Group)	**Social**	**Cognitive**	**Communality**
Quick Thinking (Learning)		0.62	0.40
Social Intelligence (Relationships)	0.52		0.27
Self-Control (Engagement)			0.09
Diligence (Engagement)	0.61		0.51
Resourcefulness (Thinking)			0.04
Inspirational Leadership (Impact)			0.04
Learning Agility (Learning)		0.64	0.40
Teamwork (Relationships)	0.87		0.73
Attention to Detail (Engagement)	0.45		0.20
Customer Focus (Relationships)	0.70		0.50
Tenacity (Engagement)			0.02
Managing Ambiguity (Engagement)			0.00
Data Fluency (Learning)		0.69	0.46
Growth Mindset (Learning)			0.03
Coachability (Learning)	0.37		0.16
Creative Insight (Thinking)		0.38	0.14

Note: Factor loadings < .32 are suppressed.

Examining the results presented in Table 5, the *Social* factor includes the following 6 capabilities:

1. collaborate well with others, work effectively in teams, and quickly learn new cultures or customs (social intelligence);

2. enjoy working with different types of people, understand group dynamics, prefer to build team consensus, but will disagree when needed (teamwork);
3. understand the customer's point of view, open to feedback from customers (customer focus);
4. be open to new ideas and ways of doing things, handle the stress and challenge of learning new things (coachability);
5. be organized, get things done on time, carefully follow the procedure (diligence);
6. be careful and thoughtful, take the time to check and double-check (attention to detail);

The *Cognitive* factor includes the following 4 capabilities:

1. learn new skills easily, adapt easily to unfamiliar environments, open to new ideas (learning agility);
2. thrive in fast-paced environments, take in information quickly, make accurate decisions under time pressure (quick thinking);
3. make connections between seemingly unrelated ideas, see problems differently, come up with novel solutions (creative insight);
4. excel at thinking through tough problems, open to data revealing new ideas, thorough, and detail-oriented (data fluency).

The *Social* factor accounted for 14.99% of the variance with an eigenvalue of 2.55 and the *Cognitive* factor which accounted for 10.43% of the variance with an eigenvalue of 1.77. Six variables were found to have a strong relationship (i.e., loadings > .32) with the *Social* factor, and four with the *Cognitive* factor, indicating a strong and solid factor structure (Costello & Osborne, 2005). Cronbach alpha coefficients were found to be 0.73 for the *Social* factor, and 0.64 for the *Cognitive* factor, indicating acceptable reliability.

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Growth Mindset (Learning)			0.03
Coachability (Learning)	0.37		0.16
Creative Insight (Thinking)		0.38	0.14

Note: Factor loadings < .32 are suppressed.

Step 3a. Linear regression - Social factor

A linear regression was conducted to assess whether the variables of gender, age, internship (either international or domestic), study abroad, and casual work (either international or domestic) predicted the *Social* factor. The linear regression model was not significant, F (7,402) = 0.91, p = .500, R^2 = 0.02.

Step 3b. Linear regression - Cognitive factor

A linear regression was conducted to assess whether the variables of internship (either international or domestic), as well as gender, age, study abroad, and casual work (either international or domestic), predicted the *Cognitive* factor. The linear regression model was significant, F (7,402) = 4.05, p < .001, R^2 = 0.07.

Table 6: Linear regression Cognitive factor

Variable	β	t	p
Gender (Male)	7.13	4.39	<0.001
International Internship	3.93	2.1	0.036
Study Abroad	-2.55	-1.61	0.109
Age	1.1	1.6	0.110
International Casual Work	-3.05	-0.96	0.338
Domestic Casual Work	-1.4	-0.83	0.406
Domestic Internship	0.21	0.13	0.894

Note. Results: F (7,402) = 4.05, $p < .001$, $R^2 = 0.07$

The entry linear regression described in Table 6, is one where all the variables are entered at the same time. This is appropriate as a first step where the variables which will be the best predictors are not known. This analysis determined that both international and domestic casual work as well as domestic internships were not good predictors, but that gender, international internship, study abroad, and age were potentially good. A forward regression model, a type of sequential regression model where independent variables are entered one at a time in the order that they influenced the dependent variable, was then conducted with gender, international internship, study abroad, and age. The forward linear regression model was significant, $F(4,405) = 6.63$, $p < .001$, $R^2 = 0.06$, Gender, $\beta = 7.29$, $t(405) = 4.58$, $p < .001$, and International internship, $\beta = 4.05$, $t(405) = 2.18$, $p = .029$ predicted the *Cognitive* factor, while neither Study abroad $\beta = -2.67$, $t(405) = -1.71$, $p = .088$, nor Age did so $\beta = 1.11$, $t(405) = 1.65$, $p = .100$ (see Table 7). These results indicate that males and those who have done an International Internship are associated with higher values for the cognitive abilities represented by the *Cognitive* factor (i.e., quick thinking, learning agility, data fluency, and creative insight).

Table 7: Forward regression of Cognitive factor

Variable	β	t	p
Gender (Male)	7.29	4.58	<0.001

International Internship	4.05	2.18	0.029
Study abroad	-2.67	-1.71	0.088
Age	1.11	1.65	0.100

Note. Results: F (4,405) = 6.63, $p < .001$, $R^2 = 0.06$

Discussion

Before discussing our results, we first consider the positive influence of work experiences, as a type of experiential learning, on employability. We then consider another type of experiential learning – i.e., international experience and its relation to employability. Attention then turns to the *Social/Cognitive* factor structure revealed by our results, followed by a discussion of the powerful role digital game-based analytics tools, like the Knack, can have in measuring the development of employability behaviors. Finally, we discuss the importance of our results for those working in higher education and curriculum development.

The current study indicates a positive relationship between work experiences and employability, which is consistent with previous research (see Gault, Leach, & Duey, 2010; McMurray et al., 2016). Students who have done work-integrated learning (WIL) score higher on math and problem solving (Drysdale et al., 2016), have higher perceived employability whether measured with the DOTS framework (D. Jackson & Wilton, 2017b), based on expectations of gaining employment (Qenani et al., 2014) or comparing their pre- and post-internship ratings on employability skills (Stack & Fede, 2017). Our study builds on the importance of work experience aligned with the program of study (internship) since casual work experience (either domestic or international) did not show significant results.

Previous research has attempted to demonstrate that the skills developed by international experiences are the ones most valued by employers. For example, Potts (Potts, 2019) argues that there is a strong connection between their international study experience and professional skills developments which includes the ability to interact with different individuals, communication skills, quick learning, teamwork, critical thinking, and problem-solving, grouping them as “professional skills”. Consistent with this, Farrugia and Sanger (2017) found that the most significant gains were reported within the interpersonal and cognitive competency domain and to a lesser degree teamwork/leadership (Farrugia & Sanger, 2017, p.12). Our study builds on these findings and demonstrates something more as it establishes that not all transferable skills are the same. Indeed, a two-factor structure emerges and for international internships it is the *Cognitive* factor skills that are developed. Second, neither study abroad nor casual international work experience were associated with these *Cognitive* skills in our study.

Several other significant results emerge from our analysis. First, across both genders, students who had done an international internship performed better on *Cognitive* factor skills than those who had done a domestic internship. This means that those who performed better were able to learn more easily from their mistakes (learning agility), think faster (quick thinking), find solutions more creatively (creative insight) while being able to use information more effectively (data fluency). Second, unlike the *Cognitive* factor, we found that students who had done an international internship did not perform better on *Social* factor skills than those who had done a domestic internship. Third, we found that no other international or domestic experience i.e., domestic/international casual work, domestic internship, nor study abroad, predicted the *Cognitive* factor.

Game-based analytics allowed us to gain insight into the hidden behaviors associated with the skills that employers value most (Pang, Wong, Leung, & Coombes, 2019b). The use of game-based analytics to measure behaviors associated with graduate employability offered us an opportunity to think more creatively about transferable skills development through international experiences, as this research is among the first to demonstrate that *Cognitive* skills are associated with international internship participation, as opposed to the *Social* skills which are usually identified. The present study, therefore, adds to previous research in assessing the relationship between international internships and graduate employability, given its focus on how game-based analytics can be an effective tool to measure behaviors associated with employability.

We propose two recommendations from our research. First, the need for higher education institutions to differentiate between various kinds of employability skills. Employability is not a fixed set of attributes that should apply to all graduates, “but a diverse, heterogeneous set of factors” (Canner, Carlton, Halfteck, & Irons, 2015). Digital assessments allow the clustering of employability skills which best fit a line of work, to go along with any required technical skills. In other words, teamwork or customer focus might help define employability for front-office employment, while data fluency and diligence might do the same for health care workers. Second, our results demonstrate that students who have completed an international internship are predicted to have strong cognitive skills. Since the international element appears to add to the experiential learning of the internship, curricula should be designed to allow non-mobile students, representing the vast majority of those in higher education, to undertake at-home internationalized experiential learning to help further develop these cognitive skills. Examples of relevant practices could include internships in workplaces with strong cultural diversity, multinational companies, or even subsidiaries of foreign companies.

Limitations and Future Research.

Every study has its limitations, and this one is no exception. Three core limitations are of particular relevance: self-selection bias, the generalizability of our sample, and the gender differences we found.

In terms of self-selection bias, the current research did not include a before/after snapshot of employability skills, therefore we do not know whether those who scored highly on the *Cognitive* factor possessed those very skills before departure. This limitation echoes Wiers-Jenssen's (2013) finding that study abroad students are self-selecting and Jones (2013) who argues that international mobility programs may appeal to those who possess certain transferable skills before departure. Further research should, therefore, investigate whether those skills associated with the *Cognitive* factor are due to self-selection. However, if our findings were affected by self-selection bias, it might be expected that the *Social* factor skills would show similar association with international compared to domestic internships, and this was not the case (see Table 8).

Furthermore, self-selection could have been predicted to influence results for all international experiences, including study abroad or international casual work but, again, Table 8 confirms this was not the case. Moreover, it is important to note, as we discuss in further detail below, that international experiential learning associated with the program of study seems to be key, i.e., an international internship.

On the second limitation, generalizability, our sample included only Italian students and was dominated by economics, business, and management majors (64% were from these majors). The applicability of these findings across other disciplines needs further investigation.

Regarding the third limitation, gender differences, it should be noted that previous research with the Knack (Galloway et al., 2017) has never found a gender bias. However, previous research does indicate a general gender bias in digital gaming. Findings indicate that males have a preference for digital games, tend to be more competitive, and have enhanced spatial skills (Quaiser-Pohl et al., 2006), the latter being relevant when analyzing digital gaming performance. The same study (Quaiser-Pohl et al., 2006) investigated the relationship between these gender differences in spatial visualization abilities. Results found that, in digital games, males perform better than females on mental rotation tests (MRT), and that males who play games often, perform better on MRT while the same result was not found for females who play games often. Future research should examine whether gender-based performance is a general issue for game-based analytics research methodologies.

The limitations identified also suggest the need for future research on whether the internship destination country plays a role, for example, those where wider cultural differences are in evidence from the perspective of the individual. Fruitful research might investigate whether internships in multinational companies, or those with a diverse, multicultural workforce, could influence the development of certain employability skills/behaviors, compared to those with a less heterogeneous group of employees.

Our findings suggest that the international element is associated with *Cognitive* skills over and above general experiential learning through internships at home. Further, *Social* skills do not appear to be associated with international internships in the same way. Importantly, the positive association appears to be with work-related international experiential learning as opposed to casual international work experience or study abroad (Table 8). Therefore, understanding exactly which aspects of the international internship experience play a key role in developing these skills is vital if we are to inform efforts to develop employability through internationalization of the curriculum at home (Elspeth Jones, 2014). While further work is needed, this research takes the first steps in distinguishing skills development in international internships compared with domestic internship experiences. Such understandings are crucial in the design of local experiential learning to ensure that the non-mobile majority of students also have the potential to develop those skills/behaviors in domestic contexts.

Conclusion

Using the Knack, we were able to test whether international internships predicted performance on 33 different skills/behaviors. Unexpectedly, the current research found that an international internship translates into behaviors involving the highest order cognitive skills (e.g., learning agility, quick thinking, creative insight, and data fluency). This contrasts with more social, interpersonal, and organizational skills such as self-confidence, effective team working, self-efficacy, self-sufficiency, and/or people skills, normally reported as outcomes of international experiences (Elspeth Jones, 2013). The study, therefore, offers insight not only for those interested in employability but also for internationalization of the curriculum at home, in its focus on providing equal opportunities for all students, not only those who are mobile.

According to Cavanagh, Burston, Southcombe & Bartram (2015), students rate higher-order cognitive skills as the most difficult to develop for work. The current study did not measure whether students possessed these skills before their international internships and did not compare directly those students who did an international internship with those who did not, but our future research will do just that. Nonetheless, skills often develop without students realizing it, and gaming analytics like the Knack can help identify this hidden skill acquisition.

Using game-based analytics to measure behaviors associated with graduate employability offered us an opportunity to define and differentiate between transferable skills to see which, if any, develop through international experiential learning over and above an equivalent domestic experience. These game-based analytics helped us gain insight into the hidden behaviors associated with international internships, and to demonstrate that these behaviors relate to cognitive skills, i.e. those that employers value most (Pang et al., 2019b). We believe that this is the first study to demonstrate an association between international internships and *Cognitive* skills, in contrast to the kind of transferable *Social* skills frequently reported as the outcome of international experiences. While further research is needed, this study represents an important first step in distinguishing international from domestic experiential learning experiences. It provides context and informs the development and design of internationalized curricula at home, so crucial for the vast majority of university students who do not have the opportunity of an international experience as part of their program of study.

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