PATHWAYS AND POSSIBILITIES: EXPLORING THE LINK BETWEEN QUALIFICATIONS AND INDUSTRIES

Jenny Connor
Industry Training Federation

Abstract

New Zealand's Industry Training Organisations (ITOs) are charged in the Industry Training Act 1992 with analysing and defining the skill needs of their industry. To do this effectively, ITOs need to understand the level of alignment between qualifications and the skills required by industries.

It is often assumed that there is a close relationship between qualifications, particularly those that are vocational, and the industries in which people work. This paper uses data from the 2006 New Zealand Census of Population and Dwellings (Census) to explore this assumption by examining the relationship between the field of study of people's highest qualification and the industry in which people work.

The assumption is explored in two complementary ways. Firstly, we look at things from the **industry point of view** by examining industries to show the field of study of qualifications held by people in the industry. These fields are classified into four broad groups: those core to the industry, those related, those that give individuals generic skills applicable across all industries, and those unrelated to the industry. Secondly, we look at things from a **worker/student point of view** by examining fields of study to show which industries people with particular qualifications work in. This information is analysed to examine if workers with a given qualification are concentrated in specific industries.

These two complementary pieces of analysis create a picture of the types of skill in an industry and where people undertaking training in particular areas are likely to work in the future. This information can be used to better match the supply of tertiary education and training to industry demand.

Introduction

One of the primary purposes of tertiary education and training is to ensure that students have the skills which will be needed to equip them for their future career. This assumes that there is an underlying relationship between what people learn through study, as recognised by formal qualifications, and the skills that they will need to work in their chosen occupation or industry. However, this relationship is not always clear and the strength of the relationship varies considerably.

In this paper statistical data from the 2006 Census is used to examine the relationship between the qualifications people hold and industries in which they work. The relationship that exists for people already in work is explored and used as an indicator of the relationship that may exist for workers in the future. This leads to implications for decision making around tertiary education and training for both industries and prospective students.

Research Method

Each qualification in New Zealand has an associated field of study that represents the topics or subjects covered and skills learned by gaining a qualification. Fields of study are classified using the New Zealand Standard Classification of Education (NZSCED) which includes over 350 different fields such as Chemistry, Nursing, English, and Marine Construction.

In the 2006 Census, people were asked about the highest post-school qualification that they held. Using this information Statistics New Zealand (Statistics NZ) determined both the level of the qualification and the field of study. This measure indicates the field of study of a person's highest field of study only and so may not include other skill sets a person has as people may hold multiple qualifications and these can be in different fields. However, it is the best approximation for formally recognised skills that is available that can be combined with industry data.

People were also asked in the 2006 Census to provide the name and address of their primary employer (if they were employed). From this, Statistics NZ determined the industry that each person worked in.

Industries in New Zealand are classified using the Australia New Zealand Standard Industrial Classification (ANZSIC) 2006. This classification groups firms into those which produce similar goods or services and includes over 500 different industries such as Deer Farming, Tyre Manufacturing, Primary Education, and Hairdressing & Beauty services.

Combining the responses to these two questions gives information about both a person's field of study for their highest qualification and also the industry in which they currently work. This provides a snapshot of skills within each industry as well as the industries in which particular skills are being used.

All analysis in this paper includes only workers that have a post-school qualification where the highest field of study can be identified. These workers make up 44% of workers aged 15 and over, while 48% of workers have no post-school qualification and a further 8% have a post school qualification but the field of study can not be identified. The share of workers with identifiable post-school qualifications varies between sectors, ranging from 29% in Retail Trade to 74% in Education & Training.

Findings and Discussion

Industry point of view

Analysing the fields of study of people's qualifications at an industry level helps illustrate the types of formally recognised skills people in the industry have. This enables firms, industries, and ITOs to determine the current skill sets of workers, potential training needs for those workers, and possible skill needs in the future.

In this section three different aspects of the field of study of people's qualifications at an industry level are examined. Firstly, relevance of fields of study to industries at

broad level industry (1-digit) or sector are analysed. This is followed by an examination of the characteristics of industries at a 5-digit level (the most detailed groupings) with either high or low concentrations of particular fields of study. Finally, implications of this analysis for education and training are examined.

In this report fields of study have been classified as being in one of four groups based on perceived relevance to each individual industry. These are:

- **Core relevance**- fields of study relating to skills which are of primary importance to the industry and are directly related to the main roles of people working in the industry. For example, Tourism Studies is of core importance to the Travel Agency & Tour Arrangement Services industry.

- **Related**- fields of study relating to skills which are in some way related to the industry although not generally the ones needed to carry out the main roles of people working in the industry. For example, the field of study Carpentry & Joinery is related to the Hardware & Building Supplies Retailing industry.

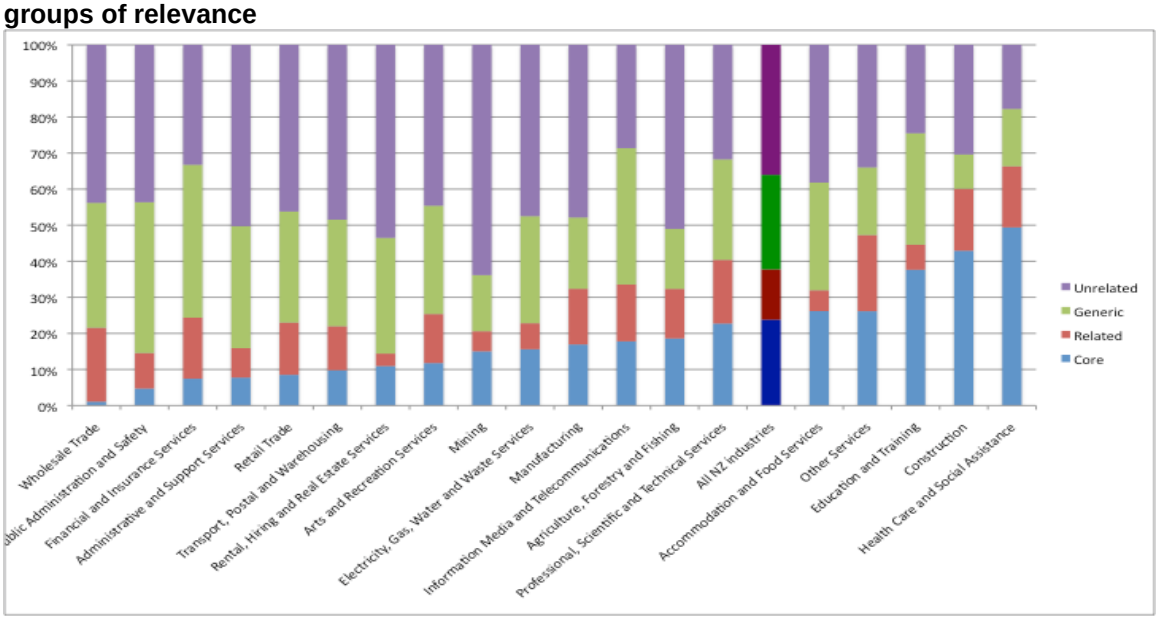
- **Generic**- fields of study relating to skills which are not specific to the industry but instead are used across many industries (such as accountancy and management) so are likely to be needed in the industry but are not the skills needed for most workers. For industries such as accounting where a generic field of study is of core importance the relevant field of study has been classified as being of core relevance.

- **Unrelated**- fields of study relating to skills which are unlikely to be directly related to the industry or are only needed for a small number of people in exceptional cases. For example, the Hairdressing field of study is considered unrelated to the Dairy Cattle Farming industry even though there are people with Hairdressing qualifications working in the industry.

Fields of study have been classified based on their relevance to industries at a 5-digit level, the most detailed level of ANZSIC 2006. Results from 5-digit industries have then been aggregated to the 1-digit level to enable analysis at a sector level.

There is a great deal of variation between sectors in terms of the percentage of workers in each of these groups. Across all New Zealand industries 24% of workers with post school qualifications have skills of core relevance to the industry in which they work, this ranges from 1% to 49% at a sector level. The proportion of workers with qualifications in related fields of study is on average smaller, with 14% of workers across all industries being in this group and a range of 3% to 21% at a sector level. The proportion of people with generic qualifications also varies widely from 9% to 42% at a sector level and an average of 26% across all industries. Finally, across all New Zealand industries 36% of workers have qualifications in unrelated fields of study with a range of 18% to 65% across sectors, making this the largest group overall.

Figure 1: The percentage of workers with qualifications with a field of study in four groups of relevance



Source: 2006 Census of Population and Dwellings, Statistics New Zealand

These results can be examined in more detail to give a greater understanding of differences between sectors. In particular, it may be useful to look in more detail at the proportion of workers with qualifications in core fields of study as these are the skills which industries are likely to have the most direct input into and influence over. There are three sectors that stand out as having a considerably higher proportion of workers with qualifications in core fields of study than the national average- Health Care & Social Assistance (49%), Construction (43%) and Education & Training (38%). These sectors have a number of things in common which may cause more people to have qualifications in core fields of study than in other sectors. These are:

- **Regulation**- these sectors all have a significant proportion of occupations that are regulated and generally require particular qualifications. For example, teachers, plumbers, and doctors.

- **History of education and training**- in each of these sectors there is a long standing history of education and training in fields relevant to the sector. For example, training in the education industry in New Zealand has taken place since the late 1800's, first at Teachers Training Colleges and more recently at universities.

- **Vocational qualifications**- in these sectors a high proportion of qualifications are vocational in nature as they focus on practical activities which are common in particular industries and therefore relate directly to jobs in the sector.

These factors are not found, or not as pronounced, in many of the sectors with much lower proportions of people that have qualifications in fields of study of core relevance. Instead, in some of these sectors, such as Wholesale Trade and Administrative & Support Services, there may be fewer requirements for, or expectations of having, qualifications. In other sectors, such as Public Administration & Safety and Financial & Insurance Services, while there is often an expectation that

workers will have a qualification, the qualification held can generally be from a wider range of fields of study.

To examine in more detail the range of formally recognised skill sets across industries and the characteristics of industries that have the most and least workers concentrated in a small number of fields of study we have analysed industries at the most detailed level (5-digit ANZSIC 2006 industries).

In some industries the majority of workers have qualifications in a small number of areas. One example is the Veterinary Services industry where 74% of workers with a post-school qualification have either 'Veterinary Science' or 'Veterinary Assisting' as their highest field of study. In other industries workers have qualifications in a much wider range of areas and there are significant numbers of workers with qualifications in different fields of study. An example of an industry with a wide range of fields of study is the Banking industry where only 10% of workers held a post-school qualification in the largest field of study 'Banking & Finance' and significant numbers of workers held qualifications in a wide range of areas such as 'Accounting', 'Economics', 'Tourism', and 'Secretarial & Office Studies'.

Table 1 shows the ten 5-digit industries that have the largest proportion of workers who have a single field of study. These industries generally have a significant proportion of workers in a single occupation, for example in Electrical Services two-thirds of workers are electricians, and generally have qualifications that relate to that occupation. Like the 1-digit industries examined earlier there is also a high degree of regulation in most of these industries as well as a well-entrenched training culture.

Table 1: The 10 industries in New Zealand with the largest percentage of workers with a qualification in a single field of study

Industry	Most common field of study	% of workers with this field
Plumbing Services	Plumbing, Gasfitting & Drainlaying	76%
Electrical Services	Electrical Engineering	67%
Hairdressing & Beauty Services	Hairdressing	64%
Physiotherapy Services	Physiotherapy	64%
Pharmaceutical, Cosmetic & Toiletry Goods Retailing	Pharmacy	63%
Accounting Services	Accounting	62%
Bricklaying Services	Bricklaying & Stonemasonry	59%
Fresh Meat, Fish & Poultry Retailing	Butchery	57%
Architectural Services	Architecture	57%
Logging	Forestry Studies	56%

Source: 2006 Census of Population and Dwellings, Statistics New Zealand

In contrast, the 10 industries with the smallest percentage of workers in a single field of study, shown in Table 2, tend to have different characteristics. In most of the occupations in these industries there is no requirement to have a particular qualification or, in some cases, a qualification of any kind. In addition, for most of the occupations that are common to these industries there are few qualifications which directly relate to the occupation. Finally, in some of these industries there are people working in a wider range of occupations which in itself is likely to lead to a more diverse range of qualifications since occupations and qualifications are often more closely aligned than qualifications and industries.

Table 2: The 10 industries in New Zealand with the smallest percentage of workers with qualifications in a single field of study

Industry	Most common field of study	% of workers with this field
Non Store Retailing	Business Management	3%
Amusement Parks & Centres Operation	Sport & Recreation Activities	4%
Other Store-Based Retailing n.e.c.	Business Management	4%
Buildings Cleaning Services	Computer Science nfd	4%
Textile Finishing & Manufacturing	Textile Making	4%
Newspaper & Book Retailing	Literature	4%
Taxi & Other Road Transport	Accounting	4%
Other Gambling Activities	Accounting	4%
Poultry Processing	Butchery	5%
Toy, Sport & Rec. Product Manufacturing	Carpentry & Joinery	5%

Source: 2006 Census of Population and Dwellings, Statistics New Zealand

In industries with workers concentrated in a small number of fields of study, such as the ones shown in Table 1 above, most workers will have specific skills related to the industry but may not have formalised generic skills such as business management, human resources, and office skills. In industries with workers spread across a more wide ranging number of fields of study, such as the ones Table 2 above, workers may be more likely to have generic skills or skills not directly related to the industry in which they work so they may require training or education in skills specifically related to the industry they are working in.

When industries or industry groups are considering future skill needs they could take into account the types of jobs that people will be performing and therefore the fields of study that future workers will need. They could also alter education and training so that students undertaking specific vocational fields of study also learned more general skills that they are also likely to need or make more general courses have more basis in particular industries so that workers have greater context for their skills.

Worker/student point of view

To create a picture of where people with particular qualifications are likely to work, we have compared the industries that people in and their fields of study. This can then be used to determine common career paths for people studying towards qualifications. Therefore, this information is useful for people considering undertaking education or training or considering where they might be able to put to use qualifications they already have.

In this section the relationship between fields of study and the industries where people work is examined in three ways. Firstly, fields of study are examined at the highest level of aggregation, the 1-digit level, to examine which industries these fields are highly concentrated in. Secondly, more detailed fields of study are examined to look at the differing patterns of industries people work in. Finally, implications for those who already have qualifications and for those wanting to undertake education and training are examined.

As indicated in the first part of this paper, people with some fields of study work in a wide range of industries while others are much more concentrated in particular

industries. To examine this in more detail, it is useful to look at the most aggregated level of fields of study, the 1-digit level. Table 3 below shows the most common broad level industry or sector that people with particular fields of study work in, as well as the percentage of all people with this field of study who work in the industry. Some workers are largely concentrated in the industry which most closely matches their field of study. In particular, 60% of workers with a qualification in Health work in the Health Care & Social Assistance industry, 60% of workers with a qualification in an Education field work in the Education & Training industry, and 47% of workers with a qualification in an Architecture, Environmental, & Related Studies field of study work in the Construction industry. These three fields of study are all closely aligned with particular industries and many qualifications within the fields of study are vocational in nature which may make them more directly applicable to particular occupations.

It is also interesting to note that people within four broad fields of study – Natural & Physical Sciences, Information Technology, Management & Commerce, and Creative Arts – are most concentrated in the Professional, Scientific & Technical Services industry. This is surprising because the fields of study which have this as the largest industry of employment are very diverse. This may be because some of these fields of study do not in general relate to specific industries or occupations or relate to occupations which are spread across a wide range of industries while Professional, Scientific & Technical Services covers a wider range of detailed industries and occupations than many other sectors.

Table 3: The most common industry people work in for 1-digit fields of study

Field of Study	Industry with most workers with this field of study	% of people with this field
Natural & Physical Sciences	Professional, Scientific & Technical Services	19%
Information Technology	Professional, Scientific & Technical Services	26%
Engineering & Related Tech.	Manufacturing	23%
Architecture & Building	Construction	47%
Agriculture, Environmental & Related Studies	Agriculture, Forestry & Fishing	38%
Health	Health Care & Social Assistance	60%
Education	Education & Training	60%
Management & Commerce	Professional, Scientific & Technical Services	17%
Society & Culture	Education & Training	18%
Creative Arts	Professional, Scientific & Technical Services	14%
Food, Hospitality & Personal Services	Accommodation & Food Services	22%

Source: 2006 Census of Population and Dwellings, Statistics New Zealand

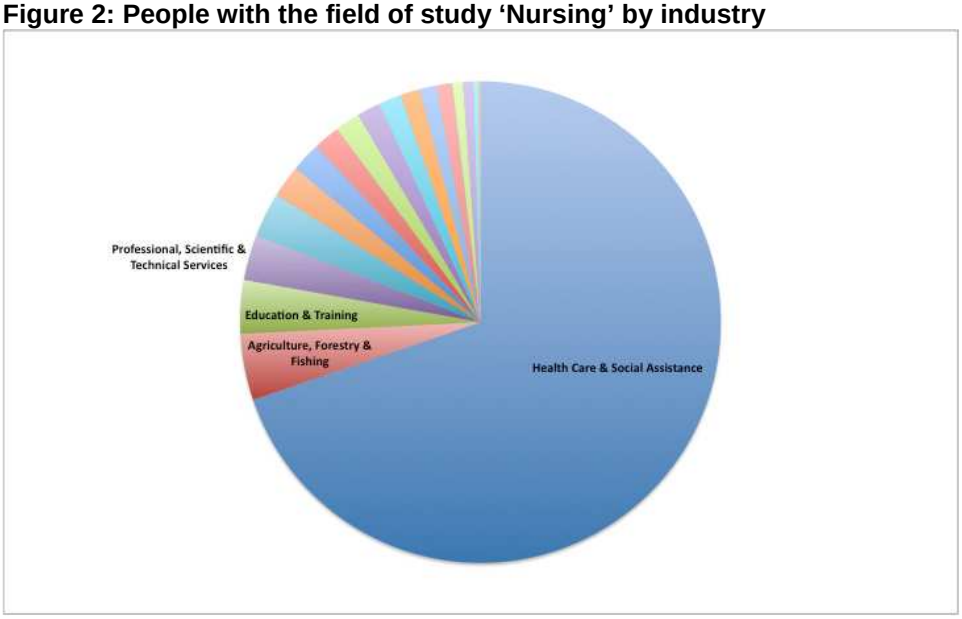
To get a better idea about career paths common for various fields of studies and how different these can be it is useful to examine fields of study at the most detailed level available, the 3-digit level. There are more than 350 different fields of study at this level, some held by only a handful of people but others held by tens of thousands.

It is useful to examine a few of these detailed fields of study to see the industries that people who hold the qualifications work in and what possible career paths may be. In this report we examine two very different fields of study which are held by large numbers of people- Nursing and Business Management. Nursing is a very specific field which is directly related to a particular occupation and includes education and training courses that are largely delivered in a similar way, in this case a mixture of

classroom based theory and practical clinical work. In contrast, Business Management is a much broader field which relates to a range of occupations and includes courses which are delivered in a variety of ways.

The defining feature of the industry composition for people with a qualification in Nursing is that the majority work in the Health Care & Social Assistance industry with just over 70% of all people with this qualification working in the Health industry at the time of the 2006 Census as shown below. A further 3-4% of workers with Nursing qualifications work in each of Agriculture, Forestry & Fishing, Education & Training, and Professional, Scientific & Technical Services and there are smaller numbers of people with these qualifications in all other 1-digit industry groups.

Figure 2: People with the field of study 'Nursing' by industry



Source: 2006 Census of Population and Dwellings, Statistics New Zealand

Looking in more detail, Table 4 shows the 10 5-digit industries with the largest number of people with Nursing qualifications. Of the top 10, all but one of these 5-digit industries are in the Health sector. What this tells us is that people who complete Nursing qualifications and are in the workforce are likely to work as a Nurse or in another related Health Care profession. This is particularly interesting as a great deal of attention has been given in recent years to the perceived high numbers of people with Nursing qualifications who are not working as Nurses.

Table 4: 10 industries with the largest number of people with nursing qualifications:

Industry	Number of people	% of people with Nursing
Hospitals (except Psychiatric Hospitals)	13,791	34%
Other Allied Health Services	5,229	13%
Aged Care Residential Services	2,958	7%
General Practice Medical Services	2,694	7%
Other Residential Care Services	771	2%
Other Social Assistance Services	714	2%
Other Health Care Services n.e.c.	549	1%
Dairy Cattle Farming	444	1%
Specialist Medical Services	432	1%
Psychiatric Hospitals	399	1%

Source: 2006 Census of Population and Dwellings, Statistics New Zealand

The industry composition of those with Business Management qualifications is very different from that outlined above for Nursing. People with Business Management qualifications are spread throughout a wide range of industries and not heavily concentrated in any one sector. The industry with the largest number of people with Business Management qualifications is Professional, Scientific & Technical Services with 18% of all people with Business Management qualifications. There are a further 11 industries which have at least 3% of people with these qualifications.

Table 5 shows the 10 5-digit industries with the largest numbers of people with Business Management qualifications. These industries are spread across the economy and include some where Business Management qualifications are specifically relevant, such as Management Advice & Other Consulting Services, and others where they support the core business of the industry, such as Supermarket & Grocery Stores.

Table 5: The 10 industries with the largest numbers of people with Business Management qualifications:

Industry	Number of people	% of people with Business Management
Management Advice & Other Consulting Services	1,023	4%
Accounting Services	909	4%
Central Government Administration	807	3%
Banking	756	3%
Computer Systems Design & Related Services	693	3%
Higher Education	531	2%
Corporate Head Office Management Services	468	2%
Real Estate Services	435	2%
Supermarket & Grocery Stores	426	2%
Other Auxiliary Finance & Investment Services	399	2%

Source: 2006 Census of Population and Dwellings, Statistics New Zealand

For potential students who are trying to decide what to study and for people who advise future students on these decisions, information about likely careers will be of interest. If people examine a particular field of study they can determine which industries people with that field of study are most likely to work in and, when matched with information about work conditions in industries, can determine potential salaries, hours of work, and prospects for finding employment in the future.

At a more general level, students can gain insights about the range of industries they could potentially work in based on some of the characteristics of the course they are considering. Courses in fields of study that are largely vocational, taught in the same way to other courses in the same field of study, and those which relate to specific occupations are more likely to lead to jobs in a narrower range of industries. Conversely, those which are less vocational, taught in a variety of ways and not necessarily related to specific occupations are more likely to lead to jobs in a more broad range of industries.

Conclusions

This paper explored the relationship between industry and field of study. This was done in two ways- by looking at the subject from an industry point of view and exploring the fields of study that are most common for particular industries, and by

looking at the subject from a students point of view and exploring the industries that were most common for particular fields of study.

The first section looked at industries and examined which fields of study were most common for workers in particular industries. At a sector level there was considerable difference between industries with some having large proportions of workers with fields of study that were of core relevance to the industry while others had very few workers in this category. Similarly, at a more detailed industry level some industries had workers concentrated in a small number of fields of study while others had workers with qualifications in a much wider range of fields of study. At both the broad level and the detailed level industries that had a close relationship between occupations and fields of study and those with more vocationally based qualifications were more likely to have workers in core areas of relevance and with a higher concentration of workers in a small number of fields of study. This has implications for the types of training current and future workers may need to complement their existing skill sets.

The second section took a students point of view and examined industries where someone with a particular field of study was likely to work. At a broad level, people with some 1-digit fields of study were likely to work in an industry which was highly relevant to the field they studied while for other fields of study the profile of industries was much more diverse. The same was true with more detailed 3-digit fields of study. In both cases people with fields of study that had a close relationship to particular occupations and those that were highly vocational were more likely to work in a narrower range of industries. This has implications for current and prospective students who are considering likely career paths.

In each of these sections common themes emerged. In some cases there appears to be a close link between industries and fields of study while in others the link is much weaker. Sectors such as Health Care, Education, and Construction that have a close link between industries and fields of study are characterised by vocational education, a strong history of training, and qualifications that directly align with particular occupations. In contrast, industries such as Retail and Administrative & Support Services do not seem to have a close link to particular fields of study, largely due to either not requiring qualifications or not requiring specific qualifications. Similarly, fields of study such as Business Management and Computer Science are not closely linked to particular industries because the skills gained in these courses are used in a variety of occupations across many industries.

These relationships between industries and fields of study should help both firms and workers. For firms, examining the fields of study that are common to their industry may give insight about the types of skills people have and also training people might potentially need to complement these skills. For workers, having more information will enable greater insight into career paths from various qualifications and therefore inform decision making.