Insights into career outcomes and skills of Dutch graduates

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2020 edition

STATISTICAL
WORKING PAPERS

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2020 edition

Manuscript completed in November 2019.

Printed by the Publications Office in Luxembourg.

Luxembourg: Publications Office of the European Union, 2019

Collection: Statistical working papers
Theme: Population and social conditions

ISBN 978-92-76-13001-7 ISSN 2315-0807 doi: 10.2785/197807 KS-02-19-909-EN-N

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Foreword by Eurostat

Eurostat and the national statistical authorities of the European Union develop, produce and publish official statistics that serve the public interest. Based on a legal framework, official statistics stand out as a unique source of rigorously established impartial and trustworthy information providing statistical information about society, economy and environment. Essentially, these statistics are the cornerstone of “evidence-based policies” at European, as well as national level. Until recently, statistical offices relied on survey and census data, and increasingly on administrative data collected by public administrations and re-purposed for producing official statistics.

During the last two decades, we have been faced with the accelerating speed of digitalisation, triggered by the development of the semiconductor industry, and advent of the Internet. “Datafication”, which signifies the quantification of various aspects of life into data, brings a paradigm shift in how data can be used to develop and deliver services to the society. These developments challenge official statistics systems in different ways. Statistical offices have to shift focus from data collection to extracting information from existing sources. In addition, new partnerships are necessary to bring together official statisticians with private partners to prepare and integrate data for policymaking.

The European Statistical System, which brings together national and European statistical offices, recognised the opportunities and challenges of using big data for official statistics with the Scheveningen Memorandum in 2013. Based on a big data roadmap and action plan, statistical offices joined forces to initiate projects and actively pursue partnerships with data holders mostly from the private sector to explore the use of new data sources for statistical purposes. In 2018, these activities were reinforced by the heads of the statistical offices in the Bucharest memorandum on “Official Statistics in a Datafied Society (Trusted Smart Statistics)”. The memorandum explicitly refers to the evolution of official statistics embracing the opportunities provided by the availability of new data sources originating from the digitalisation of our society and economy and of new technologies.

Three organisations, the Dutch statistical office (Centraal Bureau voor de Statistiek, CBS), LinkedIn and Eurostat entered into a partnership to work together. The collaboration pursued two main objectives: using LinkedIn insights to produce valuable statistical information and to assess the quality of these new data for official statistics. Work concentrated on examining data about graduates from Dutch universities in order to analyse their early career pathways. The analysis can be seen as contribution to the “New Skills Agenda for Europe” and specifically to the “Graduate Tracking” project. The research uses information that can be extracted from existing registers (CBS) and novel information (LinkedIn) to demonstrate its potential as a new data source in the European context. The existing data is used to compare and assess the relevance of this new data source. We believe that combining both information sources, official statistics and new data from private partners will guide the future way of producing new statistical information and will be a source of inspiration and encouragement for similar endeavours.

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1 Summary and Key Messages

In this co-designed study with CBS (Statistics Netherlands) and Eurostat (the statistical office of the European Union), LinkedIn examined anonymised and aggregated data about graduates of Dutch-based higher education institutions among its members to explore in detail how they progressed in the labour market or pursued further study after completing their first degree.

The dataset was built from a significant cohort of more than 292,000 members who graduated from Dutch institutions between 2010 and 2014. This cohort comprised of 159,000 members who completed a Bachelor's degree at a hogeschool institution (a university of applied sciences where there is an emphasis upon vocational study) and 133,000 who gained a Master's degree from a universiteit (a university which tends to have a broader academic focus).

In designing the study, LinkedIn worked with CBS to assess the dataset and investigate its representativeness, through validation and robustness checks. This allowed us to determine the characteristics of the data and develop an approach for analysing the early career outcomes of graduates.

This report is divided into two main parts:

- The first part is the research on Graduate Outcomes. It documents the analysis performed on LinkedIn's data, as well as outlining the parameters and framework used in the research.
- The second part is technical. It describes the various methods used to validate and verify the findings in the research part.

Graduate Outcomes

Introduction

A university degree is one of the cornerstones of today's knowledge-based society, and a highly skilled workforce is one of the EU's principal competitive advantages in a globalised world. But for students and employers alike, there is little understanding of how the choice of a university or degree will translate into a career. To plug this gap, the EU introduced the concept of graduate tracking in its 2016 skills strategy, seeking to improve the availability and quality of data about how graduates progress in the labour market.

CBS, the Dutch statistics agency, Eurostat and LinkedIn have teamed up to give life to this concept, tracking the factors that determine the pathways and skills of recent graduates as they join the workforce. The model developed to analyse these initial career moves was first applied to graduates of Dutch educational institutions. The report, which follows provides a comprehensive overview of the findings stemming from this new analysis tool that shall be rolled out in other EU Member States.

Parameters for analysis

To pursue this analysis, the research focused on over 292,000 LinkedIn members who graduated from Dutch institutions between 2010 and 2014. This cohort comprised 159,000 members who

completed a Bachelor's degree at a hogeschool institution (a university of applied sciences where there is an emphasis upon vocational study) and 133,000 who gained a Master's degree from a universiteit (a university which tends to have a broader academic focus). The detailed findings from this study are presented in Part 2 Graduate Outcomes.

In designing the study, LinkedIn worked with CBS to assess the dataset and investigate its representativeness, through validation and robustness checks. This allowed us to determine the characteristics of the data and develop an approach for analysing the early career outcomes of graduates. The findings from this exercise are described in detail in Part 3 Methodology and Validation (described below).

Findings

From the analysis, we observe that the large majority of the graduates studied indicated that they embarked on at least one work experience, internship, or further education experience within four years of graduating. For the majority of this group, this experience takes place within their first year of graduation (chapter 3). By far, this is usually in employment and a much smaller share of these graduates pursue further higher education.

The most popular sectors for graduates to work in are Health Care, Corporate Services and Software & IT services, regardless of the type of institution they attended. Those graduates of hogescholen are more likely to start their early career in Manufacturing than their universiteit counterparts. On the other hand, education is more likely to be the first employment destination for universiteit graduates compared to hogescholen graduates.

There are also distinct patterns evident in the type of roles undertaken by graduates in their first employment roles. For example, universiteit graduates are likely to work in jobs related to Research or Business Development, while hogeschool graduates are more likely to work in Sales or Operations functions. As with the sectors in which they work, the type of institution attended by a graduate seems to have some bearing on the type of role they perform. Interestingly, we also note that it takes less time for hogeschool graduates to enter the labour market than their universiteit peers.

Other patterns are further highlighted when we examine the geographical mobility of these graduates (chapter 4). Over 7% of the members in the cohort who graduated in 2014 migrated from the Netherlands, and for the majority of these members, they left within 18 months of graduation. By far, the main focus of this emigration was to European countries and North America, with Germany and the United Kingdom being the most popular. Employment seems to be the main motivator for migration - the first experience reported by members after moving abroad is work-based, with a much smaller number reporting that education is the first. Interestingly, almost a quarter of those who emigrate from the Netherlands after graduation return back to the Netherlands.

There are significant variations in the skills listed, but there are notable patterns. These patterns also illustrate the distinction between the institution type attended by graduates. Graduates of Dutch third-level institutions are most likely to list skills in Business Management, Foreign Languages, Digital Literacy, Project Management and Research, regardless of the type of institution. However, hogeschool graduates are more likely to list skills in Digital Literacy, Social Media, Manufacturing Operations and Product Marketing compared to their universiteit peers. Meanwhile, universiteit graduates are more likely to list skills in Research, Data Science, Writing, Capital Markets and Public Policy.

Observing the skills that feature most prominently in each cohort of graduates surfaces further differences between the two groups of graduates. The skills that are most specific to hogeschool graduates tend to be more work- and operations-focused, such as Revenue Analysis, Lodging, Physical Medicine and Inside Sales. The skills most specific to universiteit graduates tend to be more research-focused and include skills such as Mathematics, Nanotechnology, Neurology and Signal Processing.

Conclusions

The findings from the research illustrate some notable patterns among early career outcomes for graduates of Dutch institutions. Understanding the first experience upon which new graduates embark, at home or abroad, is key to understanding the ability of education and training systems to promote labour market readiness. Being able to distinguish the type of trajectory on the basis of institution attended is also important. Providing additional insight into these trajectories, either with regard to the job role, sector of employment or skills acquired is an important feature of any toolbox that seeks to understand the efficacy of education and training systems.

Complementing information collected by statistics agencies with granular LinkedIn skills and international migration data produces a comprehensive and dynamic picture of how graduates fare in the job market. This type of analysis could prove vital to students, who want to make an informed choice about what university track will steer them towards their intended career. For universities, the insights can help structure programmes to give alumni the best chances of success and anticipate the rapidly changing needs of today's job market. Employers will benefit from a better understanding of the skillsets they can expect from new recruits. Not least, policymakers can use these new insights to form a solid evidence base from which to build effective education and labour market decisions for the benefit of their citizens.

Methodology and Validation

To examine whether LinkedIn graduate members from Dutch higher education institutions are representative of the whole population of graduates from Dutch higher education institutions, CBS compared the findings of LinkedIn to a graduate cohort study. In this cohort study, all Dutch graduates who graduated between 2010 and 2014 were yearly followed in educational and job registrations. This exercise was performed to respond to standard concerns about the reliability and validity of your LinkedIn sample and increase confidence in the accuracy of your above results. During this period, 309,000 hogeschool graduates and 181,000 universiteit graduates graduated and were included in the cohort study. The most important findings of the comparison between the LinkedIn findings and the cohort study were:

- The LinkedIn dataset describes trends in the number of universiteit graduates quite well. However, it does not capture the exact trend of the number of hogeschool graduates to the same extent.
- When it comes to employment outcomes, the percentage of graduates finding a job is 7 to 10% points lower based on the LinkedIn dataset as it is in the CBS cohort study. Because this is 5 years average, the change in employment outcomes over time has not been analysed.
- There is skewness in the LinkedIn membership when it comes to certain sectors, favouring the ICT and financial sectors. The health sector seems to be underrepresented in the LinkedIn dataset for both hogeschool and universiteit graduates. The education sector was underrepresented only for hogeschool graduates. The conclusion drawn from the LinkedIn dataset that universiteit graduates are more likely to find employment in the education sector cannot be confirmed by the CBS cohort study.
- Although CBS couldn't validate the skills outcomes (there were no comparative data available), we assume that this skewness in the sector will also affect the prevalence of certain skills in the LinkedIn dataset.

2 Graduate Outcomes

1 Introduction

National and regional labour markets, as well as education and training systems around the European Union (EU), all have unique characteristics. However, they also share a number of similar challenges and opportunities. This is especially true of the need to ensure that higher education institutions equip graduates with relevant skills as they integrate into the different job markets.

There is very limited data available today about how graduates progress in the labour market and how their skills change over time. In 2016 the European Commission's New Skills Agenda introduced the concept of graduate tracking, which aims to address this knowledge gap and improve the availability and quality of data about graduates and their career progression. The goal of the New Skills Agenda is to improve the overall quality of skills and their relevance for the EU labour market in an effort to better anticipate future needs.

In order to address this knowledge gap, CBS, Eurostat and LinkedIn formed a partnership with the objective of analysing graduate outcomes and describing factors that determine career pathways of recent graduates. The study also aims to illustrate the characteristics of LinkedIn data and the circumstances in which it can provide additional insight that supplements existing sources of data on graduate outcomes.

The research partners have agreed that the project will first focus on a pool of recent graduates from third level education institutions located in the Netherlands (see Box 2.1). The intention is to iterate and apply that same methodological approach developed for the Dutch pilot phase to other EU Member States.

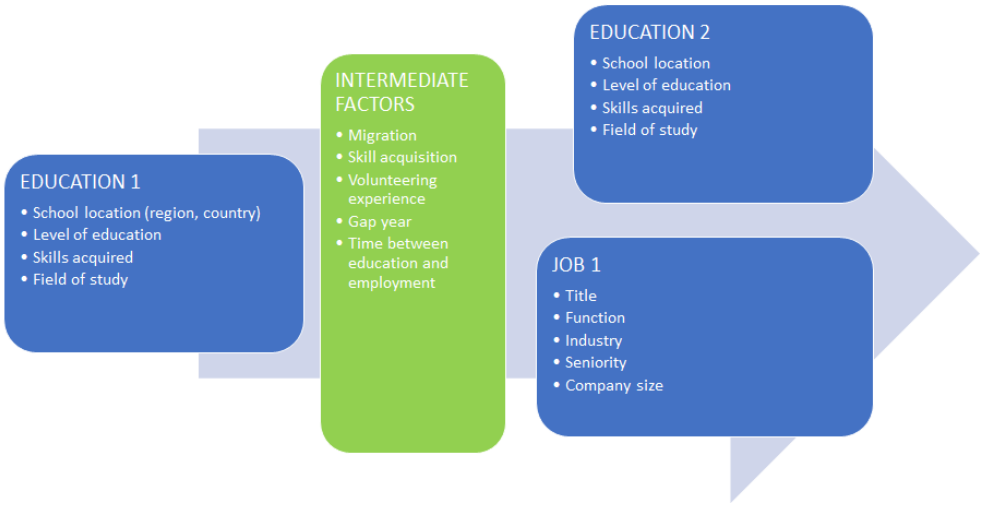
Each of the three research partners had a different role in the Graduate Tracking report but were involved in every stage. LinkedIn set up a research framework, following workshops with CBS and Eurostat, and developed a method to investigate career outcomes based on LinkedIn member profiles. The main body of research is presented in Part 2 Graduate Outcomes. The research framework and methodology are described in chapter 2, whereas results are presented in chapter 3, 4 and 5. CBS conducted a validation study to compare outcomes based on LinkedIn member profiles with their own cohort study. Results of the comparison can be found in Part 3 Methodology and Validation of the overall report. This part of the report also contains a more detailed description of the methodology used by LinkedIn and CBS. Part 4 Conclusions and Discussion contains the main conclusions of this Graduate Tracking report.

2 Methodology and Research Framework

2.1 The research framework

- LinkedIn, lists its Economic Graph (a digital representation of the global economy), has a unique capability to look at graduates throughout their career both in terms of their progression in the labour market and further education experiences.
- We studied the professional trajectories of a selected cohort of LinkedIn members through the lens of work and educational experiences (as described in Box 2.1).
- We identified the most relevant variables for describing the transition made by graduates from these tertiary educational institutions into the job market, and these formed the basis of our research framework (see figure 2.1 below). We asked an important question facing planners and policymakers: what do graduates do when they finish their degree? Do they continue to study, or do they start working?

Figure 2.1 Generalised framework for LinkedIn research on graduate outcomes



2.2 Overview of methodology

Our study is based on an analysis of data from a specific cohort of LinkedIn members. We identified members who completed their first Bachelor-level degree from a Dutch hogeschool or their first Masters-level degree from a Dutch universiteit between 2010 and 2014. To allow for a clean comparison between hogeschool graduates and universiteit graduates, members who qualified for both groups were removed from the analysis.

We then identified the additional work and education experiences of members of this cohort during the 1- and 4-year periods following the completion of their degree.

Based on member profile information offered by the LinkedIn dataset, we classified each post-graduate experience into one of the following groups of outcomes for analysis:

- Further education or study
- Internship
- Work experience

2.3 Terminology & Glossary

CBS glossary (see Box 2.1 for further information)

- **Hogeschool** (hbo) - University of applied sciences. Bachelor's degrees from a university of applied sciences have a professional orientation. The term hogeschool is used to describe graduates of such institutions throughout the report.
- **Universiteit** (wo) - Research universities. Most universiteit bachelor graduates in the Netherlands enrol in a universiteit master programme. The term universiteit is used to describe graduates of such institutions throughout the report.

LinkedIn glossary

- **Industry** - Members indicate their current and previous employers in the experience section of their profile. The industry in which a member works is determined by the classification of the company in LinkedIn's taxonomy of industries.
- **Function** - Members indicate their current and previous job titles in the experience section of their profile. The function in which a member works is determined by the classification of the job title in LinkedIn's taxonomy of functions.
- **Location** - LinkedIn determines a member's location by the location they have indicated in their profile summary. When a member changes this location to another country, LinkedIn labels that change as a migration event.
- **Education** - Members indicate their academic achievements in the education section of their profile, such as their higher education organisation and degree type.
- **Skills** - Members indicate their expertise within the skills section of their profile. LinkedIn clusters the tens of thousands of individual skills that members choose to display on their profile into categories for analysis. Each skill cluster is then further aggregated into 'parent clusters' to facilitate analysis.
- **Outcome** - For the purposes of this research, LinkedIn defines an outcome as a new education or employment experience that a graduate starts after completing their initial degree, according to their LinkedIn profile.

Box 2.1: Dutch higher education system

Dutch higher education is based around a binary system that distinguishes between research-oriented higher education (*universiteit*) and higher professional education (*hogeschool*). The hogeschool prepares students for the labour market, while the universiteit prepares students for scientific research. This distinction remained in place after the introduction of the bachelor-master degree structure in 2002 (Nuffic[1]).

There are 3 types of universities of applied sciences and research universities in the Netherlands:

1. government-funded higher education institutions

2. approved institutions

3. private institutions

1. Government-funded institutions (13 research universities, the Open University and over 35 universities of applied sciences) are financed by the Dutch government and are entitled to issue legally recognized degrees. These institutions offer study programmes for the statutory tuition fee.

2. Approved institutions do not receive funding from the Dutch government but may also issue legally recognised bachelor's and master's degrees. These institutions are not bound by statutory tuition fees and are free to determine their own tuition fees.

3. Private institutions, such as international universities, are not bound by Dutch government regulations. However, these institutions may apply for accreditation by the Accreditation Organisation of the Netherlands and Flanders (NVAO), subject to specific conditions.

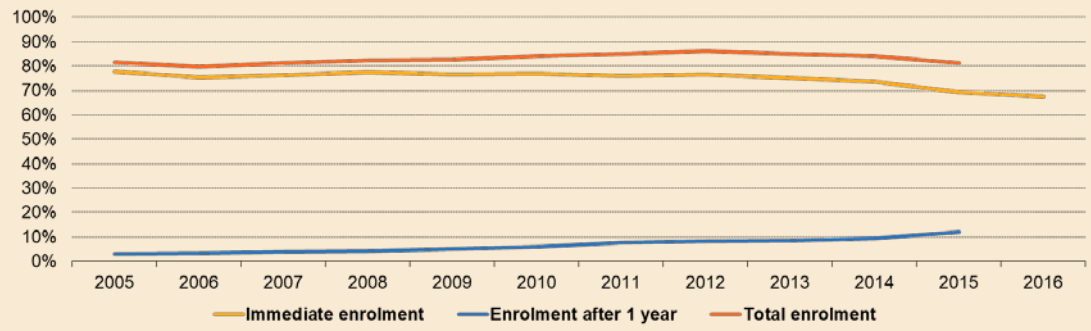
Bachelor-master

Both universities of applied sciences and research universities offer bachelor and master programmes. With a hogeschool bachelor degree, graduates can continue their education in a hogeschool master programme or (sometimes with additional requirements) a universiteit master programme.

In the Netherlands, over 60,000 hogeschool bachelors graduate each year. Only a small group continues in a hogeschool master study, as there are only over 3,000 hogeschool master graduates each year. Of all hogeschool bachelor graduates, around 8% of them continues in a universiteit master immediately after finishing their bachelor[2].

Most universiteit bachelor graduates in the Netherlands enrol in a universiteit master programme. As seen in figure 2.2, over 30,000 universiteit bachelors graduate every year. Over 80% of them continues in a universiteit master programme, although more and more there is a year between their universiteit bachelor graduation and the start of their universiteit master.

Figure 2.2 Share of universteit bachelor graduates in the Netherlands enrolling in universteit masters



Source: Inspectie van het Onderwijs

[1] Nuffic (2019). Education and diplomas in the Netherlands.

[2] Inspectie van het Onderwijs (2018). In- en doorstroommonitor 2008-2017. Utrecht.

3 Employment and Education Outcomes

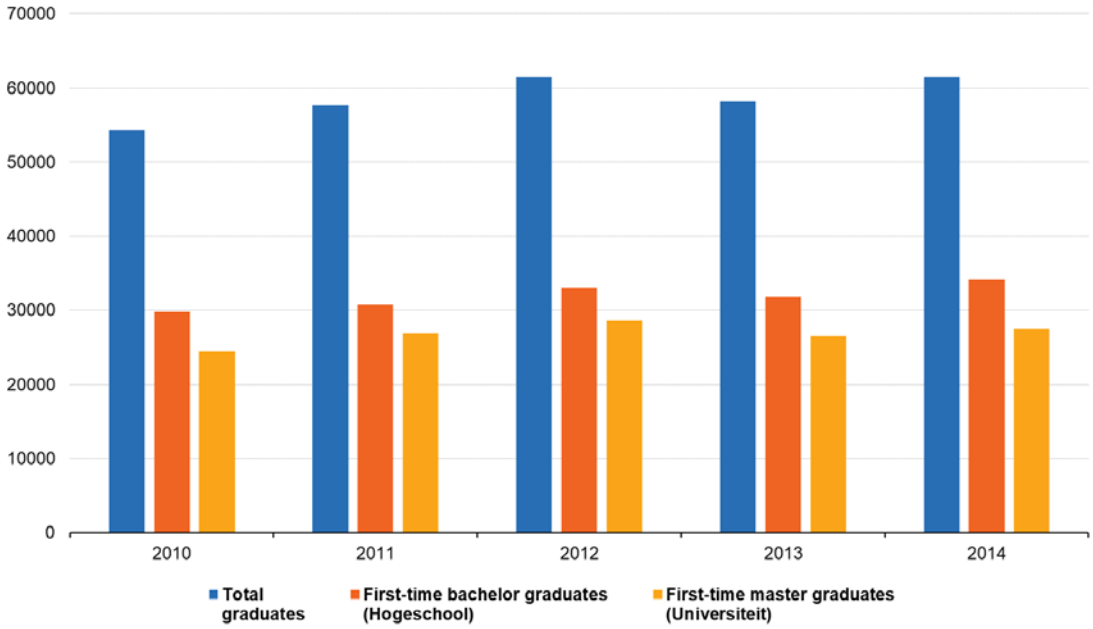
3.1 Introduction

Having set out the parameters for the research and analysis in chapter 2, we present the initial findings in the sections below. In this chapter, we explore the employment and education outcomes of members in the Netherlands who fall within the remit of our analysis. We begin in Section 3.2 by describing the overall characteristics of the cohort. Section 3.3 describes the distribution of outcomes among the overall cohort. Section 3.4 explores the distribution of outcomes on the basis of institutional background. Section 3.5 examines how the labour market outcomes for graduates in this analysis varies by industry and function. Section 3.6 looks at the length of time taken to begin the first employment experience, while Section 3.7 looks at a similar measure with the length of time to begin the first education experience. Section 3.8 concludes this chapter.

3.2 Overview of Graduates from Dutch institutions on LinkedIn

LinkedIn identified more than 292,000 LinkedIn members who had graduated for the first time from Dutch institutions between 2010 and 2014. These included 159,000 members who had completed their first Bachelor-level degree from a Dutch hogeschool and 133,000 who had completed their first Masters-level degree from a Dutch universiteit. figure 3.1 presents the number of members who indicated their graduation date from a Dutch institution.

Figure 3.1: First-time graduates of Dutch institutions, on LinkedIn by graduation year

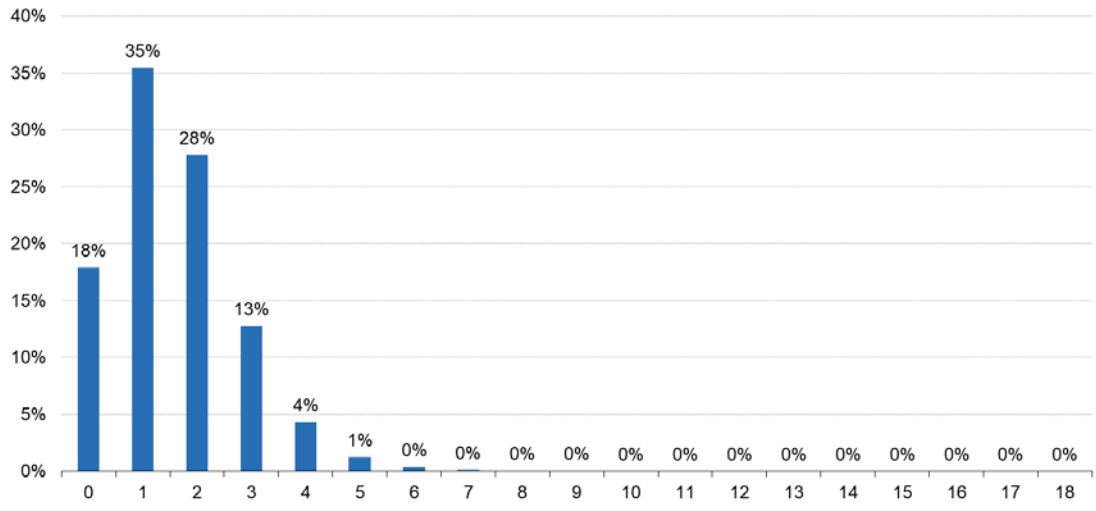


Source: LinkedIn

3.3 Early Career Outcomes of Dutch Graduates

Figure 3.2 presents the distribution of outcomes for all members of our group, within their first year after graduation. 82% of graduates indicate starting at least one post-graduate work or further education outcome within **one year** of completing their degree. Roughly one-third of graduates (35%) report only one post-graduate work or education outcome within the first year of their post-graduate career.

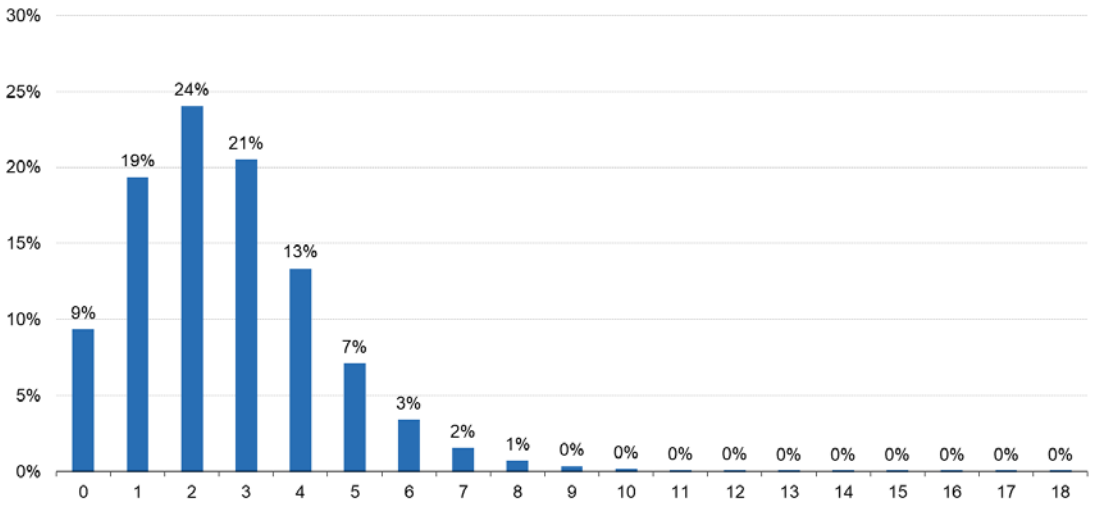
Figure 3.2: Distribution of outcomes within first year post-graduation



Source: Linkedin

Extending this timeframe to study the work and education experiences graduates started within four years of completing their degree allows for a richer understanding of their early career experiences. Figure 3.3 presents the distribution of outcomes, within four years of graduation. The percentage of graduates who indicate having started at least one post-graduate work or education experience rises from 82% within one year of completing their degree to 91% within four years.

Figure 3.3: Distribution of outcomes within four years post-graduation



Source: Linkedin

The remaining 9% of graduates observed do not list any work experience, internship or further education outcomes within four years of graduating. This figure contrasts with 18% of members who did not indicate any outcome within one year of graduation.

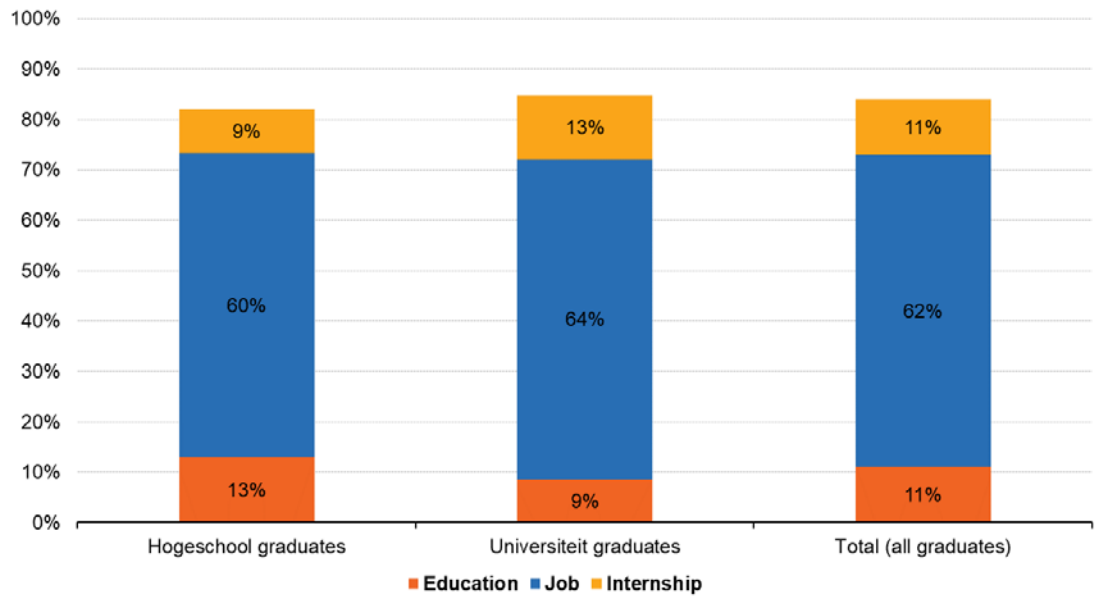
64% of graduates indicate starting between one and three post-graduate work or education experiences within the first **four years** of their post-graduate career. On average, graduates list 2.6 post-graduate work or further education experiences on their LinkedIn profile for the four year period being examined.

3.4 Early career outcomes by institution

In the previous section, we examined the number of outcomes listed by members who graduated from Dutch institutions. In this section, we explore the relationship between these outcomes and the type of institution the member attended.

A majority of both hogeschool (69%) and universiteit (77%) graduates indicate starting a work or an internship experience within one year of completing their degree. The breakdown is described in figure 3.4. It is also worth noting that members who graduated from a hogeschool are more likely to list an education outcome as a first outcome following graduation.

Figure 3.4: Distribution of graduates' first post-graduate experience (within one year)

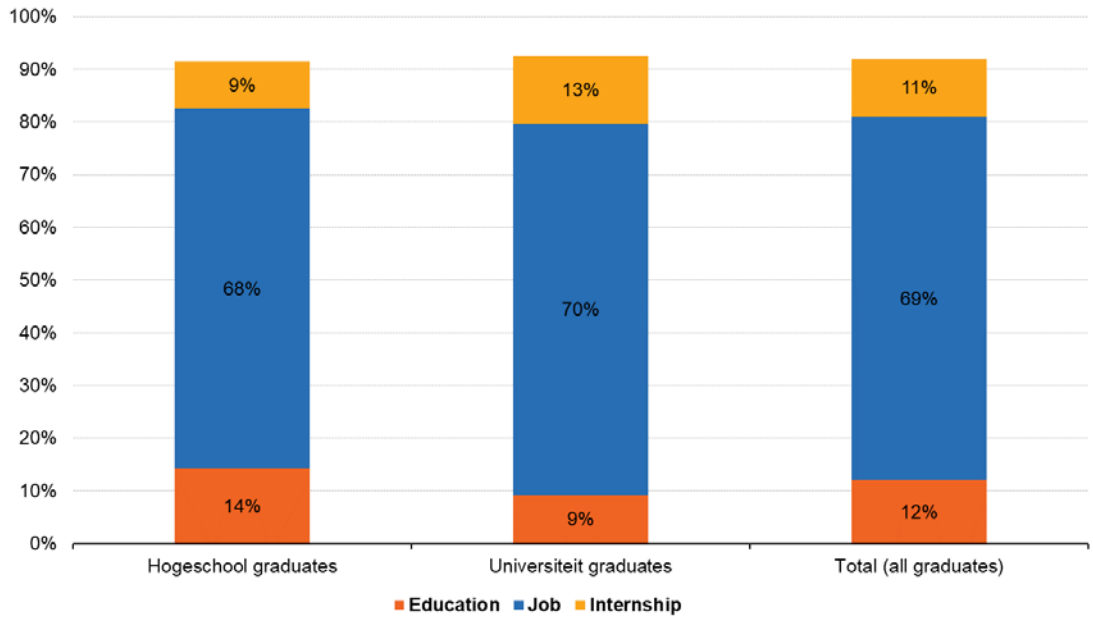


Source: LinkedIn

When the period of the analysis is extended to four years, as shown in figure 3.5, the proportion of members who have entered the labour market is higher. Within four years of their graduation date, 77% of hogeschool graduates and 83% of universiteit graduates list a work or internship experience as their first outcome.

In both cases, a smaller share of members instead lists a new education experience as their first post-graduate outcome. Only 13% of hogeschool graduates indicate pursuing further education (at Bachelor-level or above) compared to 9% of universiteit graduates (at Masters-level or above) within the first year of graduation. When we look at the four-year window, there is little change in this proportion.

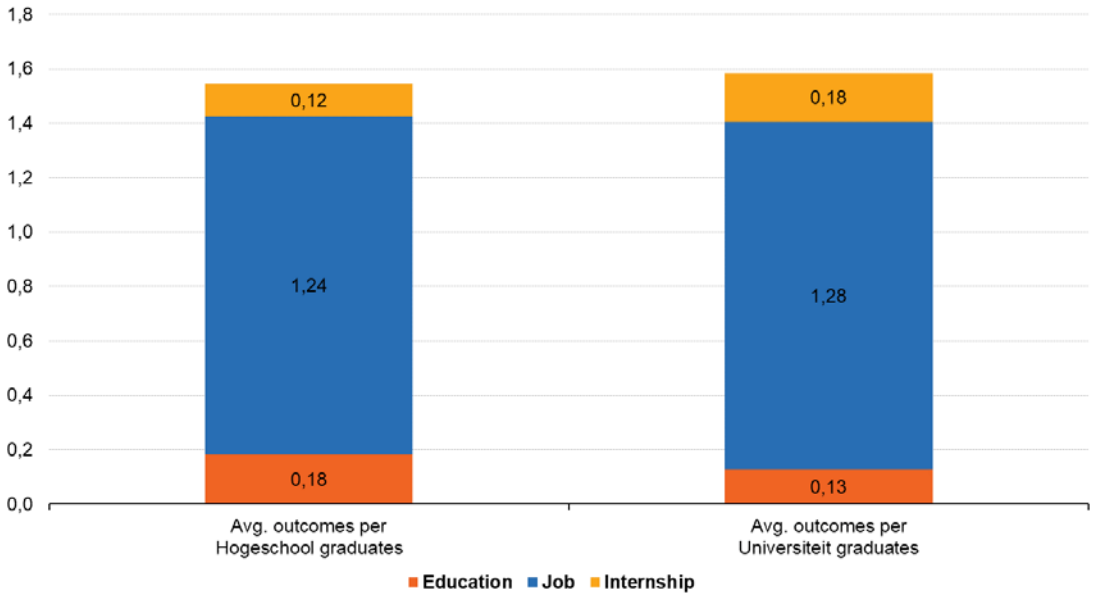
Figure 3.5: Distribution of graduates' first post-graduate experience (within four years)



Source: LinkedIn

We move next to examine the overall number of outcomes listed by graduates from Dutch institutions. Figure 3.6 displays the average number of outcomes listed by our Dutch cohort in the first year after completing their degree. In total, we observe that the average number of outcomes is quite similar for both groups, though universiteit graduates report slightly more outcomes on average than their hogeschool peers (1.59 vs. 1.54). While the largest share of these outcomes for both groups is jobs, universiteit graduates, on average, report marginally more employment outcomes.

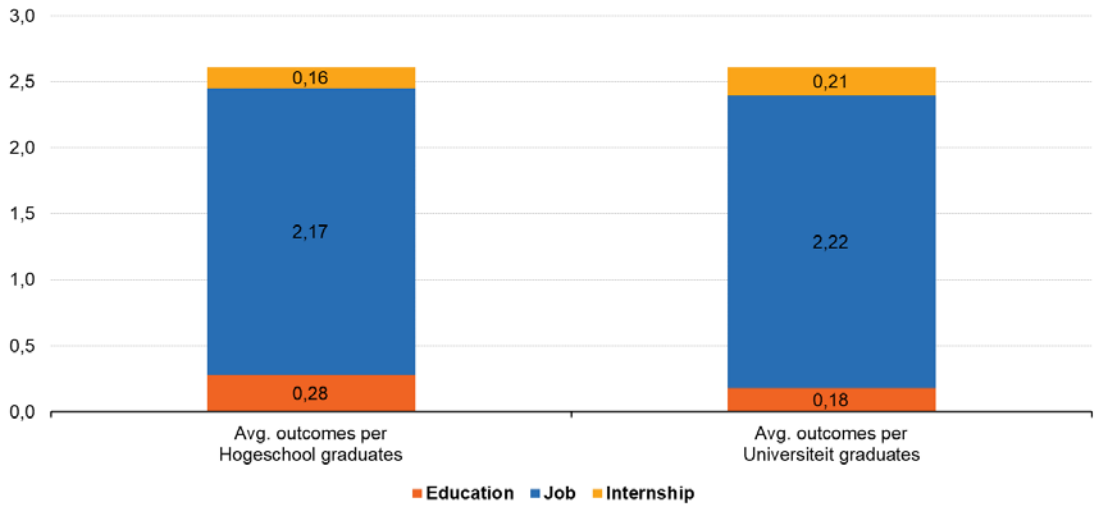
Figure 3.6: Average number of graduates' first post-graduate experience (within one year)



Source: LinkedIn

Figure 3.7 displays the same measures except for the period of analysis is extended from one year to four years. A similar pattern is also apparent here. Here we see that over the course of four years following graduation, the level of outcomes among both groups of members converges. The average number of outcomes for a graduate in this group, regardless of institutional background, is 2.61 over the first four years of their post-graduate career.

Figure 3.7: Average number of graduates' first post-graduate experience (within four years)



Source: LinkedIn

Similar to the one year window, the average number of employment outcomes listed by graduates from a hogeschool (2.17) is slightly lower than that of universiteit graduates (2.22). However, there is a notable increase in the average number of education outcomes for graduates from a hogeschool (0.28) compared to those graduating from a universiteit (0.18). The difference between the two groups is larger when observing outcomes graduates experience within the four-year window following graduation compared to the one-year window. One reason for this might be that hogeschool graduates embark on masters-level programmes after graduating from their bachelors.

We also see that universiteit graduates are more likely to list an internship outcome during both the one year and the four-year window, though the difference between these groups appears to narrow over time.

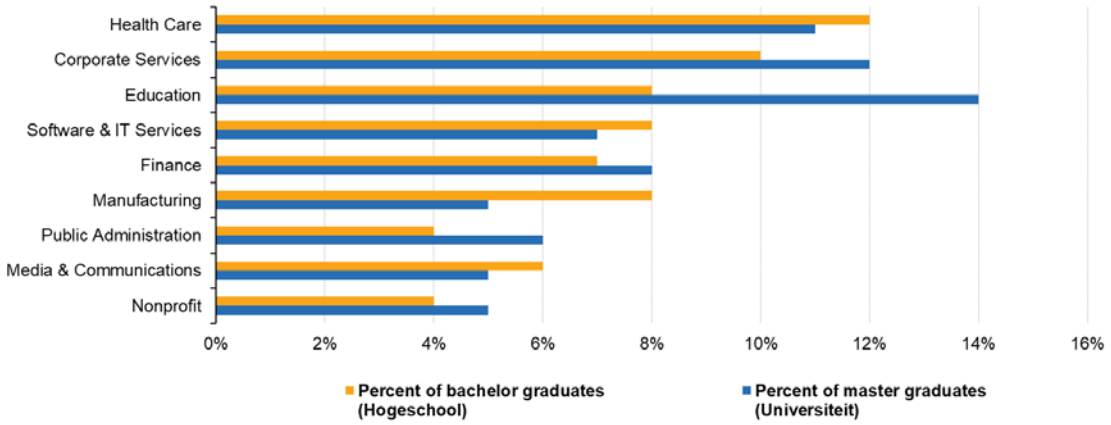
3.5 Labour market outcomes by industry and job function

In this section, we examine in greater detail the specific characteristics of the labour market outcomes observed among graduates and how they differ based on the institution attended. We achieve this by considering two dimensions of graduates' labour market outcomes: the sector in which they work (based on the member's employer) and the job function (based on the member's individual job role).

Figure 3.8 shows the most common sectors graduates enter within the first four years of completing their degree. We see that universiteit graduates are nearly twice as likely (1.8x) to list a new work experience in the Education sector as their first post-graduate outcome. They are also more likely to begin working in sectors such as Corporate Services, Finance, Public Administration and Non-profit compared to their hogeschool peers. As noted in Part 3 Methodology and Validation (Section 3.8), there are some sectors in which LinkedIn members are overrepresented which may affect the interpretation of these results.

Hogeschool graduates, by contrast, tend to enter upon employment opportunities that reflect the vocational character of this institution, as represented in figure 3.8. They are most likely to list a first employment outcome in the Health Care sector and are 1.5 times more likely than universiteit graduates to list a first employment outcome in Manufacturing. In comparison to universiteit graduates, hogeschool graduates are also more likely to list a first employment outcome in Software and IT Services or Media and Communications.

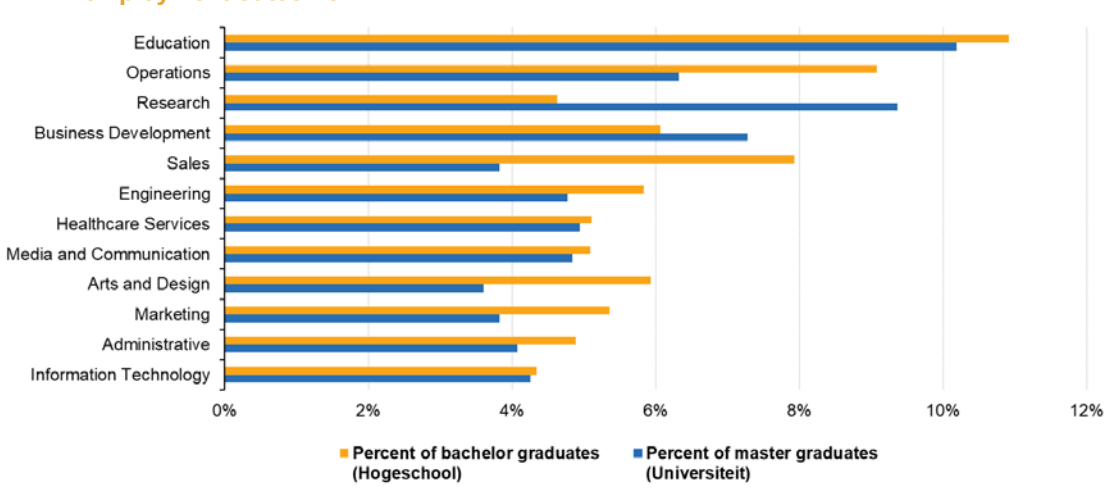
Figure 3.8: Top industries among graduates of Dutch institutions, first listed employment outcome



Source: LinkedIn

We then turn to the functions that these graduates undertake as part of their first employment outcomes, presented in figure 3.9. Similar distinctions emerge when we examine the role that these new entrants to the labour market perform in their first post-graduate work experience, based on their specific function at their new employment. For example, we observe that universiteit graduates are twice as likely to begin working in a Research function compared to hogeschool graduates. They are also more likely to work in Business Development.

Figure 3.9: Top functions among graduates of Dutch institutions, first listed employment outcome



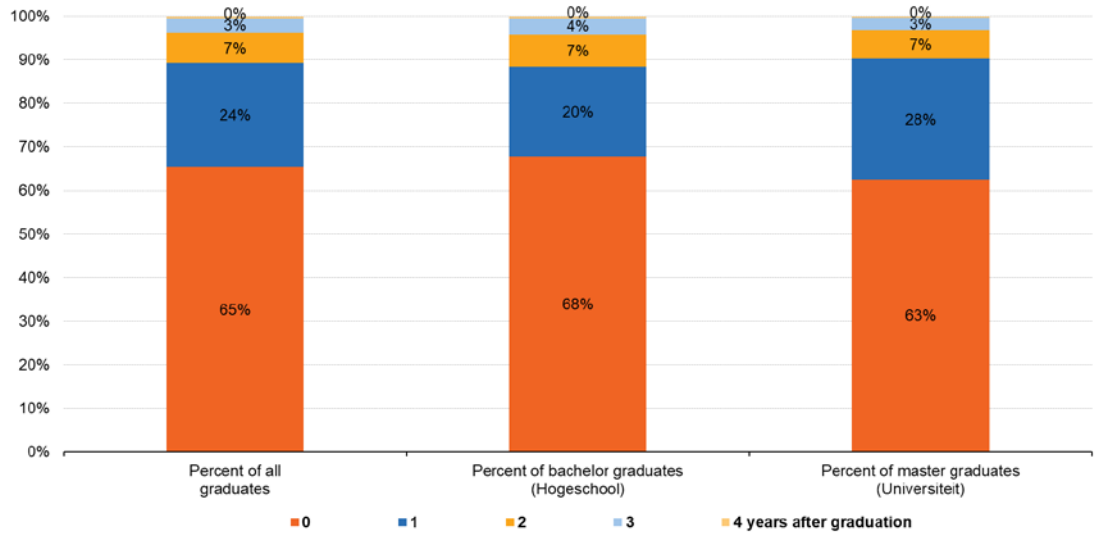
Source: LinkedIn

With regards to hogeschool graduates, their first employment outcome is twice as likely to be in a Sales function, and they are significantly more likely to list an employment outcome with a function in Arts and Design or Marketing. Hogeschool graduates are also more likely to list employment outcomes that suggest more technical roles such as Operations or Engineering.

3.6 Time to first employment

Figure 3.10 presents the breakdown of the amount of time that it takes for graduates of Dutch institutions to commence their first employment outcome. The data suggests that graduates who enter the labour market are most likely to do so within one year of graduating. A majority (65%) of all graduates who entered the labour market within four years of completing their degree began their first employment the same year they graduated. An additional 24% began their first employment the following year.

Figure 3.10: Time to first employment for graduates of Dutch institutions within four years after graduation



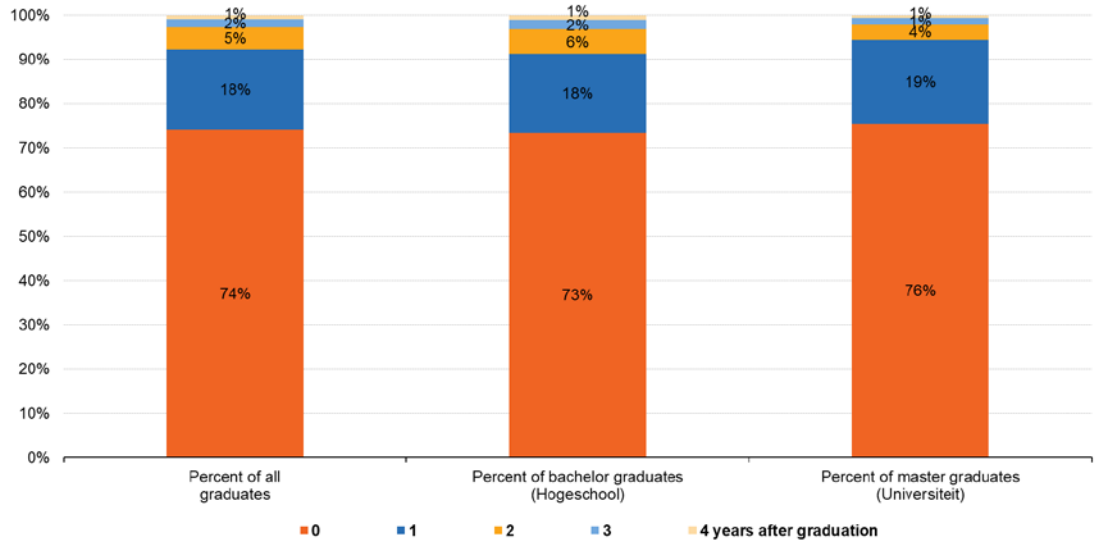
Source: LinkedIn

The data suggest that hogeschool graduates are more likely to transition quickly from education to employment than their universiteit peers, with 68% of hogeschool graduates gaining employment less than one year of graduation compared with 63% of universiteit graduates. However, the results are more balanced, when we consider the number of graduates that commence their outcomes in the following 12 months. The percentage of graduates who began their first employment experience within one year of graduating rises to 91% for universiteit graduates and 88% for hogeschool graduates.

3.7 Time to first further education

In this section, we look at the number of years taken by graduates to begin their first education outcome following graduation. The key observation we can draw from figure 3.11 is that graduates who pursue further education after graduation are most likely to do so immediately after completing their first degree, with about three quarters (74%) of graduates beginning the education outcome in the same year after graduation. A further 18% began their further education experience within one year of graduating.

Figure 3.11: Time to first education for graduates of Dutch institutions within four years after graduation



Source: LinkedIn

This pattern remains the same regardless of institutional background. Both universiteit graduates and hogeschool graduates who pursue further education are likely to begin their subsequent studies during the same year as completing their degree (76% and 73% respectively).

3.8 Concluding remarks

In this section of the report, we explored the career outcomes of graduates of Dutch institutions in the first year and the first four years following their graduation. We found the following:

- There are about 292,000 members on LinkedIn who indicated that they graduated from Dutch institutions between 2010 and 2014.
- About 82% of graduates indicate that they started at least one employment or education outcome in the first year following their graduation.
- Hogeschool graduates are slightly more likely to pursue further higher education after graduating compared to unveirsiteit graduates, both within the first year of graduation and within four years of graduation.
- Certain sectors such as Health Care, Corporate Services and Software & IT Services employ a large number of both hogeschool and universiteit graduates after they complete their degree. Hogeschool graduates are more likely to work in industries such as Manufacturing, while universiteit graduates are more likely to gain employment in the Education sector.
- For all graduates who enter the labour market soon after graduating, the majority of

graduates gain employment the same year they graduated. However, hogeschool graduates are more likely to reach their first employment outcome sooner than universiteit graduates.

- About three-quarters of those graduates who pursue further higher education after graduation do so in the year immediately after graduation.

The findings in this chapter suggest that members who graduated from Dutch institutions are able to find employment fairly soon after graduation. Where they choose to embark on further education, they do so a little sooner after graduation. We observe some differences in the outcomes patterns for hogeschool and universiteit graduates, most notably in the industries in which they secure their first employment and in the first jobs, they take on.

4 Geographical mobility of graduates of Dutch institutions (migration)

4.1 Introduction

In this chapter of the report, we investigate the geographical mobility of Dutch graduates and determine whether or not there are characteristic differences between members who indicated they migrated and the general cohort.

We assess migration from the changes in location made by LinkedIn members in the headline of their profile. The date on which such changes are made is considered to be when they migrate. This is distinct from the official definitions of migration as used by Eurostat[3]. It is worth noting that we do not know why a member migrates, and employment and education start dates are not necessarily aligned; however, we can infer what the motivation for migration is by looking at these dates.

For the purposes of this section of the report, we look at the 2014 cohort of graduates from Dutch hogeschool and universiteit. We look specifically at those who have attained at least one education or labour market outcome after graduation. There are 55,000 members in our pool who satisfy this definition. For identifying those members who migrated, we identify members from that 55,000 who have indicated an international change of location in the four years following graduation. This comes to 3,720 members which makes up 7% of the overall 2014 cohort.

We looked at the characteristics of these members, both with regard to their migration activity and also with regard to the outcomes that they attained. Section 4.2 looks at the overall characteristics of the migration undertaken by the cohort of interest. Section 4.3 examines the outcomes attained by this group, specifically those attained following migration. Section 4.4 concludes the chapter.

4.2 Overview of migration patterns

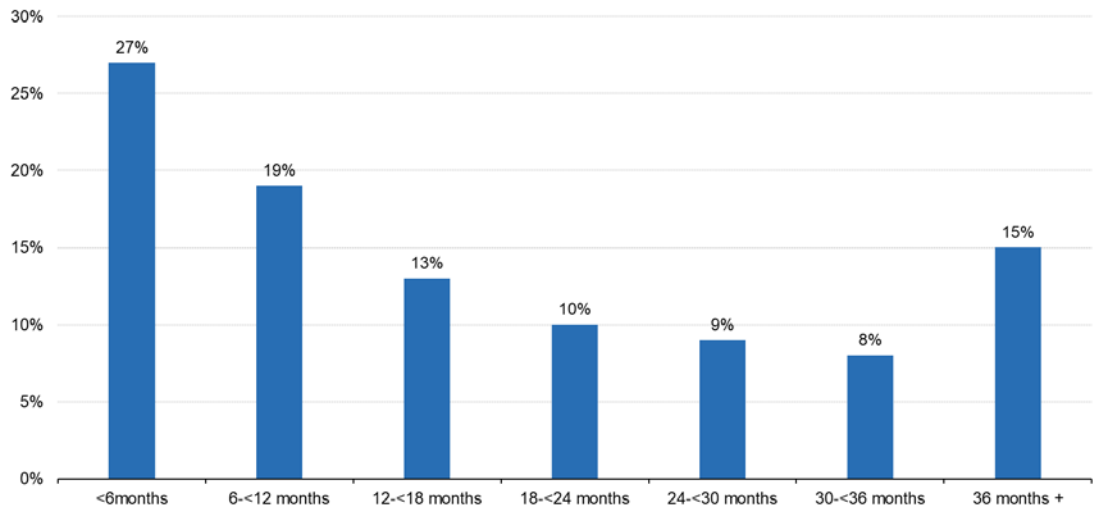
In this section, we provide an overview of the migration patterns of the 2014 cohort. We describe when migration occurred, the most common destinations for migrants to leave the Netherlands for, and the prevalence of return migration.

Figure 4.1 provides an overview of the period of time that passed between graduation and migration for graduates from the 2014 cohort. The most popular time for graduates to leave the Netherlands to go abroad is in the 6 months after graduation. In fact, just under half of all 2014 graduates, who migrated in 2014, did so in the twelve-month period after graduation. For the 2014 cohort, we can infer that the majority of graduates from that class left in the two years 2014-15 (about 73%).

[3] Definitions relating to migration as used by Eurostat include the following:

- Migration refers to the number of migrants, people changing their residence to or from a given area (usually a country) during a given time period (usually one year).
- Immigration is the action by which a person establishes his or her usual residence in the territory of a Member State for a period that is, or is expected to be, of at least 12 months, having previously been usually resident in another Member State or a third country (Regulation (EC) No 862/2007 on Migration and international protection).
- Immigrant is a person undertaking an immigration.
- Emigration is the action by which a person, having previously been usually resident in the territory of a Member State, ceases to have his or her usual residence in that Member State for a period that is, or is expected to be, of at least 12 months (Regulation (EC) No 862/2007 on Migration and international protection).
- Emigrant is a person undertaking an emigration

Figure 4.1: Period of time for 2014 graduates to migrate from the Netherlands following graduation



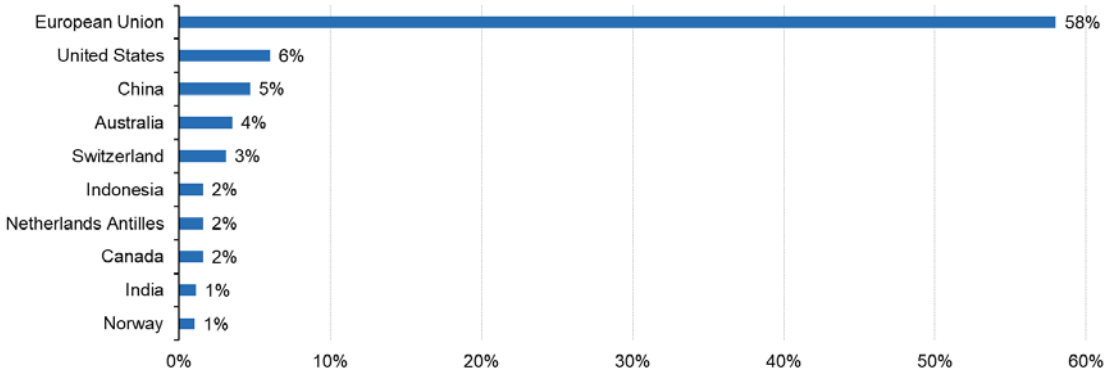
Source: LinkedIn

This characteristic is underlined when we look at the median time between graduation and migration, which is 16 months, though this varies according to the institution in which graduates have studied. While the median time between graduation and migration for hogeschool graduates is 17 months (average 20.5), for universiteit graduates it is 13 months (average 17.5). This suggests that hogeschool graduates are less likely to leave the Netherlands shortly after graduation. This becomes interesting in light of analysis later on in this chapter, when we look at the outcomes that are most closely associated with migration for these groups.

Figure 4.2 provides an overview of the first destination countries for graduates from the 2014 cohort who migrated from the Netherlands. Most of the graduates from the Netherlands in the 2014 cohort that migrated (70%) initially headed for countries in the European Economic Area and North America. By far, another European Union country was the most popular destination for these graduates.

Among the EU countries, the most popular destination was Germany (15% of all migrating graduates) followed by the UK (13%). Belgium (8%) is the third most popular country destination, followed by the United States, which is the most popular non-European destination (6%).

Figure 4.2: Destination of first migration for 2014 graduates

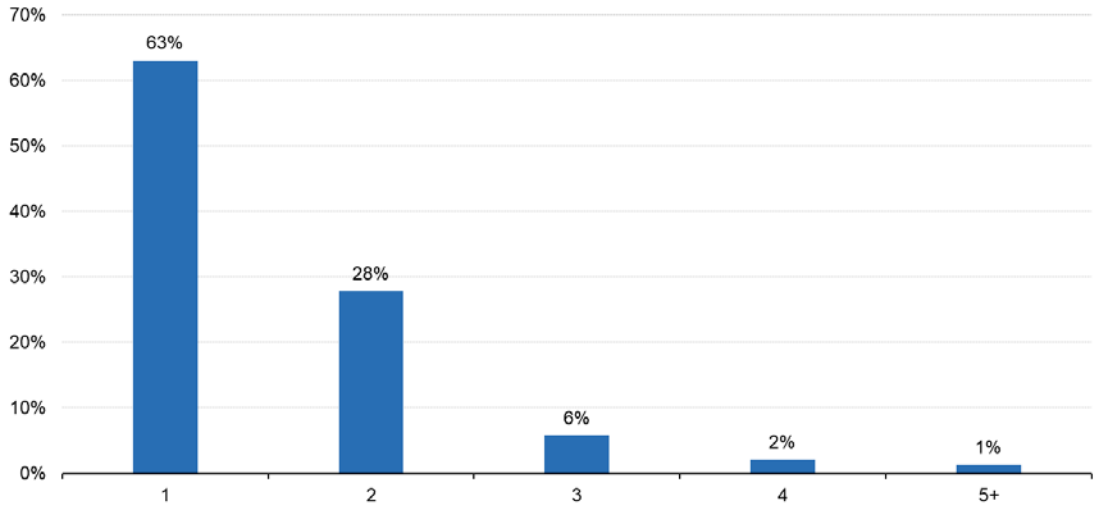


Source: LinkedIn

One policy question of interest is whether those who migrate return to their host country. While we know that the insights presented in this report do not represent nationality, we can use it as an indicator of how many members returned to the Netherlands, if they were educated there. It is possible that there are also those students who are not Dutch nationals who graduated from an institution in the Netherlands and then returned to their home country. For the purposes of this analysis, to look at the prevalence of return migration, we regard the Netherlands (given that this is where education was received) as the home country. The analysis shows that just over one in 5 members who graduated from Dutch institutions in 2014, and who went abroad, returned to the Netherlands at some point in the following four years. The analysis found that for these returning migrants, the average length of their stay abroad was 14 months. There is no significant difference for this time period by institutional background. The share of migrants who returned to the Netherlands is roughly the same both for migrants who gained employment and for migrants who pursued further education (26% and 25% respectively).

For those who move abroad, there is also the possibility that they will move to multiple locations rather than just one. Figure 4.3 presents the number of international moves made by migrants from the 2014 graduating class. As can be seen, the majority (63%) only make one international move in the four-year window after graduation, though just over a quarter make two international moves (not including the return to the Netherlands). To make three or more international moves is relatively rare and fewer than one in ten of this group do so.

Figure 4.3: Number of international moves made by 2014 graduates who left the Netherlands



Source: LinkedIn

4.3 Outcomes

In this section, we examine the outcomes profile of the graduates from Dutch institutions who migrated following graduation. We start by looking at the general outcome profile of these graduates who migrate. We then examine the characteristics of those migrants where their first outcome following migration is education versus those whose first outcome is employment.

4.3.1 OVERVIEW - TIME BETWEEN GRADUATION AND MIGRATION AND NUMBER OF OUTCOMES

Looking specifically at those graduates who were included in the 2014 cohort for the analysis presented in chapter 3 provides us with a useful context against which to compare those members who migrated from the Netherlands. Looking at the 2014 cohort who migrated, we notice that the

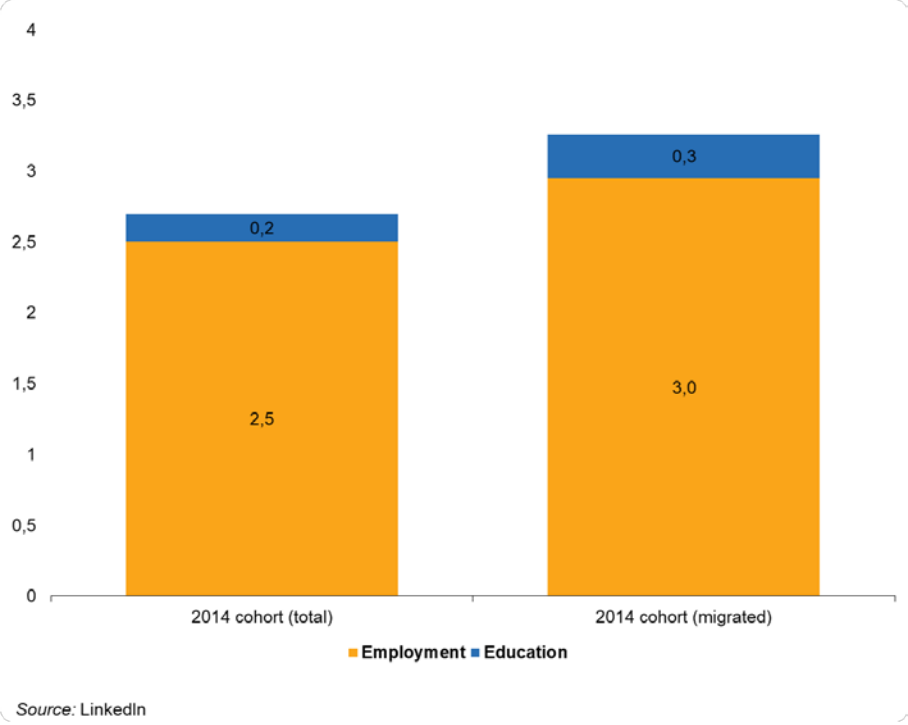
majority of this cohort had been educated in universiteit institutions (65% of all graduates who migrated). This contrasts with the overall cohort where the majority of those graduates received their degrees from hogeschool.

When we look at the first outcome embarked upon by those members of the 2014 cohort who migrated, we observe that for 85%, employment was the first outcome. This suggests that for the majority of those who migrated, their primary motivation would seem to be gaining work. For those whose first opportunity after migrating was employment, the median time between graduation and migration was 11 months, although this varies by educational background.

The median period of time between migration and graduation for those whose first post-migration outcome is employment is longer for hogeschool graduates (13 months). For members who graduated from universiteit, the equivalent period is 10 months. Where the first employment outcome is an internship, the same period of time is considerably longer (10 months) than that of universiteit graduates (5 months). However, the period of time between graduation and migration for hogeschool graduates whose first post-migration outcome is education (median 7 months) is lower than universiteit students (8 months).

Figure 4.4 exhibits the number of outcomes for those in the 2014 cohort and those in the 2014 cohort who migrated. In general, those members who migrate following graduation have a higher number of outcomes, in terms of employment and further education. For example, overall members who graduated in 2014 attained on average 2.7 employment or further education opportunities, but those who migrated attained 3.3 outcomes. Education outcomes feature more prominently for the migrant group than employment: 7% of those the outcomes attained by the 2014 cohort were in education, as compared to 9% among those who migrated.

Figure 4.4: Number of outcomes between total 2014 cohort and 2014 cohort who migrated



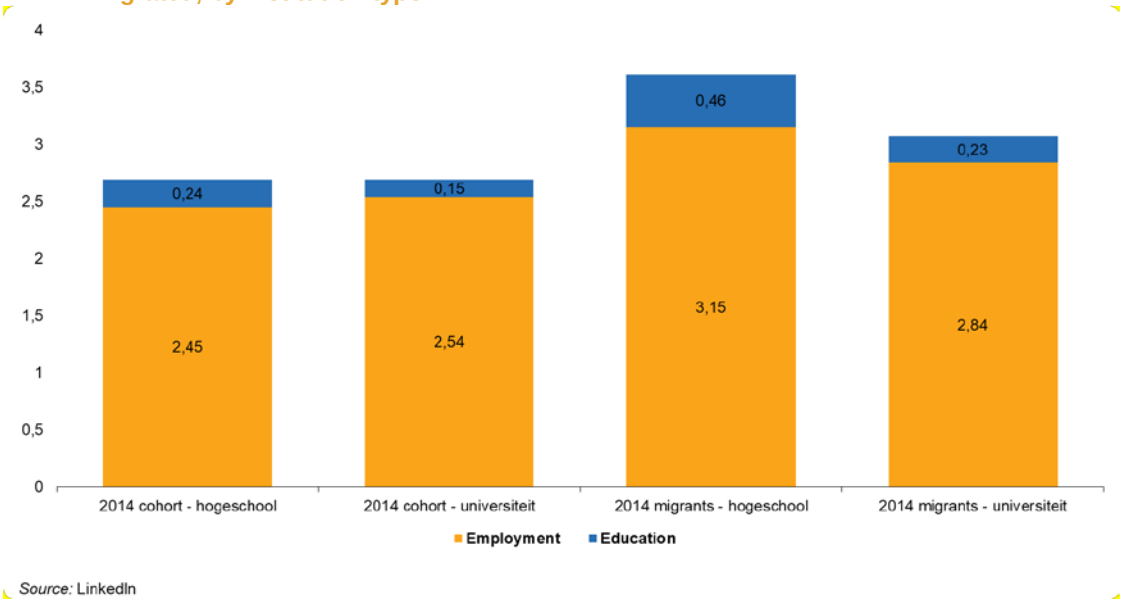
Source: LinkedIn

There are also some interesting differences in the number of outcomes between migrating members based on their institutional backgrounds. Figure 4.5 showcases these differences. While there is no difference in the average number of employment outcomes and educational outcomes enjoyed by hogeschool and universiteit graduates (2.69) across the entire 2014 cohort, a marked difference is

evident when we look at those who migrated. Within four years of graduating, members who attended hogeschool and who then migrated attained an average of 3.61 employment or further education outcomes while universiteit graduates attained 3.07.

While all graduates who migrate attain a significantly higher number of employment outcomes in the four years after graduation, this difference is marked for hogeschool graduates who attain an average 3.15 outcomes in employment compared to 2.45 for those who do not migrate. The pattern is similar for universiteit graduates, albeit not as marked - an average of 2.84 employment outcomes compared to 2.54 for those who do not migrate.

Figure 4.5: Number of outcomes between total 2014 cohort and 2014 cohort who migrated, by institution type



Source: LinkedIn

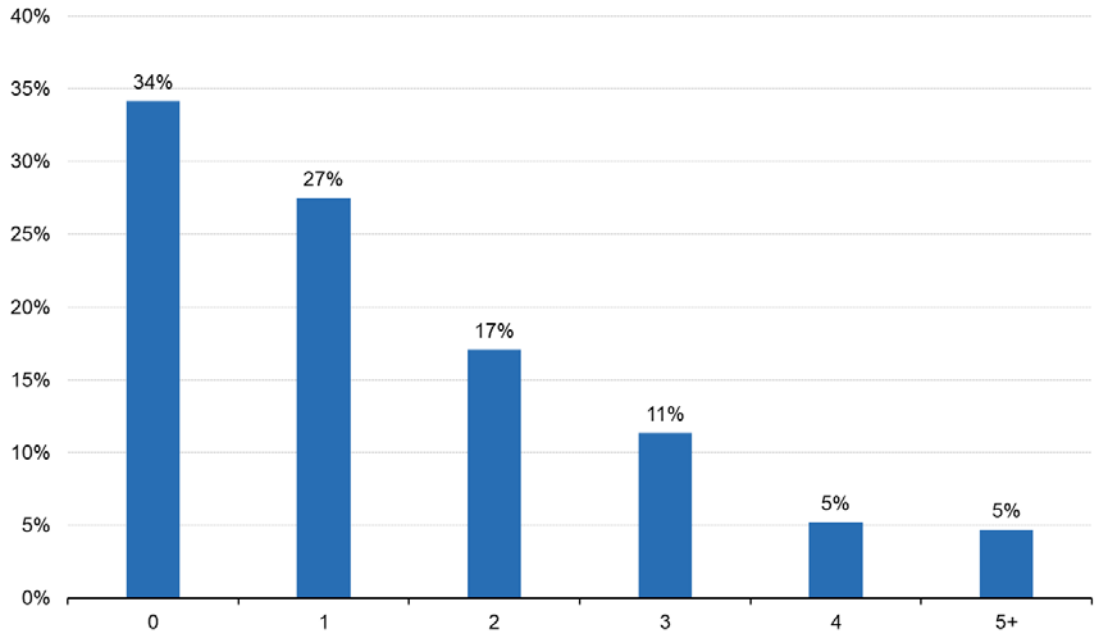
4.3.2 EDUCATION OUTCOMES

Detailed analysis of the education outcomes taken up by graduates who migrate is inhibited by the small number of members who fall in this category. However, there are some characteristics that are worth discussing. The analysis shows that those migrants whose first outcome after migrating were education, headed in the majority to the UK, Germany, Belgium, France and the USA. This pattern is similar to that of those in the 2014 cohort who migrated. The median duration of the first post-migration education outcome is 24 months.

There is, however, a significant difference in the time spent abroad studying among graduates of different institution types. The median duration of the first post-migration education experience for hogeschool graduates was 12 months, while for graduates of universiteit it was 27 months. This might suggest that these education outcomes are likely to be masters or PhD programmes. When we compare these figures with those of the general cohort who migrated, we see that the average duration of the first experience after migrating lasts for about 11 months.

Nonetheless, about a quarter (25%) of all 2014 graduates whose first outcome abroad is education, return to the Netherlands after having been abroad for 16 months on average. However, as figure 4.6 shows, a large proportion of these graduates (44%) went on to have 1 or 2 further outcomes, and 38% of those whose first post-migration outcome was education went on to have 2 or more further outcomes in the remainder of the four-year window. About a third (34%) of those graduates whose first opportunity after migrating was education did not have further outcomes.

Figure 4.6 Number of further outcomes following post-migration education outcome



Source: LinkedIn

4.3.3 EMPLOYMENT OUTCOMES

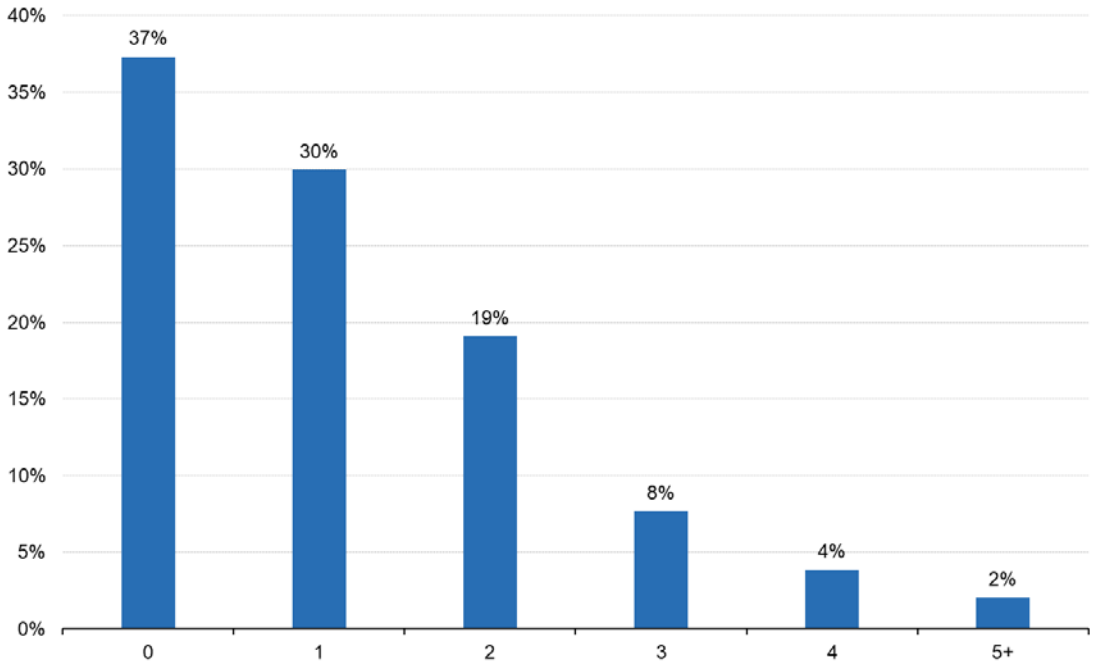
By far, the larger segment of those members who migrated are those who have attained an employment outcome after migration. As a result, the members of this group share a number of characteristics with the whole migrating group. For example, the most common destinations for migrating members. In terms of the first destination they go to after graduation, there is little difference with the general group. The UK, Germany, Belgium, China and the USA together host a significant proportion of graduate migrants whose first opportunity after migrating was in employment, albeit under 50%.

The median duration for graduate migrants whose first outcome abroad is a job is 11 months, although this differs according to the type of institution in which they had studied. For graduates of hogeschool the first employment experience abroad is shorter than their universiteit counterparts. The median duration for hogeschool graduates whose first outcome abroad is employment is 9 months, while the equivalent figure for universiteit graduates is 11 months.

Just over a quarter (26%) of all 2014 migrants who secured employment as their first opportunity after migrating returned to the Netherlands in the four-year period after graduating, with an average of 14.6 months passing between first leaving the Netherlands and returning back. Just under three-quarters of those 2014 graduates did not return to the Netherlands after leaving after graduation. While LinkedIn does not have information on the nationality of these graduates, it is plausible to suggest that there may be graduates in that group who migrated to the Netherlands for study and then returned to their home country.

Another feature of interest is the trajectory of those graduates who do go on to have further outcomes after they graduate and migrate. Figure 4.7 shows the number of additional outcomes attained by graduates who leave the Netherlands and whose first post-migration outcome is employment. The majority of those graduates who migrate and whose first outcome is employment go on to have further outcomes (63%) as shown below. Almost half (49%) whose first experience after migrating was employment went on to have 1 or 2 additional outcomes. Nonetheless, over a third (37%) did not have any further outcomes.

Figure 4.7 Number of further outcomes following post-migration employment outcome



Source: LinkedIn

4.4 Concluding remarks

In this chapter of the report, we explored the career outcomes of graduates of Dutch institutions who migrated following their graduation. The following are the main findings:

- About 7% of those members who graduated from Dutch institutions in 2014 left the Netherlands to go abroad to pursue an employment or education outcome.
- These members were most likely to migrate in the 12 months after graduation and were more likely to have attended a universiteit than a hogeschool.
- Over half of the members who migrated went to another European Union Member State as their first destination following graduation.
- Members who migrated to another country following graduation are more likely to report a greater number of outcomes compared to the general cohort of 2014 graduates.
- Over 85% of those members who migrated to another country following graduation commenced an employment outcome on arrival.
- Almost a quarter (22%) of those members who went to another country following graduation returned to the Netherlands within four years of graduating.
- Over a quarter (26%) of those who gained employment as their first opportunity after migrating returned to the Netherlands during this four-year period.

5 Graduate skills

5.1 Introduction and methodology

In this chapter of the report, we examine the skills listed and inferred by members who have graduated from Dutch institutions and determine whether patterns exist among graduates on the basis of the institution attended.

LinkedIn is able to provide skills data at a very granular level, on the basis that skills are reported on a member's profile. LinkedIn records skills in a number of places. For this analysis, we looked at skills as self-reported in the skills section of the profile or text in other sections of the LinkedIn profile from which inferred skills are extracted. There are over 50,000 standardised skills in LinkedIn's taxonomy, which in turn are clustered into over 200 individual skill groups.

For the purposes of this section of the report, we look at the overall cohort of members who graduated from Dutch institutions between 2010 and 2014 and include all skills listed on the profile by members as well as those inferred from the text in other sections of the profile.

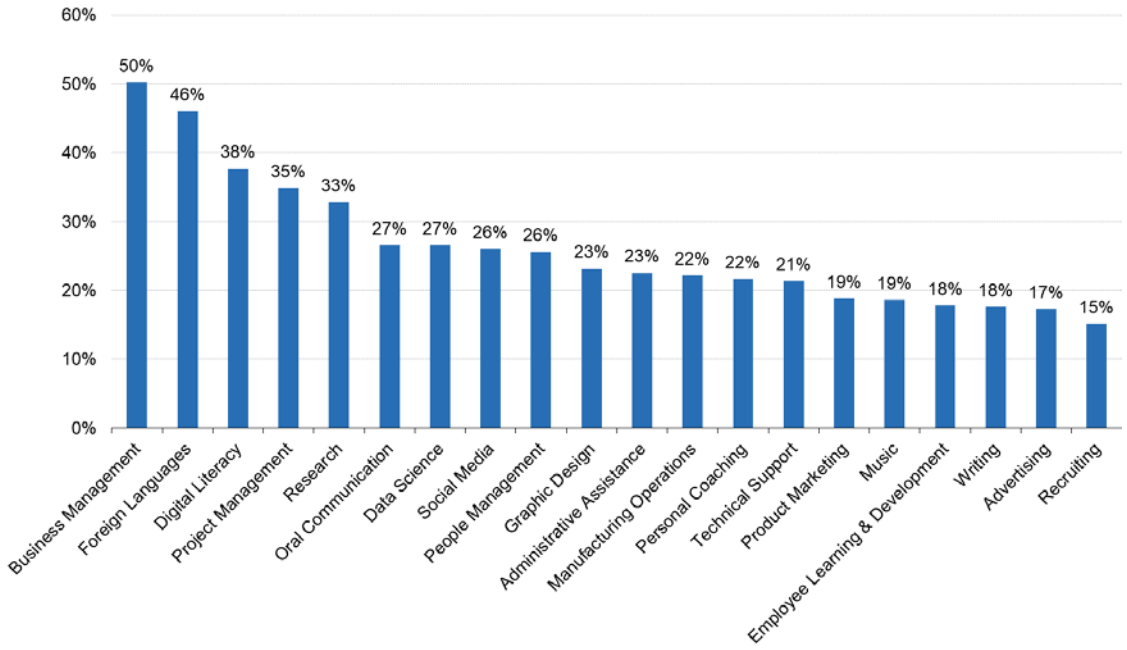
We examined the skills profiles of members, both with regard to the skills most commonly listed by graduates from Dutch institutions, but also to the skills that are more likely to be represented among a certain group of graduates compared with the others. Section 5.2 describes the skills most commonly listed by graduates of all Dutch institutions and looks at patterns across institution types. Section 5.3 examines the skills that feature more prominently among one cohort group relative to others. Section 5.4 concludes the chapter.

5.2 Top skills listed on profile, by outcomes

In this section, we look at those skills that feature most commonly on the profiles of members who graduated from Dutch institutions between 2010 and 2014. Figure 5.1 describes the skill clusters that feature most commonly among members in our cohort[4]. We have identified a significant variety in the skills cited by graduates from the proportion of those listing at least one skill in a named cluster. The most common skill cluster listed is Business Management, with almost half of the members in this cohort listing at least one Business Management skill such as Team Planning, Business Management or Strategic Planning. This is followed by Foreign Languages (a cluster that includes Dutch as well as English) and then Digital Literacy (a cluster that includes foundational IT skills such as Microsoft Office Suite tools).

[4] For inclusion, a member must list at least one skill in the particular skill cluster.

Figure 5.1 Proportion of graduates, listing at least one skill in a named cluster



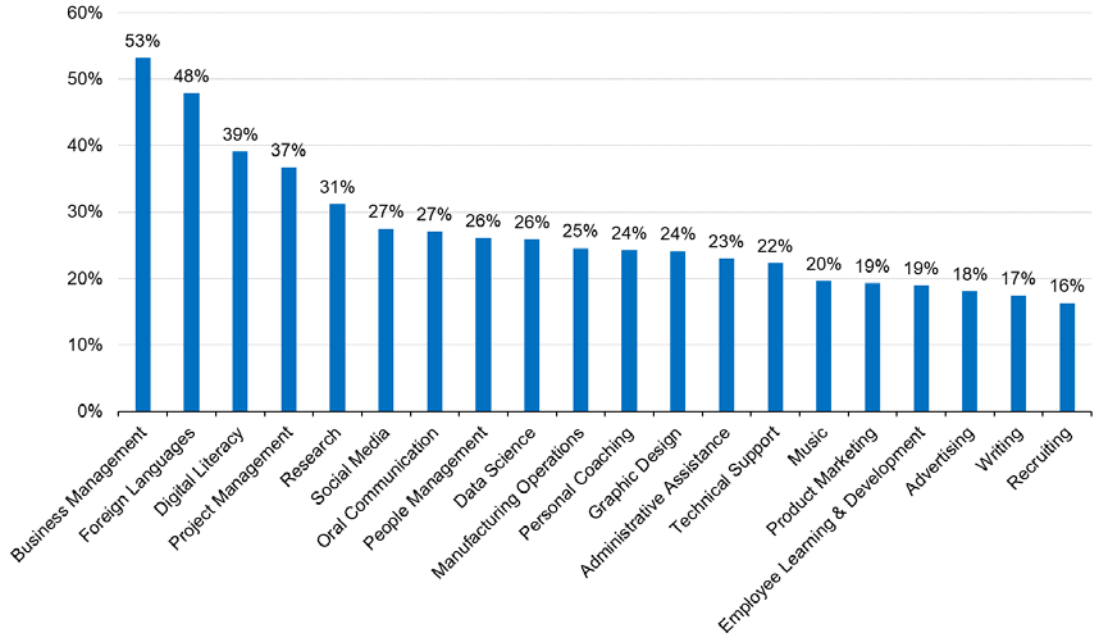
Source: LinkedIn

Those most common skills among graduates are business knowledge skills, the ability to use standard digital tools and proficiency in languages. It is also worth highlighting that Project Management and Research both feature in the top five skill clusters for graduates of Dutch institutions. This suggests a competence being developed in planning and research.

When the distinction is made in the cohort between those members whose first outcome after graduating is employment, and those for whom it is education, there is no discernible difference in the top skills listed by each cohort. This suggests that the skills that feature among members who graduate from these institutions are foundational in nature and may contribute to the resilience of the graduates as they enter the labour market. For both groups, Business Management and Foreign Languages are the most popular skill clusters in which member listed a skill.

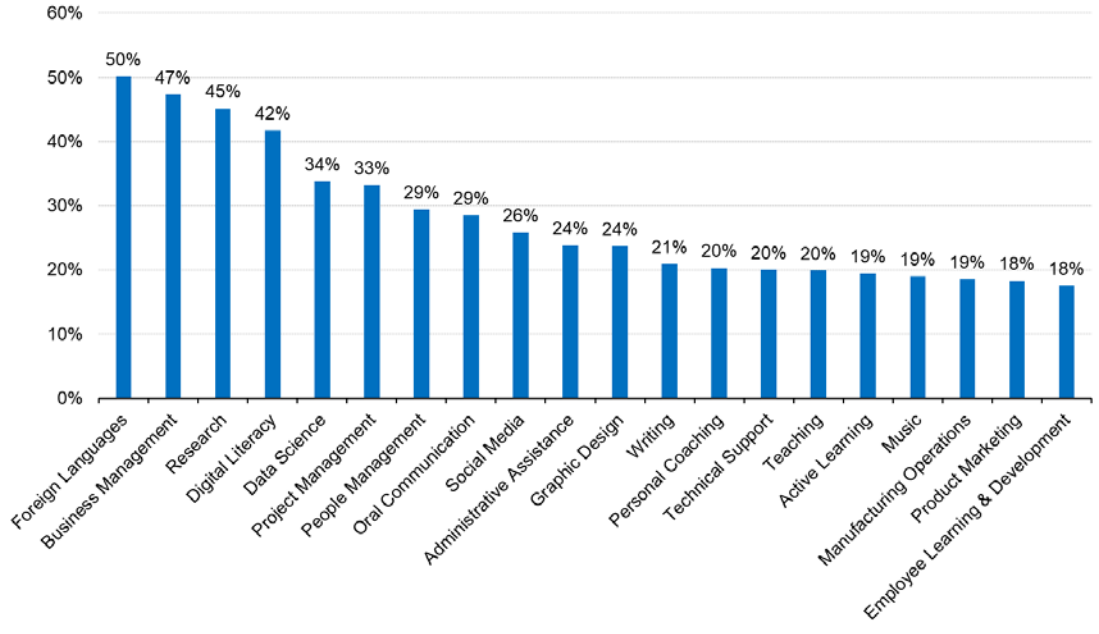
However, there is a distinctive pattern in the ordering of the skill clusters featured by members depending on the first outcome that is listed. As figure 5.2 demonstrates, the most common skills listed among members whose first outcome after graduating is employment are quite similar to those of the general cohort. However, figure 5.3 shows that those whose first outcome after graduation is education are more likely to feature skills in Data Science, Research, People Management and Writing. By way of illustration (comparing information from figures 5.2 and 5.3), we see that Data Science is listed by more members whose first outcome is education than by those whose first outcome is employment (34% vs 26%). Similarly, Research skills are also more prominent among those with education as a first outcome (45% vs 31%).

Figure 5.2 Proportion of graduates, listing at least one skill in named cluster (where the first outcome is employment)



Source: LinkedIn

Figure 5.3 Proportion of graduates, listing at least one skill in named cluster (where the first outcome is education)



Source: LinkedIn

While the first outcome of graduates can surface some interesting insight with regard to the skills listed, there is also interest in examining the institutional background. This can provide insight for policy-makers on the skills profile developed by graduates, depending on their educational pathway.

Figure 5.4 below describes members in our cohort whose degree comes from a hogeschool specifically. We see that the top-ranked skills remain the same, i.e. Business Management, Foreign Languages, Digital Literacy and Project Management. However, when we compare the proportion who list a skill in each cluster by educational background, there are some significant patterns.

Figure 5.4 Top skills for hogeschool graduates, compared with universiteit graduates

Source: LinkedIn

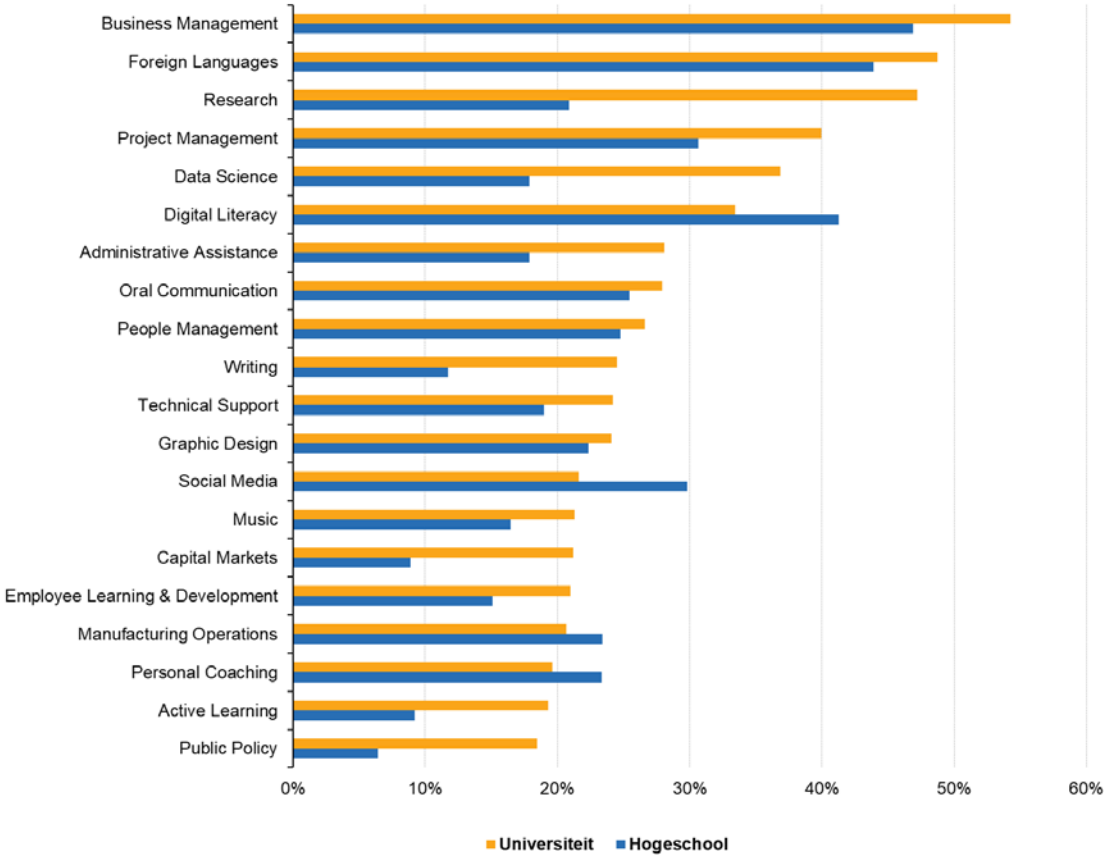
For example, our analysis suggests that hogeschool graduates are more likely to list skills in Digital Literacy, Social Media, Manufacturing Operations and Product Marketing compared to their universiteit peers. Patterns such as this are of interest to policymakers and may provide the basis for further study in future research projects. However, there may be some merit in examining whether or not the vocational nature of institutions is a driver in determining the skills members list on their profile.

Another consideration, which is worth taking into account, is that not all members may have the equal propensity to list skills on their profile. For example, for someone working in manufacturing, they may feel the need to list proficiency in email software (as it is not assumed to be part of one's day to day tasks). Conversely, someone working in sales may not feel the need to list it as one might assume this is a key responsibility of their role. While this effect should be mitigated by the sources of skills data, it should be kept in mind.

While hogeschool graduates do have some distinct patterns with regard to top skills being listed, there is little difference in the ranking when we only take into account those graduates whose first outcome is employment. However, for those hogeschool graduates whose first outcome is education, they are more likely to list skills more commonly featured by universiteit graduates, such as skills in research.

Figure 5.5 repeats the above analysis, but from the angle of the universiteit graduates.

Figure 5.5 Top skills for universiteit graduates, compared with hogeschool graduates



Source: LinkedIn

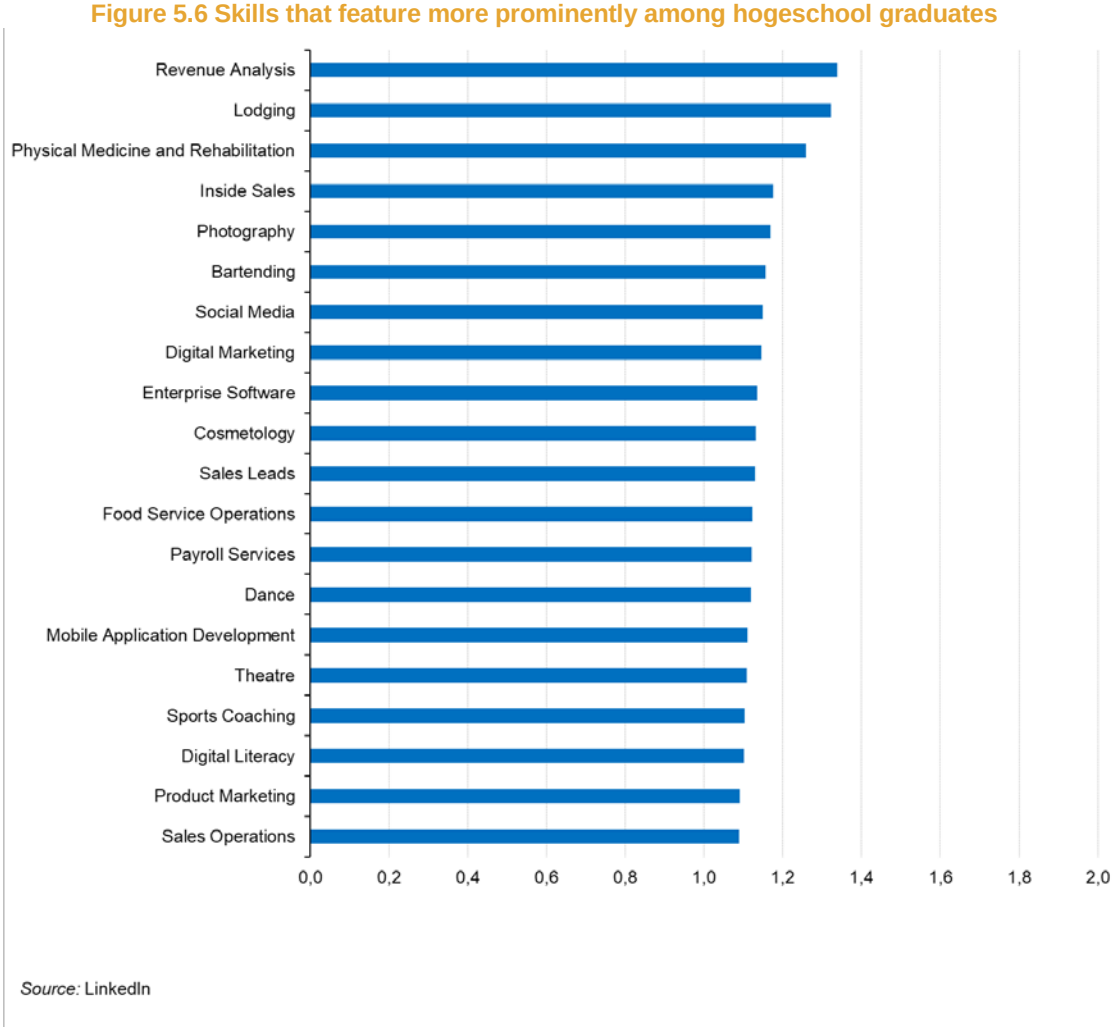
Here we can establish that there are skills that are listed by a higher proportion of universiteit graduates. Of the top 20 skill clusters for universiteit graduates, there are only four clusters that are listed by a larger proportion of hogeschool graduates. In some cases, there is a notable difference between the two groups. The gaps are greatest between those who list Research, Data Science, Writing, Capital Markets and Public Policy. It is also notable that some of those skill clusters that feature more commonly among universiteit graduates are more aligned to subject matter expertise than in the case of hogeschool graduates.

While universiteit graduates demonstrate some patterns with regard to top skills being listed, there is little difference in the ranking when we only take account of those graduates whose first outcome is employment. However, as with the general cohort, these members are more likely to feature Data Science and Research than those who have been educated in a hogeschool. When the first outcome following graduation is education, there is a clear shift in the overall ranking. Skills in Research are most commonly featured, followed by Digital Literacy.

5.3 Skills which feature more prominently

While a comparison of the skills most commonly listed by graduates of Dutch institutions gives us an idea of the volume of the skills signalled by members, comparing which skills feature more prominently is a good indicator of what skills are specialised to certain segments. In order to identify such skills, we identify those skills that are more likely to appear among members in a certain segment relative to the overall cohort.

Figure 5.6 Skills that feature more prominently among hogeschool graduates



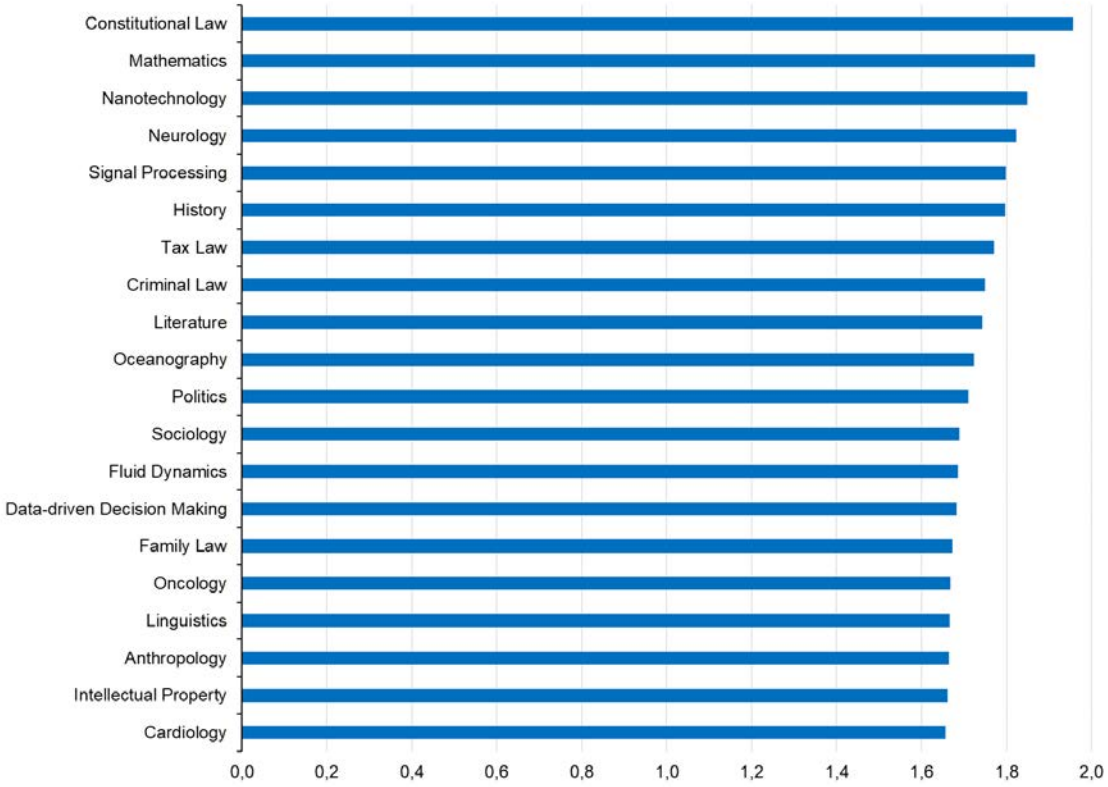
Source: LinkedIn

Figure 5.6 displays those skills that are more likely to feature among the hogeschool graduates compared with the overall population. A score of 1 (on the X-axis) suggests that the proportion of members in a certain segment that lists a skill is equal to the proportion of members who list that skill in the general cohort. Where this score is greater than 1, that skill is more likely to be prevalent in the segment of interest.

A variety of skills feature more prominently among hogeschool graduates, including Revenue Analysis, Lodging, Physical Medicine and Rehabilitation, Inside Sales and Photography. These skills tend to be more operations-focused, which might suggest something about the work-focused nature of the programmes offered by a hogeschool. When the first outcome after graduation is identified, other interesting patterns emerge. For those hogeschool graduates whose first outcome is employment, the pattern in figure 5.6 is largely the same. However, where that first outcome is education, more advanced skills like Aircraft Management and Enterprise Software feature more prominently.

Figure 5.7 shows the skills that feature more prominently among universiteit graduates. Here the skills more likely to feature compared with the general cohort include Mathematics, Nanotechnology, Neurology and Signal Processing. Universiteit graduates whose first outcome after graduation is employment are more likely to feature skills such as Mathematics and Signal Processing. Where education is the first outcome, we see specialist fields of study emerge such as Nanotechnology, Urology and Neurology. The pattern here is very evident - skills that are high-value and research-focused are more evident among universiteit graduates.

Figure 5.7 Skills that feature more prominently among universiteit graduates



Source: LinkedIn

5.4 Concluding remarks

In this chapter of the report, we explored the skills profiles of graduates of Dutch institutions. The following are the main findings:

- The profiles of members in this cohort of Dutch graduates feature a variety of skills. The most common skill groups across all segments are Business Management, Foreign Languages, Digital Literacy, Project Management and Research.
- The top five skills groups listed by hogeschool graduates are Business Management, Foreign Languages, Digital Literacy, Project Management and Social Media.
- Universiteit graduates are more likely than their hogeschool peers to emphasise nearly every skill group, except for Digital Literacy, Social Media, Manufacturing, and Personal Coaching. Among the most prominent skill groups, universiteit graduates are more likely to list skills in Research, Data Science, Writing, Capital Markets, Active Learning and Public Policy.
- The skills unique to hogeschool graduates tend to be more work- and operations-focused, such as Revenue Analysis, Lodging, Physical Medicine and Inside Sales.
- The skills unique to universiteit graduates tend to be more research-focused and include skills such as Mathematics, Nanotechnology, Neurology and Signal Processing.

3 Methodology and Validation

6 Introduction and methodology

The purpose of this part of the report is to provide methodological background for the report, as well as an overview of the robustness checks used and validation undertaken.

This chapter gives an overview of the methodological steps undertaken. chapter 7 then gives background on the robustness checks taken by LinkedIn, in collaboration with CBS and Eurostat, to ensure the analysis was thorough and robust. chapter 8 provides an overview of the validation study undertaken by CBS, which attempts to compare LinkedIn's data and metrics to other government administrative and survey data.

The methodology used in this analysis is set out in this section. It employed the following three steps to identify and quantify the early career outcomes of graduates from Dutch higher education institutions:

1. LinkedIn identified members who completed their first Bachelor-level degree from a hogeschool or their first Masters-level degree from a universiteit between 2010 and 2014.
2. LinkedIn mapped the institutions identified by these graduates to the European Tertiary Education Register (ETER) database of higher education institutions in Europe.
3. LinkedIn identified all new work and education experiences commenced during the 1- and 4-year periods starting from the date on which each graduate completed their degree. Each outcome was classified into one of three categories: work experience, an internship, or further education.

This data provided the basis for the analysis of outcomes. This is the analysis for which we attempt to compare the findings based on LinkedIn's data to those based on official Dutch statistics in chapter 8. In addition to this, LinkedIn then undertook analysis of this cohort in two additional areas where LinkedIn's data can provide more unique insight:

- *Migration* - Determining whether a member changed location in the headline summary to another country. We employed the standard approach used by LinkedIn in researching international migration.
- *Skills* - Determining what skills features on a member's profile, LinkedIn is able to draw inferences about the skills that this member possesses. Skills can be listed by the member on their profile under the "Skills" section or can be inferred from text on other sections of the member's profile.

7 Research design

7.1 Introduction

In this section, we outline the preparatory work and robustness checks undertaken by LinkedIn in advance of embarking on the study. This body of work was done as part of a series of workshops including representatives from the LinkedIn Economic Graph team, CBS and Eurostat. This chapter describes these tasks and the various considerations made when framing the analysis and which ultimately fed into the research design. This chapter does not describe the results of the validation study undertaken by CBS - this is detailed in chapter 8. However, it is important to note that the validation process was a collaborative effort and was conducted in tandem by all parties to the research. In this instance, 'we' refers to all the parties to the research.

Section 7.2 outlines the robustness checks we employed before embarking on the research. Section 7.3 highlights some of the other considerations taken into account when designing the research. Section 7.4 gives further information on the research design, and the technical decisions taken in framing the analysis.

7.2 LinkedIn robustness checks

In order to facilitate transparent research design as part of the series of research workshops, we undertook a number of robustness checks to validate our data and ensure it corresponds robustly to existing European data classifications. Additionally, the aim of these workshops was to demonstrate that LinkedIn data was able to present a detailed picture of members in the Netherlands, on various dimensions. A third objective of these workshops was to assist in identifying the necessary parameters for the study design.

To achieve this we started by mapping LinkedIn's data against a series of established taxonomies according to the geographical, industrial, occupational and educational dimensions of the dataset as follows:

- We first conducted the geographical validation in Utrecht, a province in the centre of the Netherlands that hosts several higher education institutions and includes a large population of students and graduates. This involved matching the postcodes of members in our sample with the corresponding classification from the nomenclature of territorial units for statistics (NUTS), the EU's hierarchical system for dividing its territory in order to harmonise statistics.
- We mapped the LinkedIn taxonomy of industries to that of the statistical classification of economic activities in the European Community (NACE), which provides the framework for gathering and presenting data according to economic activity within the European Union. In order to validate our industry classification, we mapped LinkedIn's 147 industry identifiers to the 21 NACE categories and industry levels. For example, we would map the LinkedIn industry "Financial Services" to the NACE category "Financial and Insurance activities". The purpose of this exercise was to enable high-level comparability between LinkedIn data and official statistics (given the difficulty in categorising official statistics according to the LinkedIn taxonomy).
- We mapped the LinkedIn taxonomy of occupations to the taxonomy of the International Standard Classification of Occupations (ISCO), a leading international classification established by the International Labour Organisation (ILO), that provides a tool for organising jobs into a clearly defined set of groups. To validate occupational classifications in our data, we mapped LinkedIn supertitles to major and sub-major groups in ISCO 2008. For example, we would map the LinkedIn function group "Engineering" to the ISCO major

group “Professionals”. We undertook this exercise to investigate the level of representativeness of various occupational groups and whether or not skew was prevalent.

- We mapped the LinkedIn taxonomy of educational degrees to that of the International Standard Classification of Education (ISCED), the international classification for organising education programmes and related qualifications by levels and fields that are implemented in all EU data collections. To validate the educational classifications in our data, we mapped 100+ degree types to the framework of ISCED 2011. This was to determine an understanding of any possible biases in the LinkedIn education data. The results of this exercise are further discussed in chapter 8.

Following the above steps, we identified the following matters for consideration during the analysis:

- Graduates working in information and communication are over-represented among LinkedIn graduates;
- Professional occupations are over-represented in the LinkedIn data. However, given the target cohort is focused on graduates, this bias should not cause massive issues for the analysis;
- The membership represented on LinkedIn is more likely to have higher levels of education, and as such, will be more similar to the graduate population than the general population;
- Unemployment may not be captured accurately on LinkedIn.

In presenting the final research, LinkedIn employed its own taxonomies and classifications. This was done to leverage the single global dataset built by LinkedIn's trained taxonomists and data science teams.

7.3 Other considerations

There were a number of other considerations which we took into account when designing the research. These considerations were discussed at the various research workshops held. Resolutions, where possible, were identified and are also detailed below. In the main, these considerations resulted in the application of certain filters to ensure that the sample of members chosen for analysis was as robust a dataset as possible. Such considerations included:

- *Overall level of representativeness* - We considered how representative the LinkedIn dataset is of the overall Dutch labour force. We determined that LinkedIn’s data was well suited to observe the characteristics of graduates, given the overall high profile completion and high data quality among this group. This is discussed further in chapter 8.
- *Characteristics of graduates* - We considered how well the characteristics of graduates are represented in the LinkedIn data and whether some groups – distinguished by various characteristics such as fields of study, migration mobility, and graduates with and without a job – could be under- or over-represented. This observation confirmed the need to only include graduates in the analysis who had employment and education outcomes listed after graduation. A comparison of the LinkedIn population of graduates to Dutch official statistics is discussed in chapter 8.
- *Accuracy of dates for employment* - We considered the fact that some LinkedIn members do not list a start or end date on their employment and that there may be a lag in updating the end date if a member becomes unemployed. A consequence of this was that we decided to apply a strict filter for the inclusion of employment outcomes, requiring a start date be listed. This was designed to ensure that we included as robust data as possible and to minimise the impact of the lack of reflection of unemployment.
- *Lack of benchmark data on migration and skills* - We also observed that there was no comparable dataset in the Dutch register that could be used to compare skills information

and mobility information. This meant that we were unable to validate the findings on mobility and skills specifically against an official dataset. These considerations were also highlighted for inclusion in the validation study described in chapter 8.

7.4 Technical definitions

As noted in section 7.2, LinkedIn used its own taxonomies and classifications when doing the research itself. A breakdown of the taxonomies used for industries and functions is presented in the Appendix. This was because it was more efficient to do so and because the data has been assigned to those taxonomies by trained taxonomists already.

In moving forward with the research, this is a description of the steps taken to analyse the broad range of variables. These variables were used to characterise the education, employment, and skills and migration experiences of Dutch graduates. The description of each of the variables is as follows:

- In terms of **education,** we considered the number of graduates of Dutch higher education institutions in the period examined, and segments of this cohort by year of graduation, higher education institution, and subsequent education and level. There were some minor differences between the definitions used by LinkedIn and by CBS. These are detailed further in Section 9.2.
- In order to examine **employment**, we identified segments of the cohort following year of graduation by the availability of information on employment, job title, and industry.
    - LinkedIn analysed the industry in which graduates found employment, and the role or occupation they took up.
    - CBS analysed employment outcomes, asking how often graduates move into employment upon completing their degree, and how many have a job one year later.
    - Both LinkedIn and CBS examined how long it takes graduates to secure their first job after completing their degrees, and whether patterns vary by the type of institution they studied at – hogeschool vs universiteit. We also looked in detail at how often graduates pursue education beyond Bachelor-level upon completing their degree, and the characteristics of further study such as the period they spend studying.
- Our report also looked at **skills** and **migration**, identifying segments of the cohort by the availability of skills, and whether a member migrated.
    - LinkedIn scrutinised the relationship between the opportunities enjoyed by graduates and their geographic mobility, asking how often they leave the Netherlands to pursue further education or employment. We sought to identify the characteristics of graduates who migrate to pursue further education, asking how long they remained outside the Netherlands and whether they continued in the same field of study. It was important to identify the time it took migrants between completing a first post-Bachelor degree and entering the labour market and the kind of jobs they gained upon returning to the Netherlands. Similarly, it was valuable to compare these characteristics of migrant graduates with those who remained in the Netherlands in order to pursue further education. We sought to identify the characteristics of graduates who left to work outside the country after completing their first degree, how long they stayed abroad, and what type of employment they were looking for. Equally, we asked what type of employment graduates who had migrated and then returned to the Netherlands were pursuing. Did their attributes differ from graduates who had stayed to work in the country?
    - We examined the relationship between the particular skills listed by members who graduated from Dutch institutions and their employment and educational outcomes.

LinkedIn compared skill profiles based on those outcomes by asking which skills are most prevalent by field of study among members who start working straight after their Bachelor's degree, who wait until they have completed subsequent post-Bachelor education, who go into employment after completing higher professional education (HBO) vocational programmes, or who go abroad after graduation. Our analysis also identified the skills that featured more prominently among certain categories of graduates according to their field of study and experiences such as migration.

8 Validation study

8.1 Introduction

This chapter presents an overview of the validation study conducted by CBS. The purpose of this exercise was to compare the findings from the LinkedIn research and to assess how well they compared against the Dutch education register. Section 8.2 details the steps taken in this project. Section 8.3 provides an overview of the results of the validation.

8.2 Methodology

CBS used previously published results to validate the LinkedIn dataset. In particular, two publications were used. The first publication[5] contains the number of graduates according to student registers from hogescholen and universiteiten. These registrations are available at CBS, and results are yearly published. There are some differences in population and definitions with LinkedIn that make a direct comparison challenging:

- LinkedIn counts the number of graduates per calendar year (January – December), while CBS counts the number of graduates by academic year (September-August).
- In this study, LinkedIn focused on first-time graduates, while the CBS number of graduates included people who graduated more than once.
- LinkedIn counts graduates from all hogescholen and universiteiten, while CBS only counts graduates from institutions financed by the Dutch government. However, the number of graduates in private institutions is small.

This first publication is used to describe the coverage of LinkedIn membership. The coverage is calculated by the number of LinkedIn graduates/number of graduates according to student registrations.

The second publication[6] is the graduates' cohort study, conducted by CBS, based on student registers, combined with job registers. In this cohort study, graduates who don't continue education immediately after graduation, are followed during their early careers. For validation purposes only, LinkedIn also selected only graduates who didn't continue education. Still there are some differences in population and definitions between the two studies:

- In terms of classification, LinkedIn employs its own proprietary taxonomies that reflect the nature of the global platform[7]. For example, for validation purposes, LinkedIn carefully mapped its industry taxonomy to the NACE taxonomy of industry sectors. However, there are inherent differences in these two classification systems that render exact comparisons

[5] http://opendata.cbs.nl/statline/#/CBS/nl/dataset/83894NED/table?ts=1541083200501

[6] https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83812NED/table?ts=1547464025931

[7] More than 70% of LinkedIn members are outside the United States, using the platform in 24 languages, and LinkedIn data science teams are merging and standardizing taxonomies and languages into a single coherent dataset.

difficult.

- In terms of methodology, LinkedIn counts the number of graduates per calendar year (January – December), while CBS counts the number of graduates by academic year (September-August).
- In this study, LinkedIn focused on first-time graduates, while the CBS number of graduates included people who graduated more than once.
- LinkedIn counts graduates from all hogescholen and universiteiten, while CBS only counts graduates from institutions financed by the Dutch government. However, the number of graduates in private institutions is small.
- LinkedIn counts outcomes (employment, education) listed within one year after graduation. CBS looks at outcomes on a specific date (October 1st).
- CBS has no information about employment abroad. Therefore, graduates who emigrated abroad, have been deleted from the analyses. In the LinkedIn results, emigrants are included.
- CBS has no information on skills held by graduates. Therefore, there is no dataset to compare the LinkedIn results on skills.
- When graduates had two outcomes at the same time, employment and education, CBS counted them as following education.

8.3 Results of the validation study

According to the Dutch student registers, about 309,000 hogeschool bachelors and 181,000 universiteit masters graduated between 2010 and 2014. This suggests that the subpopulation of LinkedIn member covers roughly 60% of those who graduated during this five-year period. Below CBS further analyses the LinkedIn subpopulation.

With over 7 million members, the penetration of LinkedIn membership is high in the Netherlands. The first research questions we posed here were:

- The level of representativeness of these LinkedIn members for the Dutch labour force; and
- The effect that this has on the analysis of employment outcomes.

A LinkedIn validation study done in collaboration with the World Bank[8] showed that the average age of LinkedIn members is 5 years younger than the average age of workers in the total labour force in high-income countries. Research from CBS[9] showed that professional social media networks like LinkedIn are far more popular among higher educated people than people with a low or medium education level. By focusing this publication on recent university graduates, LinkedIn focuses on the best-represented group in their data.

[8] Zhu, Tingting Juni; Fritzler, Alan; Orlowski, Jan Alexander Kazimierz. 2018. World Bank Group-LinkedIn Data Insights : Jobs, Skills and Migration Trends Methodology and Validation Results (English). Washington, D.C. : World Bank Group.

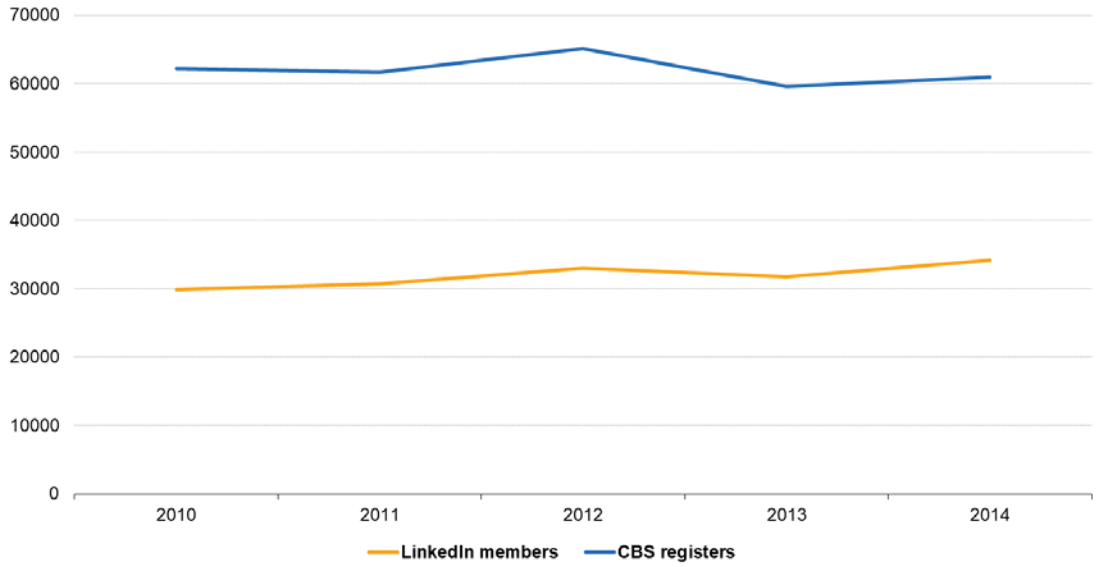
[9] CBS (2018). ICT, kennis en economie 2018. Den Haag, Heerlen.

CBS has been monitoring the progress of graduates on the labour market for over ten years. This makes it possible to compare LinkedIn outcomes to CBS results based on official university registers combined with official job registers. In this section, CBS compares the number of graduates, employment one year after graduation and employment sector.

8.3.1 MEMBERSHIP COVERAGE

In the Netherlands, the coverage of LinkedIn membership among hbo bachelor graduates rose from 48% in 2010 to 56% in 2014, as demonstrated in figure 8.1.

Figure 8.1 Graduates from Dutch hogeschool institutions, Linkedin members compared with official statistics

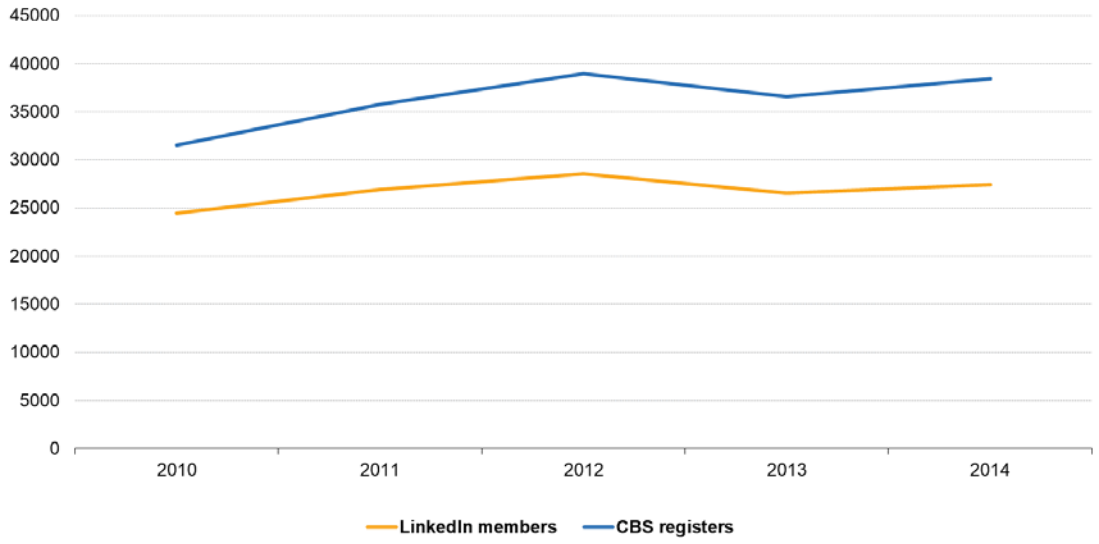


Source: LinkedIn/CBS

As the coverage of LinkedIn membership among hogeschool bachelor graduates is increasing, it is more difficult to see similar trends in the LinkedIn data as in relation to trends in the student registrations from hogeschool. There is no significant correlation between the number of hogeschool bachelor graduates based on LinkedIn and based on CBS official Dutch registers. LinkedIn data suggests that there has been a growing number of hogeschool graduates over the years, though this is not matched in official data. Despite this limitation, LinkedIn data manages to catch the most important events: increase in graduates in 2012 and the fall in graduates in 2013. The rise was due to a new law in the Netherlands introduced in 2012, which stated that students, who studied over four years, had to pay higher tuition fees. This encouraged students to speed up their graduation. Shortly after the law had been introduced, the law was abolished.

Among universiteit graduates, the LinkedIn coverage is much higher and more stable over time. The coverage dropped slightly from 77% in 2010 to 71% in 2014 (as shown in figure 8.2).

Figure 8.2 Master graduates from Dutch institutions, Linkedin members compared with official statistics



Source: LinkedIn/CBS[10]

Probably due to this high and stable coverage among universiteit graduates, patterns based on LinkedIn data are very similar to those of CBS based on registrations of research universities (significant correlation of 0.99).

8.3.2 EARLY EMPLOYMENT OUTCOMES

To validate LinkedIn results on early career outcomes (as presented in Part 2 Graduate Outcomes), the results were compared to a CBS cohort study regarding graduates on the labour market[11]. As this cohort study only focused on graduates who did not continue education, for validation purposes, also in the LinkedIn dataset, only graduates who did not continue education in the same year as graduation were selected.

Of all hogeschool graduates on LinkedIn who graduated between 2010 and 2014 and who did not continue education in the same year as their graduation, 77% reported job experience or internship on their profile within one year. This is lower than the 87% of hbo bachelor graduates who had a job one year after graduation according to the CBS cohort study. These results are displayed in figure 8.3.

There are a number of possible reasons that could explain this difference:

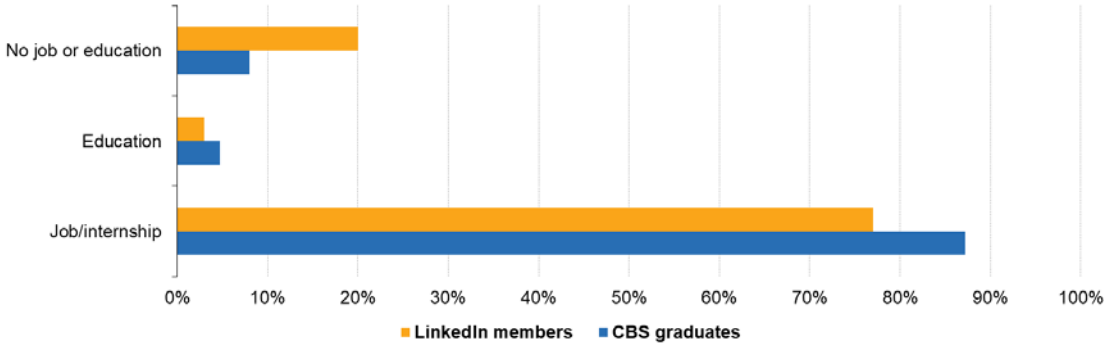
- The selectivity of the LinkedIn population or underreporting. Possibly, graduates update their profile while applying for a job, but do not update it when hired. Alternatively, they do not mention jobs on their profile that are not in line with their career plans.

[10] http://opendata.cbs.nl/statline/#/CBS/nl/dataset/83894NED/table?ts=1541083200501

[11] https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83812NED/table?ts=1547464025931

- It could also be the result of differences in both population and methods applied between the two studies. For example in the CBS population, emigrants are excluded, as CBS has no information about labour and education outside the Netherlands. See section 8.2 for a detailed description on population and methods.

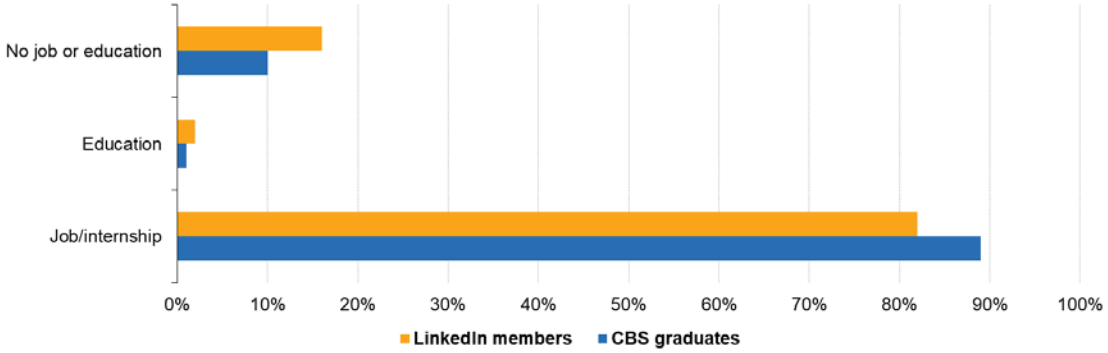
Figure 8.3 Outcomes for hogeschool graduates, after one year



Source: LinkedIn/CBS

Of all universiteit master graduates on LinkedIn who graduated between 2010 and 2014 and did not continue education in the same year as their graduation, 82% reported job experience or internship on their profile within one year (as seen in figure 8.4). Compared to hogeschool graduates, the difference with the CBS cohort study was a little smaller for universiteit graduates. According to the CBS cohort study, 89% of universiteit graduates had a job one year after graduation. The difference could be due to selectivity of the LinkedIn population or underreporting, but could also be the result of differences in both population and methods between the two studies.

Figure 8.4 Outcomes for universiteit graduates, after one year



Source: LinkedIn/CBS

8.3.3 SECTOR REPRESENTATIVENESS

The World Bank validation study mentioned earlier finds that the knowledge-intensive and tradable sectors have the best coverage by LinkedIn data. In the Netherlands, we observe something similar among recent graduates. First of all, it should be noted that it's difficult to compare the LinkedIn sector classification to the activity classification of the European Union (NACE) or the United Nations (ISIC). Some sectors of the NACE partly overlap with the LinkedIn sectors or alternatively, LinkedIn sectors overlap with NACE. A consequence of this is that we could not compare the LinkedIn sector Corporate Services with the NACE sectors. However, some clear conclusions can be drawn from comparing the data.

First, the Information and communication sector is twice as popular in LinkedIn data as it is in the CBS study. According to LinkedIn, 14% of the hogeschool graduates and 13% of the universiteit graduates listed work experience in the ICT sector in the first year after graduation. In the Dutch cohort study only 7% of both hogeschool and universiteit graduates had a job in the ICT sector after one year.

The Financial and insurance activities sector was also twice as big in LinkedIn data as it was in the CBS study. 7% of the hogeschool and 8% of the universiteit LinkedIn members reported a job in the financial services sector, while only 5% of the graduates, both hogeschool and universiteit, had a job in this sector.

On the other hand, the health sector was underrepresented in the LinkedIn data. Only 12% of both hogeschool and universiteit graduates worked in the sector Human health and social work activities according to LinkedIn data, compared to 21% of the hogeschool and 20% of the universiteit graduates according to CBS data.

The Education sector shows comparable outcomes for universiteit graduates (LinkedIn 14%, CBS 13%), but not for the hogeschool graduates. For this group, 12% worked in the Education sector according to the CBS study, compared to 8% according to LinkedIn. This suggests that, according to the LinkedIn dataset, the education sector is far more prevalent among universiteit graduates than among hogeschool graduates. However, there is no evidence for this in the CBS cohort study. This indicates that bachelor graduates in the field of education are less likely to be a LinkedIn member. Insight in the field of study of the LinkedIn graduates would, therefore, be helpful but was not within the scope of this particular research.

8.3.4 CONCLUSION OF THE CBS VALIDATION STUDY

This study is an attempt to validate the rich LinkedIn dataset. The dataset contains information about many important topics that are not available in more traditional administrative statistical sources, like skills and careers abroad.

In this study about recent graduates, we focus on a young and highly educated target population, and therefore one of the best-represented groups in the LinkedIn dataset. The coverage of LinkedIn membership is especially high and stable among universiteit graduates. For the period 2010 until 2014, the LinkedIn dataset describes the trends in the number of universiteit graduates quite well. However, it fails to give a similarly reliable trend of the number of hogeschool bachelor graduates.

When it comes to employment outcomes, the percentage of graduates finding a job is 7 to 10 percentage points lower based on the LinkedIn dataset as than it is in the CBS cohort study. Because this is a 5 years average, it is not possible to say whether LinkedIn data is able to identify changes in achievement of employment outcomes over time.

There is skewness in the LinkedIn membership when it comes to sector, favouring the ICT and financial sectors. Although we could not validate the skills outcomes (there are no comparative comparable data available), we may assume that this skewness in sector will also affect the prevalence of certain skills in the LinkedIn dataset.

Among the most interesting results of this study are the findings on graduates who continue their career abroad. With current statistical sources, it is unfortunately not possible to assess the validity of these results. Further studies and checks with subject matter experts may be necessary to judge the plausibility of these figures.

4 Conclusions and discussion

A university degree is one of the cornerstones of today's knowledge-based society, and a highly skilled workforce is one of the EU's principal competitive advantages in a globalised world. But for students and employers alike, there is little understanding of how the choice of a university or degree will translate into a career. The aim of this research project is to inform that gap in the research. By forming a partnership, LinkedIn, CBS and Eurostat designed a research framework that allowed to embark on addressing that objective by using alternative sources of data.

The findings from the research, presented in Part 2 Graduate Outcomes of the report, illustrate some notable patterns among early career outcomes for graduates of Dutch institutions. In chapter 3, we focused on the career outcomes of graduates of Dutch institutions in the first year and the first four years following their graduation. The findings here suggest that members who graduated from Dutch institutions are able to find employment fairly soon after graduation. Where they choose to embark on further education, they do so a little sooner after graduation. We observe some differences in the outcomes patterns for hogeschool and universiteit graduates, most notably in the industries in which they secure their first employment and in the first jobs, they take on.

In the research in chapter 4, we explored the career outcomes of graduates of Dutch institutions who migrated following their graduation. About 7% of those members who graduated from Dutch institutions in 2014 left the Netherlands to go abroad to pursue an employment or education outcome. Some notable patterns emerged here, most prominently that the decision to migrate happened in the 12 months after graduation and was more likely among universiteit graduates than those from a hogeschool. European countries were the first destinations of choice for many of these graduates, but almost a quarter of those who left the Netherlands returned to the Netherlands in the same four year-window. Employment is suggested to be the main motivation for this.

In chapter 5, we observe a significant variation in the skills listed, but there are notable patterns. These patterns also illustrate the distinction between the institution types attended by graduates. Graduates of Dutch third-level institutions are most likely to list skills in Business Management, Foreign Languages, Digital Literacy, Project Management and Research, regardless of the type of institution. However, hogeschool graduates are more likely to list skills in Digital Literacy, Social Media, Manufacturing Operations and Product Marketing compared to their universiteit peers. Meanwhile, universiteit graduates are more likely to list skills in Research, Data Science, Writing, Capital Markets and Public Policy.

Observing the skills that feature most prominently in each cohort of graduates surfaces further differences between the two groups of graduates. The skills that are most specific to hogeschool graduates tend to be more work- and operations-focused, such as Revenue Analysis, Lodging, Physical Medicine and Inside Sales. The skills most specific to universiteit graduates tend to be more research-focused and include skills such as Mathematics, Nanotechnology, Neurology and Signal Processing.

Understanding the first experience upon which new graduates embark, at home or abroad, is key to understanding the ability of education and training systems to promote labour market readiness. Being able to distinguish the type of trajectory on the basis of institution attended is also important.

Providing additional insight into these trajectories, either with regard to job role, sector of

employment or skills acquired is an important feature of any toolbox which seeks to understand the efficacy of education and training systems. By looking at alternative data sources to official government statistics, we can add to that toolbox and thus improve our ability to understand the outcomes of education and training systems. Understanding the differences between various sources of data is key to success here, and the validation and comparison exercise done in Part 3 Methodology and Validation of this report provides a model for how this exercise can be done in the future.

Complementing information collected by statistics agencies with granular LinkedIn skills and international migration data produces a comprehensive and dynamic picture of how graduates fare in the job market. This type of analysis could prove vital to students, who want to make an informed choice about what university track will steer them towards their intended career. For universities, the insights can help structure programmes to give alumni the best chances of success and anticipate the rapidly changing needs of today's job market. Employers will benefit from a better understanding of the skillsets they can expect from new recruits. Not least, policymakers can use these new insights to form a solid evidence base from which to build effective education and labour market decisions for the benefit of their citizens.

5 Appendix: LinkedIn industry groups and functions

A.1 Industry classification

Industry group	Industries
Agriculture	Dairy, Farming, Fishery, Ranching
Arts	Arts and Crafts, Fine Art, Performing Arts, Photography
Construction	Building Materials, Construction
Consumer Goods	Apparel & Fashion, Consumer Electronics, Consumer Goods, Consumer Services, Cosmetics, Food & Beverages, Furniture, Luxury Goods & Jewelry, Sporting Goods, Tobacco, Wine and Spirits
Corporate Services	Accounting, Business Supplies and Equipment, Environmental Services, Events Services, Executive Office, Facilities Services, Human Resources, Information Services

	Management Consulting, Outsourcing/Offshoring, Professional Training & Coaching, Security and Investigations, Staffing and Recruiting
Design	Architecture & Planning, Design, Graphic Design
Education	E-Learning, Education Management, Higher Education, Primary/Secondary Education, Research
Energy & Mining	Mining & Metals, Oil & Energy, Utilities
Entertainment	Animation, Broadcast Media, Computer Games, Entertainment, Media Production, Motion Pictures and Film, Music
Finance	Banking, Capital Markets, Financial Services, Insurance, Investment Banking, Investment Management, Venture Capital & Private Equity
Hardware & Networking	Computer Hardware, Computer Networking, Nanotechnology, Semiconductors, Telecommunications, Wireless
Health Care	Biotechnology, Hospital & Health Care, Medical Devices, Medical Practice, Mental Health Care, Pharmaceuticals, Veterinary
Legal	Alternative Dispute Resolution, Law Practice, Legal Services
Manufacturing	Automotive, Aviation & Aerospace, Chemicals, Defense & Space, Electrical/Electronic Manufacturing, Food Production, Glass, Ceramics & Concrete, Industrial Automation, Machinery Mechanical or Industrial Engineering, Packaging and Containers, Paper & Forest Products, Plastics, Railroad Manufacture, Renewables & Environment, Shipbuilding, Textiles
Media & Communications	Market Research, Marketing and Advertising, Newspapers, Online Media, Printing, Public Relations and Communications, Publishing, Translation and Localization, Writing and Editing

Nonprofit	Civic & Social Organization, Fund-Raising, Individual & Family Services, International Trade and Development, Libraries, Museums and Institutions, Nonprofit Organization Management, Philanthropy, Program Development, Religious Institutions, Think Tanks
Public Administration	Government Administration, Government Relations, International Affairs, Judiciary, Legislative Office, Political Organization, Public Policy
Public Safety	Law Enforcement, Military, Public Safety
Real Estate	Commercial Real Estate, Real Estate
Recreation & Travel	Airlines/Aviation, Gambling & Casinos, Hospitality, Leisure, Travel & Tourism, Recreational Facilities and Services, Restaurants, Sports
Retail	Retail, Supermarkets, Wholesale
Software & IT Services	Computer & Network Security, Computer Software, Information Technology and Services, Internet
Transportation & Logistics	Import and Export, Logistics and Supply Chain, Maritime, Package/Freight Delivery, Transportation/Trucking/Railroad, Warehousing
Wellness & Fitness	Alternative Medicine, Health, Wellness and Fitness

A.2 Function classification

Function	**Example titles**
Accounting	Accountants, tax accountants

Administrative	Office assistants, clerks, secretaries, executive assistants
Arts and Design	Artists, graphic designers, entertainers.
Business Development	Business development manager
Community and Social Services	Social workers, counsellors, psychologists,
Consulting	Consultants, management consultants
Education	Professors, primary and secondary school teachers, teaching assistants, and instructors.
Engineering	Product developers, software developers.
Entrepreneurship	Founders, owners
Finance	Fund managers, investment specialist
Healthcare Services	Doctors, dentists, nurses, clinical health care technicians
Human Resources	Recruiting and staffing professionals
Information Technology	Information Technology Managers
Legal	Lawyers, paralegals
Marketing	Marketing managers

Media and Communication	Corporate public relations managers, technical writers, journalists
Military and Protective Services	Soldiers, law enforcement officers, firefighters, security guards
Operations	Operative, manufacturing operative
Product Management	Product manager
Program and Project Management	Project manager, program manager
Purchasing	Procurement officers, buyers or merchandisers in retail firms.
Quality Assurance	Tester, quality controller
Real Estate	Estate agents and brokers, appraisers, landlords, and real estate developers.
Research	Researcher, data scientist
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KS-02-19-909-EN-N

Insights into career outcomes and skills of Dutch graduates

In this study, LinkedIn, Statistics Netherlands and Eurostat examine anonymised and aggregated data about graduates of Dutch-based higher education institutions among LinkedIn members to explore their professional career path in detail, e.g. how they progressed in the labour market or pursued further study after completing their first degree.

The dataset was built from a significant cohort of LinkedIn members who reported graduation from Dutch institutions on their profiles. They completed a Bachelor's degree at a university of applied sciences or a Master's degree from a research university, between 2010 and 2014.

In designing the study, LinkedIn, Statistics Netherlands and Eurostat worked together to assess the dataset and investigate its representativeness, through validation and robustness checks. An approach for analysing the early career outcomes of graduates was developed based on thorough analysis of the data.

In general, the study pursued two objectives: using LinkedIn data to produce valuable statistical information and to assess the quality of these data for official statistics.

For more information
https://ec.europa.eu/eurostat/

Publications Office
of the European Union

ISBN 978-92-76-13001-7