

# FACTORS INFLUENCING BUILT ENVIRONMENT APPRENTICESHIP COMPLETION RATES: A SYSTEMATIC LITERATURE REVIEW

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There has been a surge in public interest in apprenticeships in Ireland, because of increased awareness, political support, increased state funding and a new 2021 Apprenticeship Action Plan. In Ireland, there are 62 apprenticeships available, involving over 8,000 employers and 24,000 apprentices. However, non-completion can be costly for both employers and program administrators, as well as proving difficult for the apprentice. The aim of this research is to undertake a systematic literature review to identify 1) Where is apprenticeship completion research taking place? and 2) What factors influence the completion of apprenticeship programmes? The research method investigates findings from twenty-four articles published between January 2000 and December 2021. The investigation concludes that the reasons for completion fall into three main categories: apprentice related issues, curriculum and programme quality and employer issues. Overall, the findings will help to contextualise why apprentices do not complete their apprenticeship and determine if this might be applicable to Ireland. While only two papers were found during the systematic literature review pertaining to Ireland, the key contribution of this research is to apply the international findings with the intention of increasing built environment apprenticeship completion in this country.

Keywords: apprentice; systematic review; vocational; education; training

## INTRODUCTION

An apprenticeship is a programme of structured education and experiential training, which formally combines learning and training in the workplace and an educational setting (Department of Education and Skills, 2013). It emphasises learning by doing, while meeting the needs of the economy, and preparing the apprentice for a specific occupation. Apprenticeships involve being employed under a contract of employment, where there is a minimum of 50% workplace-based training (Generation Apprenticeship, 2020). Of the 62 apprenticeships in Ireland, there are currently 8 Built Environment Apprenticeships.

These are brick and stone laying, electrical, plastering, stonecutting and masonry, wood manufacturing, painting, and decorating, carpentry and joinery and plumbing. These follow a seven phase, on the job and off the job standards-based model (O'Connor, 2006). Apprenticeship training programmes are an attractive way to

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retain employees, as they provide a structured framework within which employers can build loyalty and broaden the range of entrants to their company (Department of Further and Higher Education, 2021). There is however, apprehension about a skills shortage within the Irish construction industry and policy makers agree that apprenticeship should be encouraged, to ensure that there will be enough trades people to continue to build Ireland into the future (Department of Further and Higher Education, 2021). There are increased demands for skilled workers as Ireland enjoys a growing economy.

The Climate Action Plan 2021 offers opportunities for growing business and employment in offshore windfarms, retrofitting and renewable resources technology. This will result in increased demand for skilled built environment workers and apprentices. Expert Group on Future Skills estimates and increase in employment in this sector from 5000 in 2020 to 27,000 in 2030 (Ireland, 2021). There are reviews scheduled to the curriculum content of existing craft apprenticeships to support the move to zero carbon economy as well as new green apprenticeships. The Action Plan for Apprenticeships 2021-2025 sets out the need to increase the number of apprentice registrations to 10,000 annually by 2025 and this gives ample opportunity to train the built environment construction workers of the future to green technology, retrofitting and the use of renewable and recycled resources. However high retention and completion rates are as important as increased registrations to address skills shortages.

Apprenticeships are an integral part of Further and Education Training sector, have the support of employers, educators, Government, and unions (O'Connor, 2006). It is in the best interests of employers and policy makers to identify factors that affect completion, as the loss of human capital, may prove expensive for both companies and apprentices alike. Apprenticeship non-completion may be an indication of the programme's weaknesses, the capacity of the employers, and the individual characteristics of the apprentices (Gambin and Hogarth, 2016). Despite evaluations of training and educational programmes, gaps remain in knowledge of the effectiveness of apprenticeship in Ireland.

For example, how the characteristics of the training programme and the apprentice themselves can affect their success. O'Connor (2006) begins by outlining that over 66% of registered apprentices complete their apprenticeship in Ireland. In 2019, an Oireachtas report declared completion rates of 65% in Carpentry, 73% in Electrical and 69% in Plumbing. In 2019, The 2019 Review of Participation and Costs of Apprenticeship reported that the government costs to the of an Irish apprenticeship was €7159 to 9877 annually. Identifying the factors that contribute to the loss of apprentices is critical in assisting government agencies, training providers, and other organisations, in determining whether and when to implement specific measures to, prevent early termination of apprenticeships. In 2018, 6.4% of the those employed in Ireland were in the construction industry. The successful delivery of Project Ireland 2040 depends on sustained and diversified construction employment and fulfilled careers.

The motivation for undertaking this research is that there exists evidence on the factors of apprenticeship non-completion in other countries, including United Kingdom (UK) (Daniel *et al.*, 2020), Australia (Harris and Simons, 2005), Canada (Laporte and Mueller, 2013), England (Gambin and Hogarth, 2016) and Germany (Bessey and Backes-Gellner, 2015), Scotland (Greig, 2019), but there is no comparable study in Ireland. Low levels of completions along with an aging

population within the Irish construction industry could result in skilled built environment workers scarcity in the future. It will present an opportunity to develop while providing a foundation for future studies on relevant research in apprenticeship completion in Ireland. This approach will aid development of more efficient apprenticeship programs, by attempting to fill the gaps in present knowledge of the various determinants and factors of success or failure. By using extant research from other geographical regions, a systematic literature review will be used, as a guide for future study into the efficacy of various methods to increase apprenticeship completion in Ireland. Such studies may give invaluable insight to policy makers working to build effective and stable apprenticeship training programs.

Subsequently, two research questions emerge and are as follows.

- RQ1 - Where is apprenticeship completion research taking place?
- RQ2 - What factors influence the completion of apprenticeship programmes?

## **METHOD**

The aim of this research was to uncover the gaps and trends in current information about built environment apprentices in the building industry. The current study employed a systematic literature review, to combine existing information and give a greater comprehension of the topic area. Because of the replicability and rigor of its conclusions, a systematic review was the preferable method, as it draws work from other researchers together, using a scientific and systematic approach, allowing the data to be synthesised. The search needed to be specific in the search terms so that only relevant papers were captured, whilst also including vital papers (Beecham *et al.*, 2008).

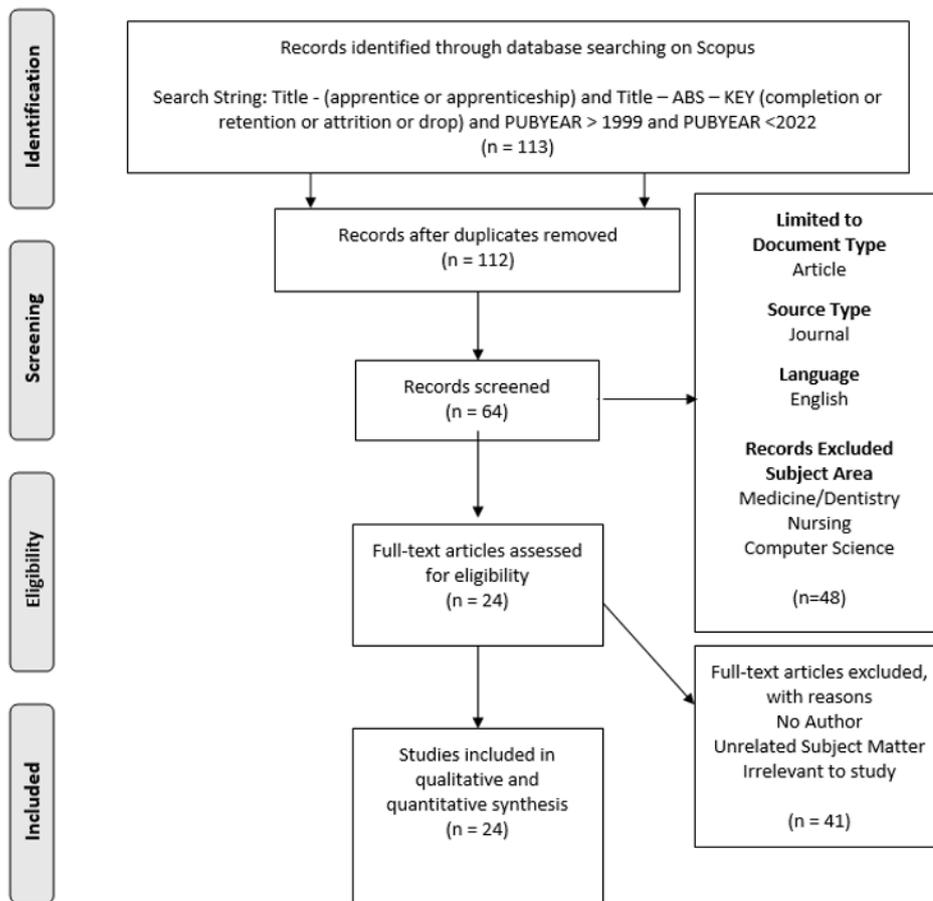
This systematic review was carried out in three stages, each of which were interconnected. A database search was carried out first, where then selection, inclusion, and exclusion criteria were applied. Finally, to provide answers to the research questions, a content analysis of selected publications was undertaken. Figure 1 depicts these steps in a graphical format, outlining the four stages adopted: identification, screening, eligibility, and inclusion in the study.

The sample consists solely of publications published in academic journals in Scopus in the University of Limerick Glucksman Library. This article research yielded one hundred and thirteen articles, which were further limited to those relevant according to the specific inclusion and exclusion criteria. The inclusion criteria included all papers pertaining to apprenticeship completion with the exclusion of those pertaining to non-construction apprenticeships. Other papers excluded include those with no author or unrelated subject matter. Finally, a total of twenty-four articles were included in the meta-analysis. Three papers were further eliminated, as they had no significance to this study, including the impact of regional climate on apprenticeship (Zoellner *et al.*, 2017), a study regarding homelessness (Cebulla and Goodwin-Smith, 2015) and school-based apprenticeships (Hill and Dalley-Trim, 2008).

## **LITERATURE REVIEW**

In addressing the first research question, that is, where is apprentice completion research taking place, the systematic literature review identified a total of twenty-four papers, located as follows: Ireland (1), Germany (3), UK (5), Australia (6), Canada (2), USA (6), and Ghana (1). Table 1 documents the twenty-four journals, their respective author/year and associated country.

Figure 1: Flow Diagram of the process of selection of articles



The second research question delved further into the topic by asking "what factors influence the completion of apprenticeship programmes?". The literature offered insight into factors that may have an impact on the process of apprenticeship completion. According to the research, these can be broadly classified into three categories; employer considerations, apprentice attributes, and curricula factors, and are discussed as follows.

## Employer Considerations

### *Relationship with employer*

The relationship between an apprentice and an employer is an important factor of apprenticeship completion. Many apprentices identify challenging working conditions and inadequate training as major factors in their decision to leave (Smyth and Zimba, 2019; Greig, 2019; Gow *et al.*, 2008). Larger employers are often associated with a higher completion rate (Neuber-Pohl, 2021), because they can offer well-developed apprenticeship programme, along with high wages and better career prospects.

Larger companies frequently hire full-time trainers to give job-specific and more general support to apprentices (Grelinger and Sandner, 2021) while apprentices in smaller companies are given more personalised instruction, usually by the company owner. Their research shows that, the employer may let an apprentice go if they perform poorly on the job or in training centre whereas the apprentice will initiate the termination if it is because of the quality of training by the employer. Studies by

Harris and Simons (2005) in Australia concur and they identify various contributing training factors to this including: a deficit of qualified trainer or training.

Table 1: Publication title, author(s)/year, and country of origin

Publication Title	Author and Year	Country
Apprenticeship non-completion in Germany: a money matter	Neuber-Pohl, (2021)	Germany
How fast do apprenticeships come to a premature end Insights into the factors that determine the speed of the process	Greilinger and Sandner, (2021)	Germany
Strategies for improving construction craftspeople apprenticeship training programme: Evidence from the UK	Daniel <i>et al.</i> , (2020)	UK
An Investigation into apprenticeship completion and retention in Northern Ireland: A social exchange programme	Smyth and Zimba (2019)	UK
Factors affecting Modern Apprenticeship completion	Greig (2019)	UK
Unemployment, The Great Recession, and apprenticeship attrition in the US	Bilginsoy (2018)	USA
Regional disparities in apprenticeship attrition rates: heat and quarter four's significance in northern Australia	Zoellner <i>et al.</i> , (2017)	Australia
Factors affecting completion of apprenticeship training in England	Gambin and Hogarth (2016)	UK
Staying within or leaving the apprenticeship system? Revisions of educational choices in apprenticeship training	Bessey and Backes-Gellner (2015)	Germany
Apprenticeships in homelessness: A quantitative study	Cebulla and Goodwin-Smith (2015)	Australia
When working hard is not enough for female and racial/ethnic minority apprentices in the highway trades	Kelly <i>et al.</i> , (2015)	USA
Apprenticeship programme requirements and apprenticeship completion rates in Canada	Coe (2013)	Canada
The completion behaviours of registered apprentices in Canada: who continues, who quits, and who completes the programs?	Laporte and Mueller (2013)	Canada
Reasons for non-completion among apprentices: The case of automotive trades of the informal sector in Ghana	Donkor (2012)	Ghana
Retention and intentions to quit among Australian male apprentices	Gow <i>et al.</i> , (2008)	Australia
Hanging in there: What makes a difference in the first year of an apprenticeship	Hill and Dalley-Trim (2008)	Australia
Surviving apprenticeship training: A duration analysis of apprenticeship contracts in Australia	Mangan and Trendle (2008)	Australia
Delivering Skills: Apprenticeship program sponsorship and transition from training	Bilginsoy (2007)	USA
Meeting the skill needs of a buoyant economy: Apprenticeship - the Irish experience	O'Connor (2006)	Ireland
Exploring the notion of retention in apprenticeship	Harris and Simons (2005)	Australia
Registered apprenticeship training in the US construction industry	Glover and Bilginsoy (2005)	USA
General training by firms, apprentice contracts, and public policy	Malcomson <i>et al.</i> , (2003)	UK
The hazards of training: Attrition and Retention in construction industry apprenticeship programs	Bilginsoy (2003)	USA
Do unions help or hinder women in training? Apprenticeship Programs in the United States	Berik and Bilginsoy (2000)	USA

Much research has been carried out in the United States on the effect of union involvement. Apprenticeship training in the United States is sponsored under three

different schemes: jointly by a union and the employer (JP), by Non-Joint Multi Employer Programmes (NJMP), or unilaterally by Non-Joint Single Employer Programme (NJSP) (Glover and Bilginsoy, 2005). The sponsor determines the basic parameters of training including apprenticeship duration, mentor to apprentice ratio, wages, work practices and instruction. Bilginsoy (2007) found that the highest apprenticeship completion rate was found in JPs (56.8%) and the lowest were in NJMPs (47.3%). In his 2018 study, findings state that between 2001 to 2014, apprentices were able to maintain their apprenticeships for longer whilst with JP programmes, even when jobs became scarce. Similar results were reported by Glover and Bilginsoy (2005), Bilginsoy (2003), and Berik and Bilginsoy (2000).

#### *Human Capital Theory*

Human capital includes employees' skills, training, education, and knowledge viewed in terms of their value or cost to a company (Becker, 1962). Companies invest in human capital to enable higher levels of production and quality. Apprenticeship is an investment in skills and the cost of training can be viewed as an investment in future earning capacity. Non-completion of apprenticeships leads to a loss of human capital which in turn harms companies, which train to secure their skills supply.

Apprenticeships must have a pecuniary benefit to both apprentice and the training establishment as well as the other partners in the apprenticeship. The apprenticeship will end when the benefits fall short of its costs (Neuber-Pohl, 2021).

#### *Wages*

In Northern Ireland, Smith and Zimba (2019) found that where apprentices were paid higher than the recommended rate, this positively impacted on their intentions to stay with their apprenticeship. Similarly, in Germany, apprentices paid 5% more than the mean apprenticeship wages, had a slightly higher completion rate (Neuber-Pohl, 2021). In addition, those apprenticeships which led to a skilled profession and who were paid 5% more, had a 3.1% higher completion rate, signifying the influence of future payoffs. Malcomson, *et al.* (2003) also say that companies who commit to paying increased wages on successful completion, will be better positioned to retain more capable staff. In Australia, Mangan and Trendle (2008) found that wages only had an impact on completion, in the early stages of an apprenticeship, and had no effect in the latter stages. Bessey and Backes-Gellner (2015) found that financial distress led to choices towards an unskilled employment route rather than apprenticeship, due to the higher initial income on offer. Donker (2012) found 55% of non-completers from the motor trade in Ghana, citing financial distress, compared to 40% who cited workplace issues. 60% of interviewees suggested that increased financial support would have improved their chances of completing.

#### *Guidance Counselling*

Daniel *et al.* (2020) discusses how poor career guidance and an underestimation of what the apprenticeship entails, can result in apprenticeship non-completion. Donker (2012) found that the early termination of 25% of automotive trade non-completers interviewed in Ghana, was because of wrong career choice, or loss of interest in the trade. Inadequate career guidance may represent misunderstanding or difficulties in locating apprenticeship information, resulting in career predicaments (Powers and Watt, 2021). Gambin *et al.* (2016) argues that if better recruitment procedures are carried out, then a better match can be created between company and apprentice. Additionally, they argue that apprentices only discover elements of the craft that they

dislike while ‘on the job’, leading them to reconsider wages acceptability and apprenticeship completion.

### **Apprentice Attributes**

#### *Gender and Age*

In the context of gender, there is evidence to suggest that women are more likely to complete apprenticeships (Kelly *et al.*, 2015; Laporte and Mueller, 2013; Berik and Bilginsoy, 2000). Berik and Bilginsoy (2000) however found that men on average, had higher retention than women, except in joint sponsorship programmes in the United States. On the other hand, Gambin and Hogarth (2015) found that when gender was interacted with company sector in male dominated apprenticeships, women were 5% less likely to compete.

Prasil (Prasil *et al.*, 2005) followed the training of apprentices registered in 1992 for a 10-year period. Age on commencement was a factor with fewer older apprentices finishing and she suggested influences relative to age might be a factor like educational attainment, literacy levels etc

#### *Disability*

Gambin and Hogarth (2016) indicated that those with learning difficulty or a disability, are found to have lower probability of completing their apprenticeship. In contrast, Greig (2019) did not report a difference in the probability of apprentices with disabilities completing. Some apprentices may need more support than others including those with learning difficulties.

#### *Mental health*

Powers and Watt (2021) looked at apprentice experience at 6 monthly intervals and examined factors influencing non-completion including anxiety and workplace interest. They found that even if the apprentices do not drop out, that their experience may be poor and that they may seriously consider quitting, therefore their study looked at drop out consideration. Their study supported the hypotheses that drop out considerations were predicted by apprentices’ level of interest and anxiety on commencement of training (Powers and Watt, 2021).

The COVID 19 health crisis has had significant impacts to apprentices, most notably training disruptions, lockdowns, pandemic payments and redundancies as well as future career opportunities. Irish research would be welcome in this area to examine the impact of the pandemic, restrictions and ultimate reopening of the country on apprentice's mental health.

#### *Apprentices characterises and entry levels*

Entry levels are attributable to apprenticeship success. Laporte and Mueller (2013) found that the level of completion increased, if the participant had completed their high school diploma. Neuber-Pohl (2021) also discusses that non-completion is more prevalent from those who enter the apprenticeship from the lowest track of secondary school. Some students, on successfully leaving college, purposefully follow an apprenticeship, as a combination of further and academic education, which can be associated with higher earnings (Neuber-Pohl, 2021). Gambin and Hogarth (2015) summarised those entering Level 2 apprenticeships, having a Level 2 or Level 3 education previously, was associated with higher completion rates, and similarly at Level 3 apprenticeship.

## **Curriculum and Programme**

The quality of teaching and relationship with instructors has been found to be a factor affecting apprenticeship completion (Greig, 2019; Gambin and Hogarth, 2016). The structure of the apprenticeship programme in Canada was not related to apprenticeship completion (Coe, 2013). Coe (2013) found that longer apprenticeships did not result in lower completion rates or that block release training delivery were barriers to completion. In Germany, on passing a final exam, the qualified apprentice receives a nationally recognised Diploma. (Neuber-Pohl, 2021). Neuber-Pohl (2021) goes on to explain that where some trades, like electrical, are licensed, requiring apprentices to get a trade certificate before practicing, whereas others, like carpentry, are unlicensed, making it less competitive to begin and attracting lower salaries upon completion; thus, resulting in differing completion rates between trades. Coe (2013) also found that where certification was mandatory, completion rates were 10% higher.

Communication and collaboration between the company and the vocational training centre are vital to connect long term learning processes and teaching units (Neuber-Pohl, 2021). In a vocational school, the activities that apprentices must do are simpler at first, and progressively grow more difficult, so a lack of competence may not become apparent until later (Greilinger and Sandner, 2021).. In Ireland, the theory learned in the training centre, including the science and mathematics modules, are crucial to the education portion, but it is the application of these competencies in real life situations 'on the job'. (O'Connor, 2006).

## **CONCLUSION**

As the built environment continues to struggle to fulfil the void in skilled trades people, there is a need to mitigate against the non-completion levels within Irish apprentices. The Climate Action Plan 2021 and the Action Plan for Apprenticeships 2021-2025 outline, the construction industry in Ireland needs to change and there will be a need for not only more apprentices but apprentices in environmental practices. When properly trained, these qualified apprentices will become the key construction and built environment workers of the future. Therefore, this paper asks the question; what factors influence built environment apprentice's completion rates?

To address this, factors influencing apprenticeship completion rates were investigated via a systematic literature review. The factors influencing completion were found to include fundamental apprentice attributes, features of the apprenticeship programme and employer considerations. Improvements in policies are vital strategies for improving completion rates, to attract, train and retain apprentices to meet the industries future needs and stabilise the apprenticeship system.

This paper contributes to the current body of knowledge, by providing an understanding of the challenges faced by apprenticeship in built environment training, identifying the need for further research and subsequent change in practice and procedures, with possible policy changes required in the future. Further research into the issues of prevention and early warning, as well as the wider issue of prematurely ended apprenticeships in the Irish apprenticeship system, will proceed this study. Future investigations would be justified by the gaps highlighted in present understanding about apprenticeship training.

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