

Total VET program completion rates

Brad McDonald
National Centre for Vocational Education Research



Publisher's note

The views and opinions expressed in this document are those of NCVER and do not necessarily reflect the views of the Australian Government, or state and territory governments. Any interpretation of data is the responsibility of the author/project team.

To find other material of interest, search VOCEDplus (the UNESCO/NCVER international database <<http://www.voced.edu.au>>) using the following keywords: completion; data collection; outcomes of education and training; participation; providers of education and training; registered training organisation; statistical method; statistics; students; vocational education and training.

© Commonwealth of Australia, 2018



With the exception of the Commonwealth Coat of Arms, the Department's logo, any material protected by a trade mark and where otherwise noted all material presented in this document is provided under a Creative Commons Attribution 3.0 Australia <<http://creativecommons.org/licenses/by/3.0/au>> licence.

The details of the relevant licence conditions are available on the Creative Commons website (accessible using the links provided) as is the full legal code for the CC BY 3.0 AU licence <<http://creativecommons.org/licenses/by/3.0/legalcode>>.

The Creative Commons licence conditions do not apply to all logos, graphic design, artwork and photographs. Requests and enquiries concerning other reproduction and rights should be directed to the National Centre for Vocational Education Research (NCVER).

This document should be attributed as McDonald B 2018, *Total VET program completion rates*, NCVER, Adelaide.

This work has been produced by NCVER on behalf of the Australian Government and state and territory governments, with funding provided through the Australian Government Department of Education and Training.

COVER IMAGE: GETTY IMAGES

ISBN 978-1-925717-19-8

TD/TNC 131.08

Published by NCVER, ABN 87 007 967 311

Level 5, 60 Light Square, Adelaide SA 5000

PO Box 8288 Station Arcade, Adelaide SA 5000, Australia

Phone +61 8 8230 8400 Email ncver@ncver.edu.au

Web <<https://www.ncver.edu.au>> <<https://www.isay.edu.au>>

Follow us:  <<https://twitter.com/ncver>>  <<https://www.linkedin.com/company/ncver>>



About the research

Total VET program completion rates

Brad McDonald, National Centre for Vocational Education Research

The objective of this paper is to determine whether, following the introduction of 'total VET activity' (TVA) in 2014, it is possible to estimate projected completion rates for all vocational education and training (VET) programs. This paper also considers the possibility of incorporating the unique student identifier (USI) into the process of matching program enrolments and completions across years. Finally, the paper determines and evaluates an approach to estimating projected program completion rates for individual registered training organisations (RTOs).

Key findings

- Following refinements (NCVER 2016) to the current method of using 'absorbing Markov chains' (see Mark & Karmel 2010) to estimate the projected completion rates of government-funded programs, this methodology can also be applied to total VET activity, with only a slight modification to the process of matching a program enrolment and its completion across years. For TVA, program enrolments and completions can be matched using a student identifier, program identifier and RTO identifier. For government-funded activity, program enrolments and completions would continue to be matched using a student identifier, program identifier and data submitter (which represents the organisation that administered the funding of the training activity).
- The first year that total VET projected program completion rates can be reported for is 2015, given the methodology requires a three-year window, centred on the reporting year (TVA was implemented from 2014.) The rates calculated in this technical paper are for 2015 and use TVA data from 2014, 2015 and 2016.
- USIs can be readily incorporated into the process of matching enrolments and completions across years, and into the completion-rate methodology. Where a USI is not available, the current method of using an encrypted identifier, sex and date of birth will continue.
- Projected program completion rates for individual RTOs can be calculated using absorbing Markov chains in the following instances:
 - where an RTO has at least 50 program enrolments in both the commencing year and the following year
 - for RTOs with more than 1000 program enrolments in both the commencing year and the following year it is possible to estimate the projected program completion rates for student and training attributes for an individual RTO.

Dr Craig Fowler
Managing Director, NCVER

Contents



Tables and figures	6
Introduction	7
Can the process be adapted for TVA program completion rates?	8
The unique student identifier	10
Program completion rates for individual RTOs	13
Conclusion and future work	16
Individual completion rates	16
USI use in the unique counting unit	16
References	18
Appendix A – The methodology	19
Appendix B – 2015 TVA projected program completion rates	21

Tables and figures

Tables

1	Projected TVA program completion rates by state or territory of delivery location, using the different methods (A and B) of matching program enrolments, 2015	12
2	Projected government-funded VET program completion rates by state or territory, using different methods (A and B) of matching program enrolments, 2015	12
3	Rules for calculating RTO program completion rates depending on the number of program enrolments	13
4	Number of RTOs by projected VET program completion rate and RTO size for programs that commenced in 2015	14
A1	The 2016 status of 2015 TVA program enrolments	20
A2	The 2016 status of 2015 TVA program enrolments, as a proportion (%)	20
B1	Projected TVA program-completion rates by state or territory of RTO's head office, using the different methods of matching program enrolments, 2015	21
B2	Projected TVA program completion rates by state or territory of delivery location, using the different methods of matching program enrolments, 2015	21
B3	Projected TVA program completion rates by state or territory of client, using the different methods of matching program enrolments, 2015	22
B4	Projected TVA program completion rates by program level, using the different methods of matching program enrolments, 2015	22
B5	Projected TVA program completion rates by provider type, using the different methods of matching program enrolments, 2015	22
B6	Projected TVA program completion rates by field of education, using the different methods of matching program enrolments, 2015	23
B7	Projected TVA program completion rates by funding source, using the different methods of matching program enrolments, 2015	23

Figures

1	Proportion of small RTOs (<50) in each projected program completion rate range for programs that commenced in 2015 (%)	15
2	Proportion of medium RTOs (50–999) in each projected program completion rate range for programs that commenced in 2015 (%)	15
3	Proportion of large RTOs (>1000) in each projected program completion rate range for programs that commenced in 2015 (%)	15

Introduction

Program completion rates are an important measure for determining the success and efficiency of the Australian vocational education and training (VET) system. Until recently, the National Centre for Vocational Education Research (NCVER) only collected information from government-funded training organisations and consequently only published completion rates for government-funded VET programs. This paper investigates whether, with the introduction of 'total VET activity' (TVA) in 2014, it is now possible to calculate completion rates for all VET programs.

If every student's enrolment can be tracked from start to finish, then the methodology used in the calculation of government-funded completion rates can be assumed to be suitable for TVA. In determining whether this methodology can be applied to TVA, three questions need to be asked:

- Is enough information available to match program enrolments and completions across years?
- Are enough years of data available?
- Are any adjustments needed to the model to cater for total VET activity?

The methodology requires information from a three-year window, centred on the commencing year. Total VET activity was introduced in 2014, which was both the first and a transition year, in that a number of training providers were granted exemptions from reporting, while others did not report their training activity. Many training providers also reported data for the first time. Information on TVA program enrolments and completions is only available from 2014. With the requirement of a three-year window, centred on the commencing year, 2015 is therefore the first year for which program completion rates can be calculated for TVA.

The introduction of the unique student identifier (USI) in 2015 provides an opportunity to better track a program enrolment across multiple years and to determine whether that program has been completed. This paper considers whether the USI can be incorporated into the process of matching enrolments and completions across years and ways in which it can be utilised in the methodology for calculating program completion rates.

This paper also evaluates the possibility of calculating program completion rates for individual RTOs and whether any additional factors need to be considered in their derivation.



Can the process be adapted for TVA program completion rates?

This section reviews the suitability of the methodology used for estimating projected completion rates for government-funded VET programs as the preferred approach for calculating projected program completion rates for total VET activity.

The current methodology used by NCVET to estimate projected government-funded VET program completion rates is presented in Mark and Karmel (2010). In 2016, NCVET reviewed this method and concluded that this method is reliable and aligns well with the actual rates of completion (NCVET 2016). Given that it takes a number of years for actual rates of completion to stabilise, the review found that the projected completion-rate method should be used to estimate rates for the most recent years and the actual rates used for prior years.

Another key finding of the review was a recommendation for the definition of a program commencement and its starting date: defining a program's commencing year as the year it first appears in the National VET Provider Collection rather than using the commencing flag variable. This updated methodology was first used in the calculation of government-funded program completion rates in *Australian vocational education and training statistics: VET program completion rates, 2011–15*, released in 2017 (NCVET 2017). Here actual rates were calculated for the years 2011–12 and projected rates were estimated for years 2013–15.

The methodology for estimating projected completion rates requires information about a program enrolment, such that it is classified as being in one of four transition states:

- commencing course year
- continuing course year
- dropped out of the course
- completed the course.

These transition states are used in the 'absorbing Markov chain' theory to derive the probability of a commencing program enrolment being completed. Student and program information are matched across a three-year window, centred on the commencing year. This commencing year is *year n*, the year prior *n-1*, and the following year *n+1*. This means that completion rates cannot be calculated for the first year that TVA was introduced (2014), as there is no information available for the *n-1* year (2013).

As a program's commencement is determined by the first year it appears in the National VET Provider Collection, all programs in the first year of TVA would have a commencing year of 2014, even though they may actually be continuing enrolments from a previous year. Completion rates can therefore only be calculated from 2015 and onwards.

If every student's enrolment can be tracked from start to finish, then the methodology used in the calculation of government-funded completion rates can be assumed to be suitable for TVA.

Three questions will help to determine whether this methodology can be applied to TVA:

- Can the transition states be classified using the information collected in TVA?
- Is enough information available to match program and completion data across years?
- Are enough years of data available?

The answer to the first question is yes: the data collected can be used to classify a program enrolment in one of the four transition states. NCVET uses the data collected from program enrolments to determine whether the program is commencing or continuing. It uses the data from program completions to determine whether the program is complete, and a program is classified as dropped out if there was a program enrolment in a year, no enrolment in the following year and no completion for that program.

The answer to the second question is also yes: enough information is collected to track a program enrolment across years and also match to a program completion. In the methodology used in the government-funded VET projected program completion rates, program enrolments are matched across years by using an encrypted identifier (unique encrypted ID), sex, date of birth, course identifier and data-submitter identifier. All of these are collected by NCVET as part of the TVA collection.

Finally, as previously discussed, the requirement for having data to cover a three-year window, centred on the commencing year, is met by providing completion rates from 2015 and onwards.

For government-funded activity, program enrolments and completions will continue to be matched using a student identifier, program identifier and data-submitter identifier. This is to maintain the definition for a state or territory within government-funded activity, defined as the organisation that administered the funding of the training activity.

The state of funding definition does not apply to a TVA program, and a training provider identifier is therefore more suitable for classifying an individual's enrolment in a single VET program. For TVA, programs and enrolments will be matched using a student identifier, program identifier and an RTO identifier.

In summary, the method of using absorbing Markov chains to calculate program completion rates can be applied to TVA. Further explanation of the methodology and a worked example can be found in appendix A. Appendix B presents 2015 TVA program completion rates for various training attributes.

The unique student identifier

In the previous section, where the suitability of using the government-funded VET program completion rates methodology for TVA was assessed, an important question was addressed: is there enough information available in TVA to match data across years? As NCVET does not collect the actual names and addresses of individuals, the current process of matching students across years is based on a combination of an encrypted identifier, sex and date of birth. There are, however, issues with using this encrypted identifier that limit the accuracy of how data can be matched across years. For example, a new encrypted identifier is created if a student changes his or her name and therefore it might not be possible to match this to any previous year's enrolment or completion information.

By incorporating the unique student identifier (USI) into the process of tracking a student's enrolment, the accuracy of matching information across years and between program enrolments and completions should be increased. This process can be undertaken for both government-funded and TVA since the USI is collected as part of the National VET Provider Collection.

Introduced under the *Student Identifiers Act 2014*, the USI is a reference number made up of 10 numerals and letters assigned to each student through the Australian Government's USI website. From 2015, an RTO cannot issue a VET qualification or statement of attainment to an individual without a USI. Students who have a genuine personal objection to being assigned a USI are able to apply for an exemption. A number of additional exemptions apply, such as for international offshore students; this means the USI does not have complete coverage in the National VET Provider Collection.

The USI could be used in a similar way to the current matching process to track a student's progress in a program. The current matching process (A) uses a combination of: encrypted identifier, sex, date of birth, course identifier and either RTO for total VET, or data-submitter identifier for government-funded VET. In the USI process (B), the USI would replace the encrypted identifier, sex and date of birth, where possible, and use (A) where the USI is not supplied. The combination of a student identifier and program identifier is required as it is a program completion rate and a student may have enrolled in more than one program and each needs to be separated and tracked to determine a program completion rate.

Table 1 shows projected program completion rates for the two methods of matching (A and B) for state or territory of delivery location for TVA in 2015. It indicates that across most jurisdictions projected program completion rates are improved when the USI is included in the matching process. Table 2 shows the government-funded program completion rates for the two methods of matching (A and B) for state or territory of data submitter in 2015.

An individual's enrolment in a single program, where a student identifier is combined with the program identifier and either data-submitter identifier for government-funded VET or RTO for total VET, is known as a unique counting unit (UCU). A student may be enrolled in more than one program and therefore the student will have multiple counting units. The unique counting unit is the single unit from which completion rates are calculated, and it is this information that is matched across years to construct the longitudinal dataset.

Under the current method of matching students for government-funded program completion rates, the UCU is constructed by combining an encrypted identifier, sex, date of birth, program identifier and data-submitter identifier. Under the proposed changes, only the USI, program identifier and data-submitter identifier will be used to create the unique counting unit.

There are some issues with using the USI as the preferred method of matching across years. The main one in the short term is that the USI was not implemented until 2015; therefore, it cannot be used to match programs that started before 2015. In 2016, 84% of TVA program enrolments had a USI; for government-funded programs this figure increases to 94%. Both of these figures also include those students with a valid exemption.

For both TVA and government-funded VET program completion rates, a transition is required to enable the incorporation of the USI into the unique counting unit. The main reason for this is to ensure that programs that began before the implementation of USI can be matched to the program that is continuing or completed after the USI was implemented. In the transitional period, the USI will be used as the student identifier in the unique counting unit if the commencing year is 2015 or later and only if a USI appears with both a program enrolment and a program completion. In all other cases, the primary source of the student identifier in the UCU will be created from the encrypted identifier, sex and date of birth.

As 2016 is the first commencing year for which the USI is available for matching enrolments and completions in each year of the three-year window, the transition period should remain until those students who began their training in 2016 have had sufficient time to complete their training (2020). Projected program completion rates would be calculated for 2016 commencing enrolments until 2019, after which actual program completion rates will be available. This would allow the USI to be the primary source of the student identifier in the unique counting unit, with the encrypted identifier, sex and date of birth (A) only used where USIs were not available.

Not only is there greater potential to match between program enrolment and program completion using the USI, there is also a better chance of determining the commencing year of the program. As previously identified, the commencing year is the first year a program enrolment appears in the collection. With more efficient matching processes, the program enrolment can be better allocated to one of the four transition states.

Using the USI in the matching process can both raise and lower the completion rates compared with those obtained using the encrypted identifier, sex and date of birth. For example, better matching between program enrolment and completion will increase the rate, while the rate may be lowered if an enrolment is determined to be a continuing enrolment, instead of a commencing enrolment.

In summary, the USI should be used as the preferred method of matching students across years for all commencing programs from 2015; the current method of using encrypted identifier, sex and date of birth should only be used where there is no USI or where the program commenced before 2015. This process of incorporating USIs into the matching process should also be used in the calculation of government-funded VET program completion rates.

Table 1 Projected TVA program completion rates by state or territory of delivery location, using the different methods (A and B) of matching program enrolments, 2015

State or territory of delivery location	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A (%)	Percentage point difference between A and B	Percentage difference (%) between A and B
New South Wales	45.5	45.8	0.2	0.5
Victoria	45.4	45.4	0.1	0.2
Queensland	47.0	47.7	0.7	1.5
South Australia	42.6	42.8	0.2	0.5
Western Australia	39.6	39.2	-0.4	-1.0
Tasmania	40.1	40.4	0.4	0.9
Northern Territory	41.8	42.1	0.2	0.6
Australian Capital Territory	44.4	44.6	0.3	0.6
Overseas	64.1	64.1	0.0	0.0
Other	52.0	52.9	0.8	1.6
Australia	45.1	45.4	0.3	0.6

Table 2 Projected government-funded VET program completion rates by state or territory, using different methods (A and B) of matching program enrolments, 2015

State or territory of the organisation that administered the funding of the training activity	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A (%)	Percentage point difference between A and B	Percentage difference (%) between A and B
New South Wales	52.5	52.9	0.4	0.7
Victoria	47.3	47.8	0.4	0.9
Queensland	58.1	59.2	1.1	1.9
South Australia	43.4	44.0	0.7	1.6
Western Australia	40.0	40.3	0.3	0.8
Tasmania	49.0	50.0	1.1	2.1
Northern Territory	42.9	43.1	0.3	0.6
Australian Capital Territory	45.6	46.0	0.4	0.8
Australia	49.4	50.0	0.6	1.2

Tables B1 to B7 provide total VET program completion rates by state or territory of RTO head office, state or territory of delivery location, state or territory of residence, program level, provider type, field of education and funding source.

Note that these projected rates may not be comparable across jurisdictions, with rates being impacted by different jurisdictional enrolment practices and funding policies.



Program completion rates for individual RTOs

Demand for data on completion rates has grown over recent years and there has been a policy focus in this area, including calls for information on the program completion rates of RTOs.

One of the concerns about estimating projected program completion rates for RTOs is whether the Markov chain methodology is applicable to RTOs with small numbers of program enrolments. An RTO with a single or small number of program enrolments can have a dramatic effect on the calculated completion rate. As the completion-rate calculation depends on how programs transition between states over two years, a minimum number of program enrolments for the commencing year and the following year must be maintained. For an acceptable margin of error (approximately $\pm 10\%$) and confidence interval (90%), an RTO must have at least 50 program enrolments in both years.

For new RTOs or an existing RTO with zero enrolments in the year prior to the commencing year ($n-1$), a projected program completion rate for that RTO can still be calculated. The completion-rate formula (see appendix A) includes the proportion of programs continuing from the previous year. For these RTOs, that proportion is zero and the program completion rate will be calculated from the proportion that commences in year n and completes in the following year, $n+1$.

Program completion rates can also be calculated for different student and training attributes in an RTO. For example, a completion rate can be calculated for programs by sex or age range, or by qualification level within an RTO. Again, there is a risk that the number of program enrolments for those student or training attributes may be fewer than the 50 minimum required for an entire RTO. NCVER has consequently developed a set of rules specifying how program completion rates can be calculated for an RTO depending on the number of program enrolments in the commencing year (n) and the following year ($n+1$). These rules are given in table 3.

Table 3 Rules for estimating projected RTO program completion rates depending on the number of program enrolments

Program enrolments in commencing year (n) and following year ($n+1$)	Rules for calculating RTO completion rates	Size of RTO
Fewer than 50 in either n or $n+1$	No completion rate can be calculated.	Small
Greater than 50 in both n and $n+1$ but not greater than 1000 in both n and $n+1$	An overall, single RTO level completion rate can be calculated. No further disaggregated rates.	Medium
Greater than 1000 in both n and $n+1$	An overall, single RTO level completion rate can be calculated. Completion rates for student or training attributes within the RTO may also be calculated.	Large

In 2015, 3450 RTOs reported at least one commencing program enrolment at certificate I or above. Of these, 1499 were small RTOs with fewer than 50 program enrolments in either 2015 or 2016. Program completion rates would not be calculated for these RTOs under the rules outlined above.

Of the 1715 medium-sized RTOs, with between 50 and 1000 enrolments in both 2015 and 2016, a completion rate can be calculated for the entire program enrolments for each RTO.

For the 236 large RTOs, those with 1000 or more program enrolments in both 2015 and 2016, a completion rate can be calculated for the entire program enrolments for each RTO, as well as for student or training attributes within the RTO.

These figures are based on an individual RTO identification number; in some instances an RTO may have multiple identification numbers or multiple RTOs may have merged and are now operating under a single identification number. It is possible to group multiple RTO identification numbers to produce a combined projected program completion rate. This method of grouping identification numbers can also be applied in other situations; for example, a combined projected program completion rate can be calculated for all small RTOs in a state or territory.

Each program enrolment is comprised of a number of subjects, also known as 'modules' or 'units of competency'. It is possible to calculate subject-completion rates, termed a 'load pass rate', which is weighted by reporting hours to accommodate the varying lengths of individual subjects. A subject load pass rate is defined in Bednarz (2012) as: 'the ratio of hours studied by students who passed their subject(s) to the total hours committed by all students who passed, failed or withdrew from the corresponding subject(s)'.

As Bednarz (2012) explains, load pass rates use actual data (no estimation required) since the subjects are all completed within a year. Thus there is no requirement for a minimum number of subject enrolments to enable these rates to be determined. While there are distinct differences between program and subject enrolments and how these are calculated, calculating subject-load pass rate could be offered as a substitute to RTOs that do not meet the minimum program enrolments.

Based on TVA figures for 2015, projected program completion rates vary considerably by individual RTO, with 10.5% of RTOs having a zero per cent projected program completion rate and 5.9% of RTOs a one hundred per cent projected program completion rate (table 4 and figures 1 to 3).

Table 4 Number of RTOs by projected VET program completion rate and RTO size for programs that commenced in 2015

Projected program completion rate range	RTO size based on number of program enrolments in 2015 and 2016							
	Small <50	%	Medium 50–999	%	Large >1000	%	Total	%
0.0%	290	19.3	70	4.1	3	1.3	363	10.5
0.1–20.0%	171	11.4	179	10.4	40	16.9	390	11.3
20.1–40.0%	189	12.6	232	13.5	34	14.4	455	13.2
40.1–60.0%	215	14.3	387	22.6	70	29.7	672	19.5
60.1–80.0%	237	15.8	476	27.8	64	27.1	777	22.5
80.1–99.9%	207	13.8	359	20.9	23	9.7	589	17.1
100.0%	190	12.7	12	0.7	2	0.8	204	5.9
Number of RTOs	1499	100.0	1715	100.0	236	100.0	3450	100.0

Figure 1 Proportion of small RTOs (<50) in each projected program completion rate range for programs that commenced in 2015 (%)

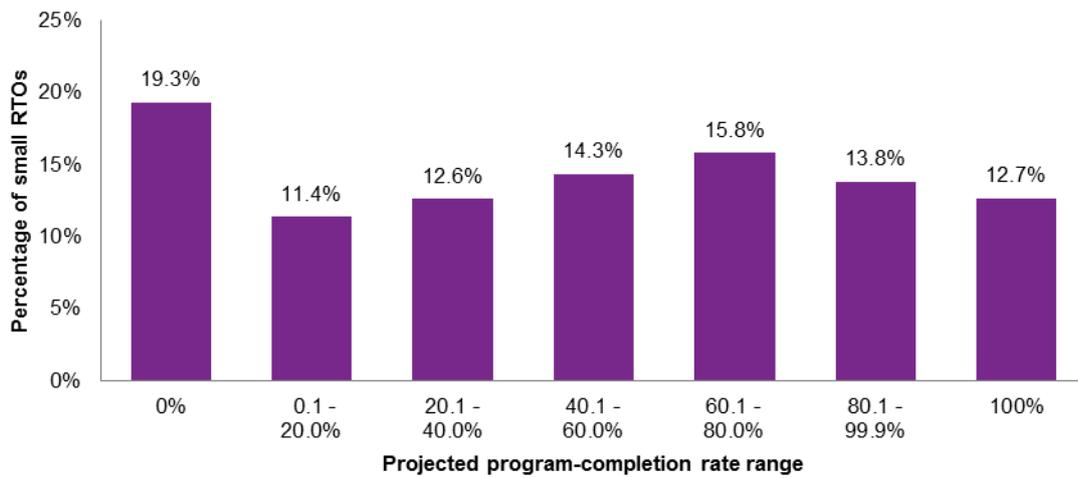


Figure 2 Proportion of medium RTOs (50–999) in each projected program completion rate range for programs that commenced in 2015 (%)

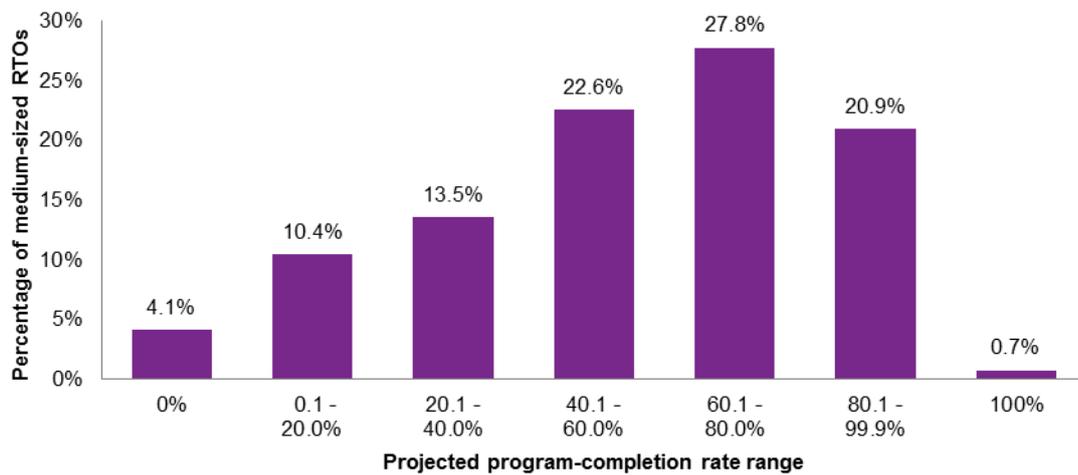
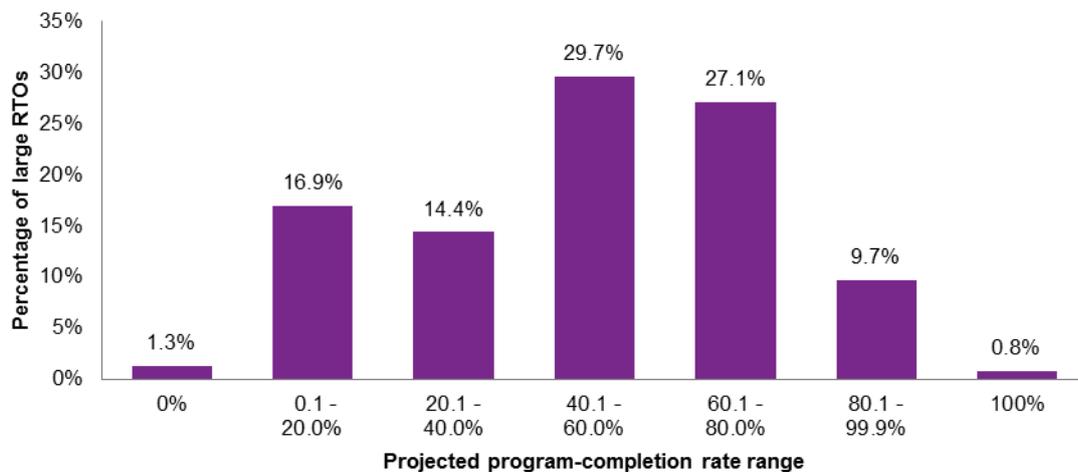


Figure 3 Proportion of large RTOs (>1000) in each projected program completion rate range for programs that commenced in 2015 (%)





Conclusion and future work

This paper has shown that the methodology developed by Mark and Karmel (2010) is suitable for estimating projected total VET program completion rates, and that completion rates can be calculated for individual registered training organisations with 50 or more program enrolments in both the commencing year and the following year. Having such information available would provide a starting point for understanding diversity across providers and the factors that contribute to the differences observed.

This paper also demonstrates that the USI is the preferred student identifier variable for matching data across years. Using the USI increases the number of correct matches between program enrolments and completions, which in turn increases the accuracy of the projected completion rate.

A logical extension of this work is to investigate the suitability of the methodology for calculating individual completion rates, as well as confirm the use, from 2020, of the USI as the primary component of the unique counting unit.

Individual completion rates

With the introduction of the USI, it may now be possible to calculate individual completion rates to provide information on the percentage of commencing students who have completed at least one VET program.

There are many reasons why a student may not complete the program in which they were enrolled: the student may have transferred to a comparable program; continued the same course with a different training organisation; accidentally enrolled in an incorrect course; the training organisation may have closed before the student could complete their course – or a combination of these.

Until now, an individual student's progress could only be tracked if he or she attended the same training provider and kept the same student identification number. There has been no way of tracking a student across different training organisations and therefore no way of determining whether a student completed at least one course. With the USI, a student's enrolments and completions can be tracked, meaning that it should be possible to calculate an individual completion rate. This could be achieved by modifying the method used to calculate VET program completion rates. A longitudinal dataset could be created, whereby the client information is collected and the USI matched with a program completion. This could then be used in the Markov chain formula (see appendix A) to calculate completion rates in instances where a student has completed at least one program.

USI use in the unique counting unit

In 2019, a review should also be conducted to assess the ongoing suitability of using the USI to match enrolments and completions as the primary component of the unique counting unit (UCU). As outlined in this paper, the USI could be used in the UCU if the program commenced in 2015 or later and only if a USI appears with both a program enrolment and a program completion.

In all other cases, the primary source of the student identifier in the UCU would be created from an encrypted identifier, sex and date of birth. In 2020, it should be possible to use the USI as the main component of the UCU as the USI should be available to match enrolments and completions in each year of the three-year window.



References

- Bednarz, A 2012, *Lifting the lid on completion rates in the VET sector: how they are defined and derived*, viewed November 2017, NCVER, Adelaide, <<http://www.ncver.edu.au/publications/2467.html>>.
- Mark, K & Karmel, T 2010, *The likelihood of completing a VET qualification: a model-based approach*, NCVER, Adelaide, viewed November 2017, <<http://www.ncver.edu.au/publications/2272.html>>.
- NCVER (National Centre for Vocational Education Research) 2016, *VET program completion rates: an evaluation of the current method*, NCVER, Adelaide, viewed November 2017, <<https://www.ncver.edu.au/publications/publications/all-publications/vet-qualification-completion-rates-an-evaluation-of-the-current-method>>.
- 2017, *Australian vocational education and training statistics: VET program completion rates, 2011–15*, NCVER, Adelaide, viewed November 2017, <<https://www.ncver.edu.au/publications/publications/all-publications/vet-program-completion-rates-2011-15>>.



Appendix A – The methodology

The first step in the process of estimating projected VET program completion rates is to create a dataset of program enrolments. The second stage is to determine whether each program enrolment has been completed, by matching information about program completions to program enrolments across years.

In the first step, students are matched with the programs in which they are enrolled. From this, the commencing year is determined to be the first year in which the program appears in the dataset. Information about students and training attributes can be added to this dataset to calculate completion rates for these attributes. For government-funded VET, program completion rates are calculated by: state or territory of the organisation that administered the funding of the training activity, program level, field of education, full-time status, age and previous education. Tables B1 to B6 in appendix B show TVA projected program completion rates for programs commencing in 2015 by state or territory of RTO head office, state or territory of delivery location, state or territory of student residence, program level, field of education, provider type and funding source.

This dataset now includes information about program enrolments and program completions. The next stage is determining the status of the program enrolments for the commencing year and the following year. In the Mark and Karmel (2010) process, each program enrolment is classified in a one-year period as being in one of the four transition states:

- commencing course year
- continuing course year
- dropped out of the course
- completed the course.

A program enrolment can only be classified to one transition state in each year, so if a program commences and completes in the same year, it has deemed to have commenced in year n and completed in the following year $n+1$. This shift from one transition state to another depends only on the transition state the program is currently in, and is independent of the past; Mark and Karmel (2010) describe this as a discrete-time stochastic (random) process. The last two transition states (dropped out of the course and completed the course) are called absorbing transition states, as a program that has been completed or dropped out remains a completed or dropped out program.

The first two transition states are transient states (commencing and continuing), as a student in these transition states will eventually leave it for another transition state, and will finally transition into one of the absorbing states. As the longitudinal dataset contains information across many years, it is possible for a program enrolment to be in none of these four transition states; thus a dummy variable (not in system) is created for such enrolments. The status of these 'not in system' program enrolments is either: have not yet commenced, have already been completed or have already dropped out of the year of interest.

Once a program enrolment has been classified to a transition state, we apply the method set out in Mark and Karmel (2010) to derive the program-enrolment statuses for both the

commencing year (n) and also the transitioning states for the following year ($n+1$). Table A1 shows the number of program enrolments as they transition from 2015 to 2016.

Table A1 The 2016 status of 2015 TVA program enrolments

Program enrolments in 2015	2016 status					Total
	Completed (1)	Dropped out (2)	Continuing (3)	Commencing (4)	Not in the system	
Completed (1)	10 248	8 768	1 728	0	821 787	842 531
Dropped out (2)	542	0	15 254	0	1 421 012	1 436 808
Continuing (3)	254 188	263 762	158 314	0	0	676 264
Commencing (4)	807 885	1 003 188	390 602	0	0	2 201 675
Not in the system	0	0	0	1 909 063	0	1 909 063
Total	1 072 863	1 275 718	565 898	1 909 063	2 242 799	7 066 341

While table A1 provides the number of program enrolments as they transition from 2015 to 2016, it is the proportion that is required for the Markov chain theory formula. The highlighted section in table A2 indicates the data required for the formula.

Table A2 The 2016 status of 2015 TVA program enrolments, as a proportion (%)

Program enrolments in 2015	2016 status					Total
	Completed (1)	Dropped out (2)	Continuing (3)	Commencing (4)	Not in the system	
Completed (1)	1.22	1.04	0.21	0.00	97.54	100%
Dropped out (2)	0.04	0.00	1.06	0.00	98.90	100%
Continuing (3)	37.59	39.00	23.41	0.00	0.00	100%
Commencing (4)	36.69	45.56	17.74	0.00	0.00	100%
Not in the system	0.00	0.00	0.00	100.00	0.00	100%

The completions formula given in Mark and Karmel (2010) uses the theory of absorbing Markov chains and is as follows:

$$\text{Pr}(\text{eventually completing a course}) = p_{41} + p_{43} \frac{p_{31}}{p_{31} + p_{32}}$$

Where

p_{41} = proportion of program enrolments commenced in year n and completed in $n+1$

p_{43} = proportion of program enrolments commenced in year n and continuing in $n+1$

p_{31} = proportion of program enrolments continuing in year n and completed in $n+1$

p_{32} = proportion of program enrolments continuing in year n and dropped out in $n+1$

Using the highlighted data in table A2, gives each variable the following:

$$p_{41} = 36.69$$

$$p_{43} = 17.74$$

$$p_{31} = 37.59$$

$$p_{32} = 39.00$$

Applying these to the Markov chain formula results in the projected probability of a TVA program enrolment commenced in 2015 eventually being completed of 45.4%.



Appendix B – 2015 TVA projected program completion rates

Tables B1 to B7 describe 2015 projected total VET program completion rates for the following sub-categories: state or territory of RTO head office, state or territory of delivery location, state or territory of residence, program level, provider type, field of education and funding source.

Note that these projected rates may not be comparable across jurisdictions, with rates being impacted by different jurisdictional enrolment practices and funding policies.

Table B1 Projected TVA program-completion rates by state or territory of RTO's head office, using the different methods of matching program enrolments, 2015

State or territory of RTO's head office	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
New South Wales	47.5	47.7	0.3	0.6
Victoria	46.2	46.3	0.1	0.2
Queensland	44.0	44.7	0.6	1.5
South Australia	40.5	40.8	0.3	0.8
Western Australia	41.6	41.2	-0.4	-0.9
Tasmania	38.4	38.7	0.3	0.8
Northern Territory	45.7	45.9	0.2	0.5
Australian Capital Territory	51.2	51.4	0.3	0.5
Other	48.8	46.7	-2.1	-4.4
Australia	45.1	45.4	0.3	0.6

Table B2 Projected TVA program completion rates by state or territory of delivery location, using the different methods of matching program enrolments, 2015

State or territory of delivery location	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
New South Wales	45.5	45.8	0.2	0.5
Victoria	45.4	45.4	0.1	0.2
Queensland	47.0	47.7	0.7	1.5
South Australia	42.6	42.8	0.2	0.5
Western Australia	39.6	39.2	-0.4	-1.0
Tasmania	40.1	40.4	0.4	0.9
Northern Territory	41.8	42.1	0.2	0.6
Australian Capital Territory	44.4	44.6	0.3	0.6
Overseas	64.1	64.1	0.0	0.0
Other	52.0	52.9	0.8	1.6
Australia	45.1	45.4	0.3	0.6

Table B3 Projected TVA program completion rates by state or territory of client, using the different methods of matching program enrolments, 2015

State or territory of residence	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
New South Wales	47.3	47.5	0.2	0.5
Victoria	43.1	43.2	0.1	0.1
Queensland	47.2	47.9	0.7	1.6
South Australia	41.3	41.6	0.2	0.6
Western Australia	37.2	36.5	-0.7	-1.9
Tasmania	37.0	37.2	0.2	0.6
Northern Territory	40.8	41.0	0.2	0.5
Australian Capital Territory	40.9	41.1	0.3	0.7
Overseas	59.9	60.4	0.5	0.8
Other	34.4	39.2	4.9	14.2
Australia	45.1	45.4	0.3	0.6

Table B4 Projected TVA program completion rates by program level, using the different methods of matching program enrolments, 2015

Program level	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
Diploma or higher	42.8	43.3	0.4	1.0
Certificate IV	51.4	51.7	0.3	0.5
Certificate III	46.9	47.2	0.4	0.8
Certificate II	44.2	44.2	0.0	0.0
Certificate I	31.0	31.1	0.1	0.4
Total	45.1	45.4	0.3	0.6

Table B5 Projected TVA program completion rates by provider type, using the different methods of matching program enrolments, 2015

Provider type	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
School	54.6	55.3	0.7	1.2
TAFE	41.0	41.2	0.2	0.5
University	46.2	47.0	0.8	1.7
Enterprise provider	47.2	47.4	0.2	0.4
Community education provider	42.0	42.2	0.2	0.6
Private training provider	46.2	46.5	0.2	0.5
Total	45.1	45.4	0.3	0.6

Table B6 Projected TVA program completion rates by field of education, using the different methods of matching program enrolments, 2015

Field of education	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
Natural and physical sciences	60.9	61.3	0.4	0.7
Information technology	42.1	42.4	0.3	0.7
Engineering and related technologies	42.7	43.0	0.3	0.7
Architecture and building	33.3	33.6	0.3	0.9
Agriculture, environmental and related studies	35.4	35.6	0.2	0.5
Health	49.8	50.1	0.3	0.6
Education	52.8	53.2	0.4	0.7
Management and commerce	46.8	47.1	0.3	0.6
Society and culture	54.4	54.7	0.2	0.5
Creative arts	50.6	50.6	0.0	0.1
Food, hospitality and personal services	42.8	43.0	0.2	0.5
Mixed field programmes	33.8	34.0	0.2	0.6
Total	45.1	45.4	0.3	0.6

Table B7 Projected TVA program completion rates by funding source, using the different methods of matching program enrolments, 2015

Funding source	A Completion rate using encrypted id, sex and date of birth (%)	B Completion rate using USI where possible, otherwise using A	Percentage point difference	Percentage difference (%) between A and B
Commonwealth/state funding	49.1	49.3	0.2	0.3
Fee-for-service – domestic	37.5	37.8	0.4	0.9
Fee-for-service – international	61.9	62.5	0.6	0.9
Total	45.1	45.4	0.3	0.6



National Centre for Vocational Education Research

Level 5, 60 Light Square, Adelaide, SA 5000
PO Box 8288 Station Arcade, Adelaide SA 5000, Australia

Phone +61 8 8230 8400 **Email** ncver@ncver.edu.au

Web <https://www.ncver.edu.au> <https://www.isay.edu.au>

Follow us:  <https://twitter.com/ncver>  <https://www.linkedin.com/company/ncver>

