THE CHALLENGE OF COMPARING APPRENTICESHIP COMPLETION RATES: AN INTERNATIONAL REVIEW OF TERMINOLOGY

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When considering construction apprenticeship 'success', two general categories can be distinguished, namely completion and non-completion. However international comparisons cannot be effectively established because of the differing terminology and definitions used by various researchers. Comparative investigations face challenges due to social and educational disparities, making direct evaluations misleading or ineffective. The aim of this paper is to communicate how different countries define 'completion' and 'completion rates', to find common ground between the definitions and recommend consistent terms for use in further Irish research. Research papers from five countries were selected: - Ireland, United Kingdom. United States of America, Australia, and Germany to analyse and compare completion terminology. The literature confirms a lack of consensus on the terminology as well as differing methodology for calculating completion rate. There is limited research on apprenticeship completion in Ireland and as such the key contribution will be utilising this research to create a definition of apprenticeship completion and completion rates for Ireland to make comparisons internationally with the eventual hope of increasing apprenticeship success in this country.

Keywords: apprenticeship, built environment, terminology, vocational, training

INTRODUCTION

An apprenticeship is a planned programme of education and training that combines classroom instruction with workplace learning (Education and Skills, 2013). The programme places a strong emphasis on practical learning experience and prepares apprentices for a particular occupation while also addressing economic demands. An apprentice must be engaged under a contract of employment that calls for at least 50% of their training to be completed on the job (Generation Apprenticeship, 2020). There are eight built environment apprenticeships available in Ireland, including electrical, plumbing, and carpentry and joinery, within a total of 67 programmes. These adhere to a seven-phase, standards-based, on-the-job, and off-the-job strategy to achieve QQI (Quality and Qualifications Ireland) Level 6 certification (O'Connor, 2006) which is equivalent to Level 5 on the European Qualifications Framework (EQF) (Mc Manus,

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2014). This certificate is issued by An Seirbhísí Oideachais Leanúnaigh agus Scileanna (SOLAS), the national training and employment authority in Ireland.

When comparing international apprenticeship systems, it is firstly important to outline the similarities. Apprenticeship systems will always have the following in common:

- Apprenticeship programmes involve a system of on and off the job periods.
- The objective of apprenticeship programs is to equip individuals with the necessary skills and knowledge for a specific trade or occupation.
- Assessments are conducted to evaluate the competency, knowledge, and skills of apprentices, encompassing written exams, practical assessments, and workplace observations.
- There will be an overall statutory body with responsibility for apprenticeship in each country/region e.g., SOLAS (Ireland), Institute for Apprenticeships and Technical Education (England), Skills Development Scotland (Scotland) and the Federal Ministry of Economics and Energy (Germany). Sometimes it is shared between two or more bodies e.g., federal and territory government (Australia) and Department of Labour along with industry bodies and unions (USA).
- Completion usually results in recognised vocational qualification which may be assessed against the European Qualifications Framework (see table 1). It is worth noting that while these countries have similar apprenticeship systems to Ireland, there are differences in the specific regulations and requirements and as such the process and criteria for completion may vary.

One way of measuring programme success is by evaluating apprenticeship completion rates, but these can be difficult to compare internationally due to the differing definitions and terminology used by researchers. Gaining an understanding of international completion and completion rates may help increase overall apprenticeship completion in Ireland through implementation of specific policies, for example, the Action Plan for Apprenticeships (Department of Further and Higher Education, 2021).

European Qualifications Framework Level (EQF) →	EQF 4	EQF 5
Timeline ↘		
Country ↓		
Germany	3/4 years	
England/Wales/N Ireland	2 years	3/4 years
Scotland		4 years
Ireland		4 years
USA (Equivalent EQF Level)	4 years	
Australia (Equivalent EQF Level)	4 years	

Table 1 Table of equivalence of international qualifications (McManus, 2014)

Clear delineation of completion terminology and definition is essential to maintain consistency and accuracy in their analyses, as noted by Larsen *et al.,* (2013) and Kehm *et al.,* (2019). Terminology plays a crucial role in determining completion rates, as it establishes the criteria for defining a completed apprenticeship. Variations in terms and definitions exist across countries and industries, further complicating the establishment of a universal definition. Additionally, discrepancies in assessment methods, survey techniques, and certification levels contribute to the challenge. Standardising terminology and definitions can promote consistent reporting of completion rates and facilitates effective evaluations of apprenticeship programme.

This study is part of a University of Limerick research project investigating apprenticeship completion in Ireland. A major challenge is the lack of consistent definitions used in international studies, hindering comparisons. To address this, a structured approach is needed to analyse different countries' definitions and methodologies for calculating completion rates.

LITERATURE REVIEW

There has been a noticeable increase in the quantity of studies published by countries on apprenticeship completion, particularly in the past two decades. These studies focus on the UK (Smyth and Zimba, 2019; Daniel *et al.,* 2020; Greig, 2019; Gambin and Hogarth, 2016), Australia (Zoellner *et al.,* 2017; Cebulla and Goodwin-Smith, 2015; Gow *et al.,* 2008; Mangan and Trendle, 2008; Harris and Simons, 2005), USA (Bilginsoy, 2018; Kelly *et al.,* 2015; Glover and Bilginsoy, 2005) and Germany (Neuber-Pohl, 2021; Bessey and Backes-Gellner, 2015; Greilinger and Sandner, 2021). A recent systematic literature review identified various factors influencing completion were identified, such as apprentice characteristics, attributes of the apprenticeship program, and employer considerations, however, non-completion may stem from a combination of multiple factors (McMahon *et al.,* 2022).

The term "completion rate" refers to the percentage of apprentices who complete their training programs within a specified time frame. As identified in Table 2, various countries and training systems employ different methodologies for calculating these rates so understanding the specific methodology used is essential. For instance, time-based completion calculates the rate based on the apprentice number who complete the programme within the required time, while competency-based completion considers apprentices who have demonstrated proficiency in required competencies. Many countries adopt a hybrid approach that combines both time-based and competency-based criteria for completion.

Country	Apprentice Completion and Apprentice Completion Rates
Ireland	Completion is determined by the Education and Training Board Results Approval Panel, verifying achievement of standards, on-the-job and off-the-job elements, assessments, and meeting minimum apprenticeship duration. Completion rates vary across trades and industries, with reported overall rates of 66%. O'Connor (2006). A later report indicated completion rates of 65% in carpentry, 73% in electrical, and 69% in plumbing, without specific time constraints (Oireachtas Report, 2019).
Australia	Apprenticeship completion is determined by fulfilling both on-the-job training under the guidance of qualified tradespeople and off-the-job training. Qualification acquisition requires successful completion of various assessments, including written exams, practical evaluations, and workplace observations. Completion rates in trade occupations beginning in 2017 was 54% (NCVER, 2022) and are calculated by monitoring the apprentices progress and their contracts over time.
USA	Completion requirements vary by trade and state. Apprentices receive a nationally recognised certificate or journey worker card upon successful completion which serves as evidence of their competence. Completion rates in the United States varied across states, with an average rate of 59.4% reported in a study by Glover and Bilginsoy (2005). The completion rate represents the percentage of apprentices successfully completing the programme within a specified timeframe.
UK	Gambin and Hogarth (2016) define completion as obtaining a recognised vocational qualification, while Daniel *et al.,* (2020) defines it as achieving specified learning outcomes. In Scotland, completion is determined by meeting standards set by the Scottish Qualification Authority (Greig, 2019). Completion rates of 57.5% (academic year 2019/2020) reported (Department for Education, 2023), with variations across industries (Gambin, 2016; Daniel *et al.,* 2020; Greig, 2019).
Germany	Completion marked by passing the "Gesellenprüfung" exam which includes practical and written components. Upon successful completion, apprentices are awarded the "Gesellenbrief," a certificate of achievement (Bessey and Backes-Gellner, 2015). In Germany, the completion rates for apprenticeships were around 75% (Neuber-Pohl, 2021). Completion rate calculation like the UK i.e., dividing the number of graduates by the number who started the program.

Table 2 Completion and completion rates in selected countries

The varying definitions of retention and completion rates in the Irish and international education systems also present challenges when comparing data (Van Stolk, 2007). In

Irish schools, retention rate refers to the percentage of students who stay until their Leaving Certificate (O'Brien, 2023). The Higher Education Authority acknowledge the difficulty of developing internationally comparable measures due to diverse entry systems, access to HE, and definitional and methodological complexities (Piggot and Frawley, 2019). A comprehensive investigation was conducted to analyse completion rates within the Institute of Technology sector, wherein the concept of completion was defined as the successful conclusion of a course within the stipulated timeframe or a permissible extension of up to one year beyond the designated duration (CODIT, 2006). Comparative research conducted in Australia, Ireland, the USA, and the Netherlands aimed to explore non-continuation rates in HE found that not all countries measure completion rates. In the USA, completion refers to graduating within 150% of the normal course duration while Ireland distinguishes between on-time and late graduation. The Netherlands defines graduation as "yield," representing on-time graduates, and retention as the number of students continuing, HE after the first two years of study. The Netherlands employs a definition of progress, tracking the number of students who remain in their courses and progress on schedule. Australia defines attrition as dropouts after the first year of HE and measures completion rates as the graduation rate after seven years of study (Van Stolk, 2007).

The literature highlights a lack of consensus on the terminology and methodology for measuring apprenticeship completion rates worldwide. Common elements of completion include meeting training requirements, passing exams, and fulfilling competency standards. Apprenticeship completion rates in Ireland are not extensively researched or reported compared to other countries like Germany, the UK, the USA, and Australia. This lack of information creates knowledge gaps regarding the effectiveness of the program. Despite the significance of completion rates in evaluating apprenticeship programs, there is a lack of agreement on how to define and calculate these rates across countries and industries and standardisation would improve comparability and usefulness of completion rate data.

The overall aim of this paper is to address the challenges associated with researching and comparing apprenticeship completion rates in Ireland and internationally. The study aims to establish a standardised definition of apprenticeship completion and completion rate in Ireland to enhance the comparability and utility of data in this area of research and as such the research questions are as follows:

RQ1: What are the current challenges and limitations in researching apprenticeship completion rates in Ireland, and how does the lack of a standardised definition and methodology hinder the comparability of data across programs?

RQ2: What are the commonalities and differences in international terminology and methodology used to define and calculate apprenticeship completion rates, and how can these findings inform the development of a more comprehensive and standardised definition for calculating completion rates in Ireland?

METHOD

This study employed a literature review approach, building upon the previous systematic literature review (SLR) of McMahon *et al.,* (2022). These 24 papers were re-examined to determine consensus on terms, definitions, and technical evaluation methods. The literature review involved searching and analysing relevant literature from academic databases, journals, reports, and publications to understand apprenticeship completion rates and associated definitions and methodologies. The

SLR allowed for a comprehensive examination of findings across countries, identifying similarities and differences in terminology, measurement approaches, and reporting practices. The search strategy was developed, incorporating keyword searches, database selection, and inclusion/exclusion criteria aligned with the research questions and objectives. The SLR facilitated a broad understanding of existing knowledge by examination of findings across different countries and regions. Comparative analysis involved identifying similarities and differences in terminology, measurement approaches, and reporting practices. Data extraction techniques were used to gather relevant information, which was synthesised to develop a standardised definition for calculating completion rates in the Irish context. The methodology acknowledges limitations, such as potential biases in the literature and the generalisability of findings. Despite not utilising a mixed-methods approach, the SLR methodology enables a thorough examination of existing literature, contributing to the establishment of a standardised Irish definition for apprenticeship completion rates.

This study adopts an interpretivist philosophical positioning, as indicated by the focus on understanding and interpreting social phenomena related to apprenticeship completion rates (Saunders, 2009) The utilisation of secondary data, such as existing literature and publications, aligns with the nature of the data being collected for comparative analysis within the context of the study. By employing comparative analysis, the study aims to uncover patterns and variations in apprenticeship completion rates across different countries and systems, providing valuable insights to address the research objectives, informing policy decisions and allows continuous learning of the apprenticeship system.

FINDINGS

The first research question addresses the challenges and limitations associated with researching apprenticeship completion rates in Ireland, focusing on the lack of a standardised definition and methodology. This absence leads to inconsistencies in how completion rates are measured and reported, impeding the comparability of data. Researchers encounter difficulties in obtaining accurate and reliable data due to the absence of a common understanding and approach to defining and calculating completion rates. Consequently, assessing programme effectiveness, identifying areas for improvement, and making informed policy decisions are hindered.

The second research question aims to identify commonalities and differences in international terminology and methodology for defining and calculating apprenticeship completion rates which will inform the development of a standardised definition in Ireland. Similarities across countries can establish a common framework, while unique approaches can be adapted. Considering international perspectives will lead to a more robust and consistent definition and methodology, improving data comparability and usefulness in Ireland and enabling cross-country comparisons.

As this paper is focused on examining various definitions and terminologies used to describe apprenticeship 'success', there are no empirical results to report. Instead, this section will outline the key findings of the literature review in relation to how different countries define 'completion' and 'completion rates' in their apprenticeship systems. Over twenty different terms were found, all arguably meaning the same thing. These are outlined in Table 3. While terminology like completion and non-completion seems to be universal, Germany tends to favour terminology like termination, USA favours words like quitter and Australia favours 'withdrawal'. In

Ireland, the term completion was favoured in the one paper found during the 2022 SLR. The most predominantly used term used was completer while cancellation was used frequently as well. Dropout, drop out and drop-out were used in different papers while potentially meaning the same thing.

Table 3: Terminology used in research from Germany, USA, UK, and Australia

Publication Title, Author and Year, Country	Terminology used in paper
Apprenticeship non-completion in Germany: a money matter, Neuber-Pohl, (2021), Germany	Early contract termination, successful completion, non-completion
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	Drop-outs, early terminations, premature terminations, fast terminations
Strategies for improving construction craftspeople apprenticeship training programme, Daniel *et al.,* (2020), UK	Completion, non-completion
An Investigation into apprenticeship completion and retention in Northern Ireland: A social exchange programme, Smyth, and Zimba (2019), UK	Completion, non-completion, retention, drop out
Factors affecting Modern Apprenticeship completion, Greig (2019), UK	completion
Unemployment, The Great Recession, and apprenticeship attrition in the US, Bilginsoy (2018), USA	Attrition, completion, cancellation
Regional disparities in apprenticeship attrition rates: heat and quarter four's significance in northern Australia, Zoellner *et al.,* (2017), Australia	Successful completion, withdrawals, cancellations, non-completion
Factors affecting completion of apprenticeship training in England, Gambin and Hogarth (2016), UK	Completion, success
Staying within or leaving the apprenticeship system? Revisions of educational choices in apprenticeship training, Bessey and Backes-Gellner (2015), Germany	Dropping out
Apprenticeships in homelessness: A quantitative study, Cebulla and Goodwin-Smith (2015), Australia	Dropout, completer, drop-out
When working hard is not enough for female and racial/ethnic minority apprentices in the highway trades, Kelly *et al.,* (2015), USA	Completion, termination
Retention and intentions to quit among Australian male apprentices, Gow *et al.,* (2008), Australia	Retention, early withdrawal
Hanging in there: What makes a difference in the first year of an apprenticeship, Hill and Dalley-Trim (2008), Australia	Cancellation, non-completion, withdrawal, non-continuing
Surviving apprenticeship training: A duration analysis of apprenticeship contracts in Australia, Mangan and Trendle (2008), Australia	Attrition, completion, drop out, non-completion, cancellation, withdrawals
Delivering Skills: Apprenticeship program sponsorship and transition from training, Bilginsoy (2007), USA	Quitters, completers
Exploring the notion of retention in apprenticeship, Harris and Simons (2005), Australia	Retention, completion, non-completion, cancellation, withdrawal
Registered apprenticeship training in the US construction industry, Glover and Bilginsoy (2005), USA	Completion, cancellation, attrition
General training by firms, apprentice contracts, and public policy, Malcomson *et al.,* (2003), UK	Completion, quitter
The hazards of training: Attrition and Retention in construction industry apprenticeship programs, Bilginsoy (2003), USA	Completion, attrition, retention, cancellation, desertion, exit
Do unions help or hinder women in training? Apprenticeship Programs in the US, Berik and Bilginsoy (2000), USA	Attrition, retention, completion, dropout, cancellation, voluntary quits

The review of apprenticeship completion in Ireland, Germany, UK, USA, and Australia reveals variations in the terminology and methodology used to measure completion. The review identifies key elements for a potential framework to compare completion rates across countries, such as standardising terminology, developing a

common methodology, and accounting for differences in the structure and length in the programmes. However, it is important to note that this study does not guarantee the creation of a framework within its current scope.

The fundamental requirements for completion internationally consist of satisfying the mandated amount of both on-the-job and off-the-job training, successfully completing the final examination, and meeting the competency criteria established by the programme sponsor. It appears that certain countries have established a specific time completion criterion, so it may be reasonable to suggest a similar criterion for Ireland. In the USA, "college completion" refers to students who graduate within 150% of the standard programme length. Research in Irish Institutes of Technology's defined completion within the designated time frame or within one year beyond the given time frame. Neuber Pohl (2021) noted that the final apprenticeship exam could be taken after the apprenticeship contract ends and allowed for updates to the education variable within 183 days of the end of the apprenticeship period. SOLAS, who have statutory responsibility for apprenticeship say that the apprenticeship is completed when the apprentice has 'successfully achieved the required standard, completed all of the alternating on-the-job and off-the-job elements of his/her apprenticeship, and served the minimum 208-week apprenticeship period specified in the relevant Apprenticeship Programme' (Generation Apprenticeship, 2016) However, there is no upper limit, making international comparisons difficult. It would seem reasonable to allow a cut off limit of 234 weeks to account for examination board approval and certificate generation. It is proposed that the new apprenticeship completion rate for Level 6 QQI apprentices in Ireland is ' percentage of apprentices who complete their training programs within 234 weeks of registration with an extended completion rate of those who complete their apprenticeship within 260 weeks (5 years). This study is part of an ongoing research project at the University of Limerick investigating apprenticeship completion in Ireland. Preliminary unpublished findings indicate that within a 234-week period, electrical apprentices achieve a completion rate of 65%, plumbing apprentices demonstrate a rate of 55%, and carpentry and joinery apprentices exhibit a rate of 45% among those entering with the lowest educational entry level. However, it is important to note that these results do not provide an overall completion rate as apprentices with higher educational qualifications on entry to the apprenticeship programme were excluded from the initial analysis.

CONCLUSIONS

Apprenticeship completion rates and definitions vary widely between different countries and training systems and can be calculated using a variety of methodologies. The systematic literature review by McMahon *et al. (*2022) highlighted the importance of standardising terms to enable comparison across different studies. Defining "completion" is crucial, but interpretations may vary, causing different perceptions of fulfilment. Indicators like time to complete, employment status, and acquired skills are relevant but lack clear definitions and can be subjective. Additionally, completion should be assessed based on standardised criteria that encompass not only the duration of training but also the attainment of requisite skills and competencies. This comprehensive evaluation would ensure consistency and comparability across different apprenticeship systems.

When researchers, policymakers, and stakeholders have a clear understanding of the terminology used to define and measure completion rates, they can effectively communicate and exchange information which facilitates collaboration and the

sharing of best practices, enabling a more coordinated and targeted approach to address challenges related to completion rates. This information can be used to set realistic targets, establish quality assurance mechanisms, and allocate resources effectively. Researchers and evaluators can analyse data and identify areas for improvement, leading to evidence-based recommendations for programme modifications and enhancements. Creating a new Irish definition of completion and completion rates is crucial for future research in this area to enable consistent and comparable analysis of completion rates in Ireland and globally. It will aid in identifying factors that contribute to completion and informing policy decisions to improve completion rates in Ireland.

This paper on apprenticeship completion rates contributes to the conference theme "Constructing for the Future" by providing insights and recommendations that can inform the development and improvement of apprenticeship programs. By addressing challenges, standardising definitions, and identifying effective strategies, this study contributes to building a strong foundation for the future of apprenticeship education. This is crucial for the Irish construction industry as it helps to address the skills gap by providing a structured training pathway for individuals to acquire the necessary knowledge and practical skills specific to the construction sector. Apprenticeships ensure a skilled workforce capable of meeting the industry's increasing demands and promoting productivity and quality in construction projects. Furthermore, apprenticeship education fosters career development and upward mobility opportunities for individuals, promoting long-term sustainability and growth within the construction industry in Ireland.

In summary, a clear understanding of terminology related to apprenticeship completion rates facilitates effective communication, enables comparative analysis, informs policy development, supports programme evaluation, and promotes stakeholder engagement. These factors collectively contribute to increasing apprenticeship completion rates by guiding evidence-based decision-making, fostering collaboration, and implementing targeted interventions.

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