

COS80025-Data Visualisation

Final Report

State of Australia's Early Childhood Workforce: Is it in Crisis?

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Introduction:

Background and motivation:

Early childhood education is crucial for development of children in the age range of 0-school age for cognitive, social, physical, and emotional development. In Australia, early childhood education and care is provided by selected providers and services across the country. The service members include educators, teachers, support staff, educational leaders, managers, and directors. The government also runs programs and provide grants for regional, indigenous, disadvantaged, and remote communities. Early childhood education aims to prepare children for school. Hence setting the foundation for life-long development of a child.[1]

This project focuses on the early childcare education sector and creating meaningful visualizations to emphasize the importance of educators in our society.

Data visualizations will be created on this topic for the users like government bodies, educators, and parents. The visualizations aim to help people understand the workforce better and it will draw some light on what policies need to be amended or decisions need to be taken for the betterment of this sector in general.

Project Objectives:

- What is the distribution of approved service providers across different localities?
Which areas have fewer approved providers in the state of Victoria?
- Are there regions with limited access to these services?
- What is the distribution of approved education services across the state of Victoria?
- How have enrolment numbers in different service types changed over the years in Australia?
- What are the enrolment patterns for different types of services, such as Family Day Care, Kindergarten Service, and Long Day Care?
- What is the age distribution of children in different types of early childhood education services?
- What are the annual operational hours for education services, and how do they vary by service type or location?

- What are the trends in staffing members for different service types? Are the staff members qualified depending on the service type? Are the staff members undergoing any studies?
- How operational hours(annual) correlated with number of approved places and overall rating?

Project Schedule:

Week	Topic	Comments
Week 1-4	Understanding datasets provided and choosing appropriate ones. Submitting project proposal	Chose the datasets and submitted the project proposal.
Week 5-7	Working on the data sets, data cleaning and processing. Starting with data visualizations using appropriate tools and procedures. Getting valuable feedback on the progress made. Submitting progress report of the project.	Worked on the feedback provided by the teachers. Made some changes to the report. Submitted the progress report.
Week 8-12	Finishing with the final draft and testing it. Getting feedback on the work and making changes accordingly. Final submission.	Received and worked on the feedback received. Made changes to the progress book for final report and submitted it.

Data:

Data sources:

Provided data sources are list of registered providers

(<https://www.acecqa.gov.au/resources/national-registers>), Statistics about preschool education([Preschool Education, 2022 | Australian Bureau of Statistics \(abs.gov.au\)](#)), information about services provided by early childhood educators and the staff employed([Early Childhood \(qed.qld.gov.au\)](#)).

The datasets that I chose are list of registered providers and services in Victoria [2] (<https://www.acecqa.gov.au/resources/national-registers>).

Services in early education sectors:

[3](<https://qed.qld.gov.au/publications/reports/statistics/early-years/early-childhood>.)

The datasets are mainly in a tabular format having rows and columns.

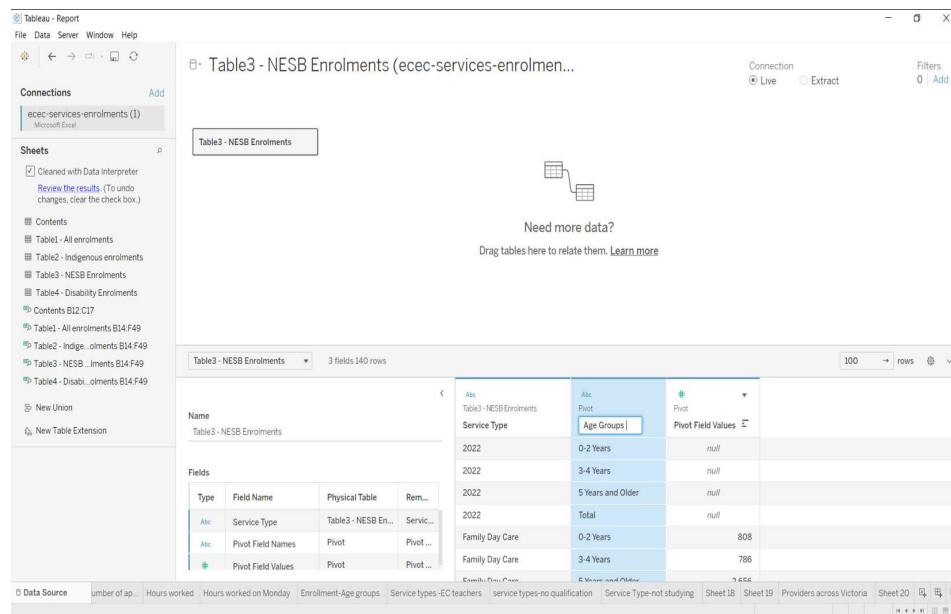
Data in the datasets provided –

Name	Columns and their type	Description of the data
Approved-providers-vic-export	<ul style="list-style-type: none">• Provider Approval Number: Categorical• Service Approval Number: Categorical• Legal Name, Trading Name, Address, Suburb, State: Categorical• Postcode: Categorical• Date Approval Granted: Temporal• Conditions: Categorical	This dataset focuses on approved education providers across the state of Victoria.
Education-services-vic-export	<ul style="list-style-type: none">• ServiceApprovalNumber, Provider Approval Number: Categorical• ServiceName, ProviderLegalName, ServiceType, ServiceAddress, Suburb, State: Categorical• Postcode: Categorical• Phone, Fax: Categorical• Conditions on Approval: Categorical• NumberOfApprovedPlaces: Quantitative	This dataset tells us about the education services in the state of Victoria.

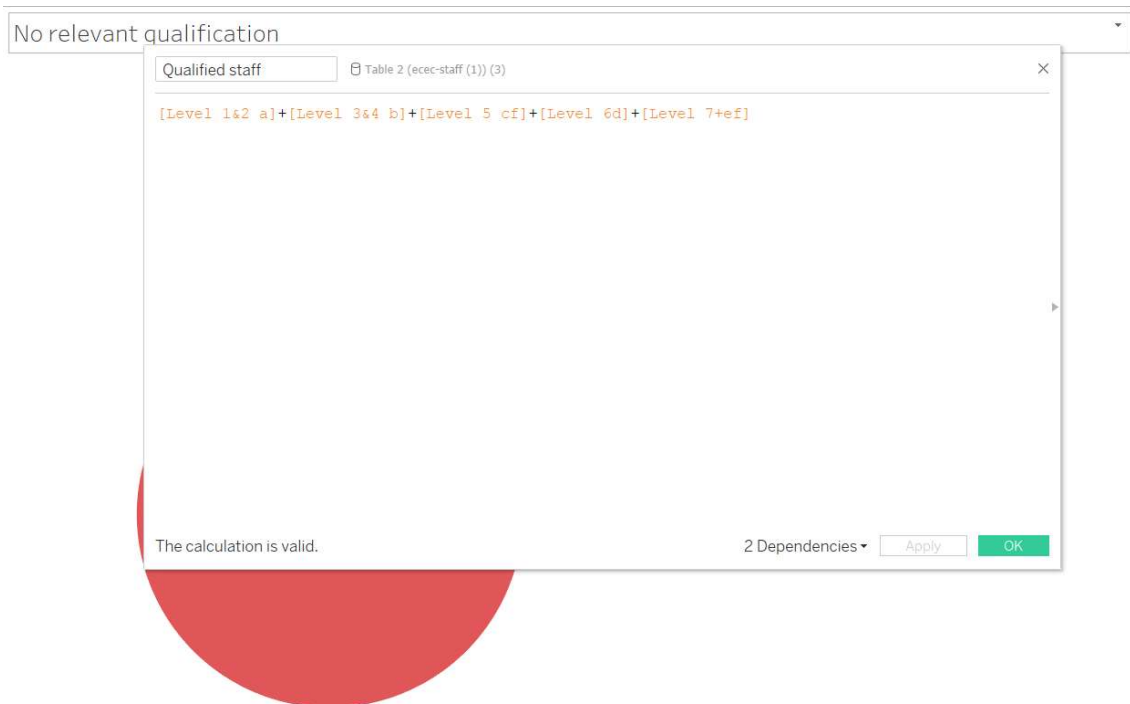
	<ul style="list-style-type: none"> • ServiceApprovalGrantedDate: Temporal • QualityArea Ratings: Ordinal • OverallRating: Ordinal 	
Ecec-Service enrollments: (Total enrollments, NESB enrollments, disability enrolments, indigenous enrolments)	<ul style="list-style-type: none"> • Service Type: Categorical • Age Groups Enrolment Data: Quantitative • Total Enrolment: Quantitative 	This gives information about students enrolled in total and types of enrolments with age group and service types.
Ecec-staff:Staff by position (2018-2022)	<ul style="list-style-type: none"> • Service Type: Categorical • Staff Position Counts: Quantitative 	This gives information about staff positions in the early childhood education sector.
Ecec-staff:Staff by qualifications completed (2018-2022)	<ul style="list-style-type: none"> • Service Type: Categorical • Qualification Level Counts: Quantitative 	This gives information about qualifications of staff.
Ecec-staff:Staff by qualifications studying (2018-2022)	<ul style="list-style-type: none"> • Service Type: Categorical • Qualification Level Counts: Quantitative 	This gives information about qualifications of staff is studying.

Data processing:

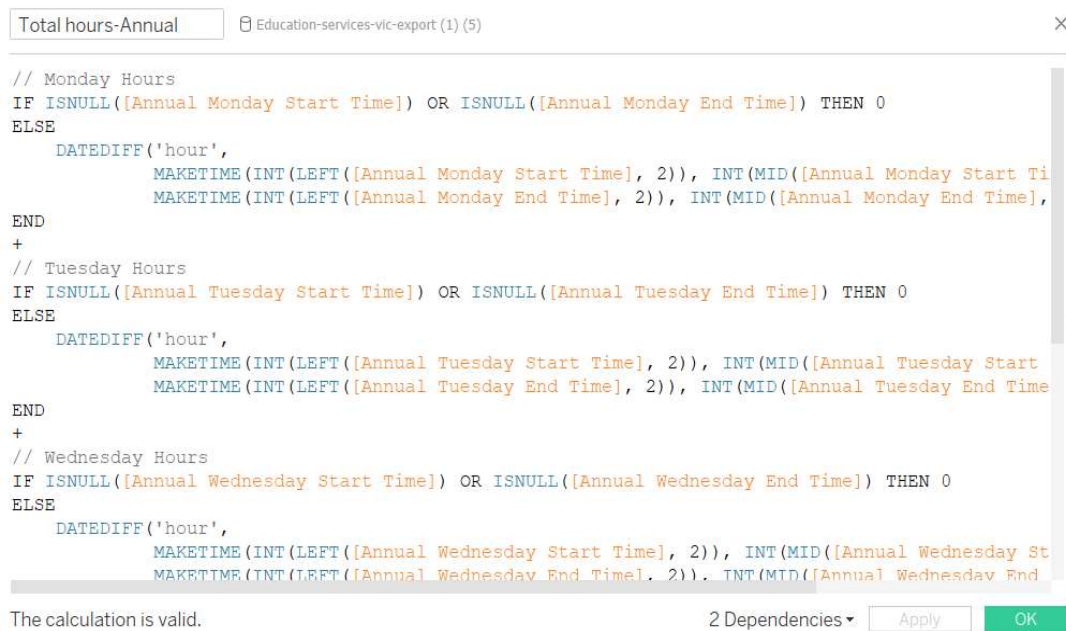
- After connecting to a data source in Tableau, data can be previewed in "Data Source" tab. We can see the first few rows of our dataset and the data types that Tableau has inferred for each column.
- Use the "Data Interpreter" to help identify and clean data. Here we can filter out null values, hide columns that are not relevant to a particular visualization and the same time we can make calculated fields and can use pivot to combine several columns.
- Data in 'Approved-Providers-vic-export' was direct and we included necessary columns like Legal Name, Suburb and Postcode.
- Table structure of the 'ecec-services-enrolments' made it difficult to visualize some attributes effectively. We used pivot option to create new fields 'Age Groups' and 'Enrolment count'.
- In the above we hid columns Total and filtered Year columns as Tableau was taking its values as null. This was done for all types of enrolments. Its to be noted that Tableau added all the enrolment count for specific years automatically.

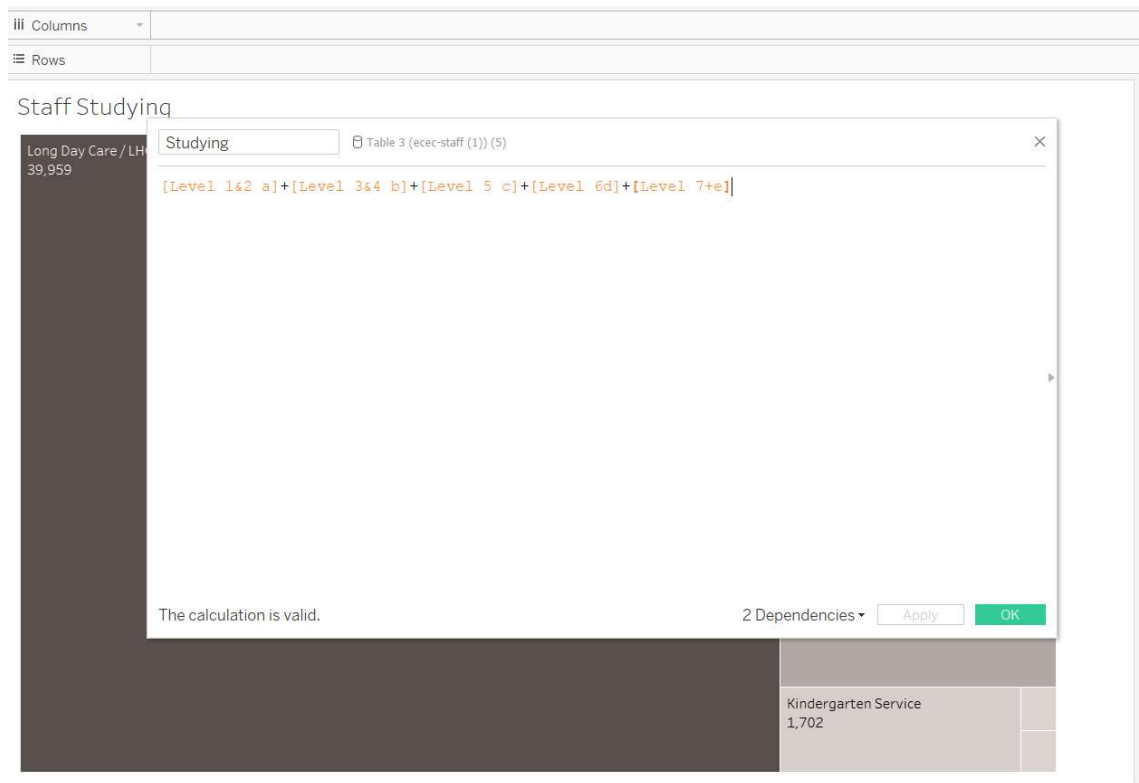


- For ecec-staff data, staff by qualifications and staff by qualifications studying, we used calculated fields in data source tab and created two categories for each table, Relevant Qualifications-Non-Relevant Qualifications and Studying-Not Studying.

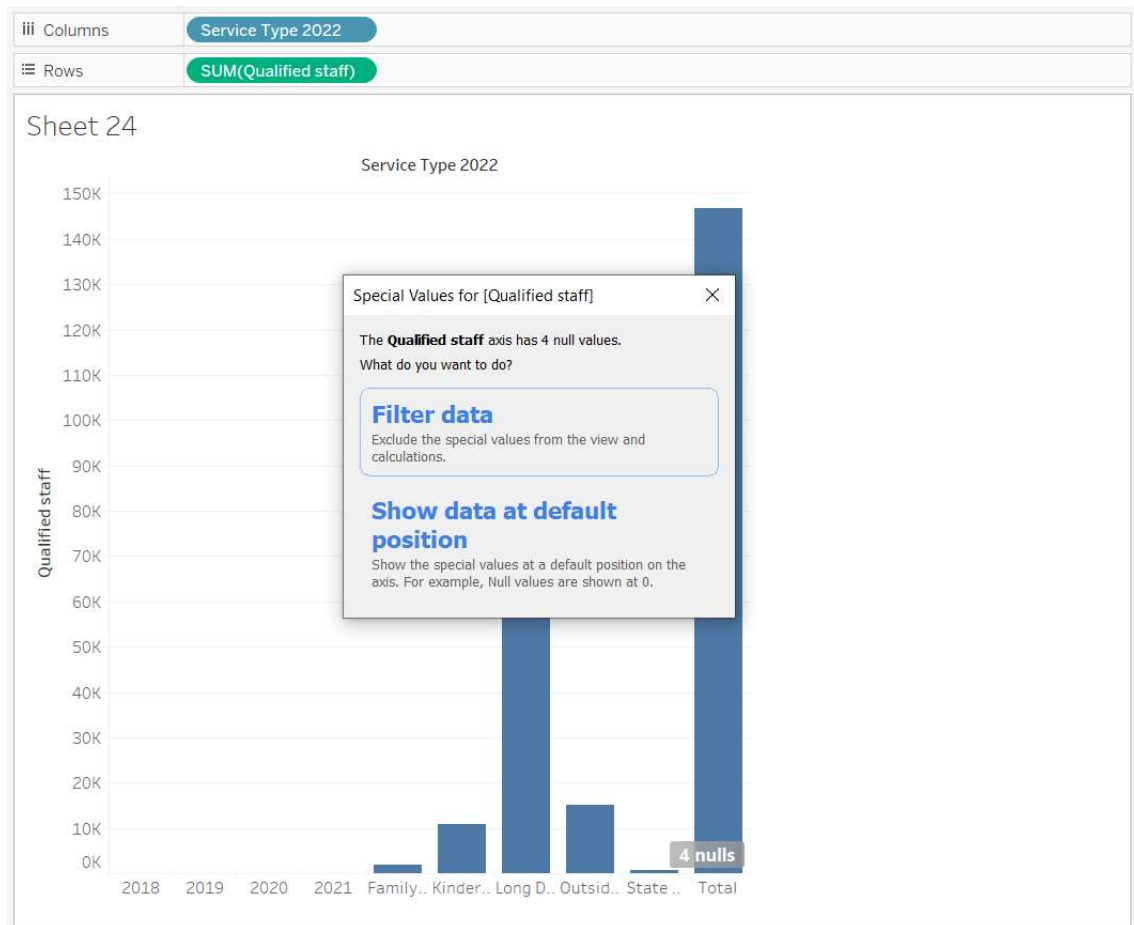


- For Education-services-vic-export, we created a calculated field for total annual hours spend by the workforce however, many fields were null. We combined hours of weekdays and data was converted accordingly as it was string type before.





- Throughout the process data filters were applied when Tableau prompted for any null or unwanted values.



Requirements:

Must-have features:

Some attributes that were essential for visualizing-

Dataset	Columns	Description
Education-services-vic-export	ServiceName, Service Type, Suburb, Postcode, OverallRating, NumberOfApprovedPlaces, Annual [weekday] Start Time, Annual [weekday] End Time	These attributes are required to gain information about ECEC services across Victoria, operational hours of staff, types of services and number of approved places.
Approved-providers-vic-export	Legal Name, Suburb, State, Postcode	These attributes are needed to highlight distribution of

		education providers across Victoria.
Ecec-service-enrolments	Service types, age groups, years	All tables depicting types of enrolments are used.
Ecec-staff	Service types, staff positions, qualifications	All tables are used to get insights into ECEC staff.

Optional features:

- In ‘Education-Services-vic-export’ data attributes representing school hours only and Holiday care timings could be used to gain insights into type of service and hours worked by the staff members.

But I choose annual timings as primary attributes, I did not choose to include the above optional features.

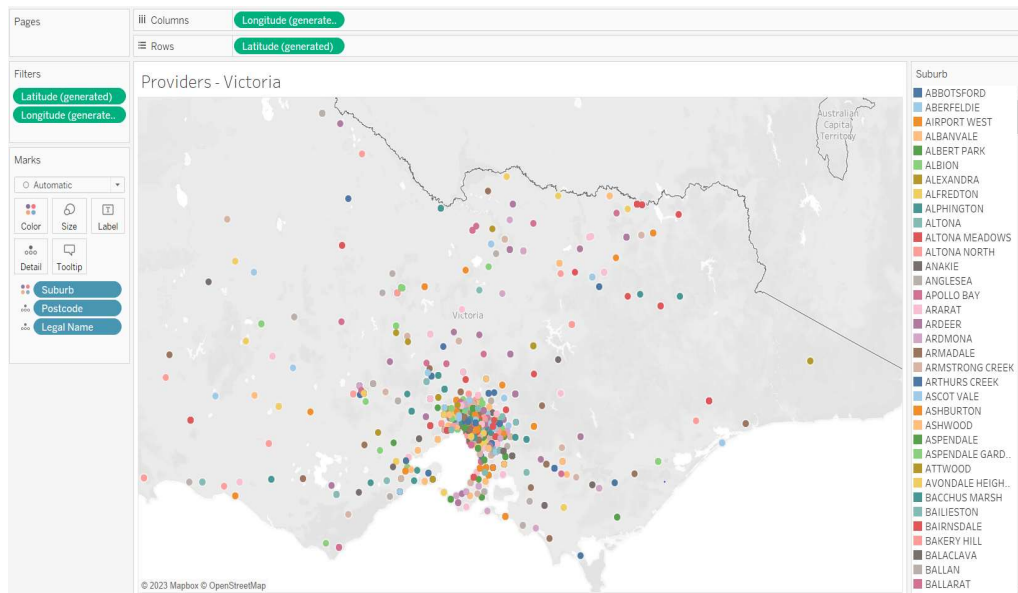
Visualization design:

Choice of chart is integral to communicate necessary information through visualizations.

Visualization types and why they were chosen:

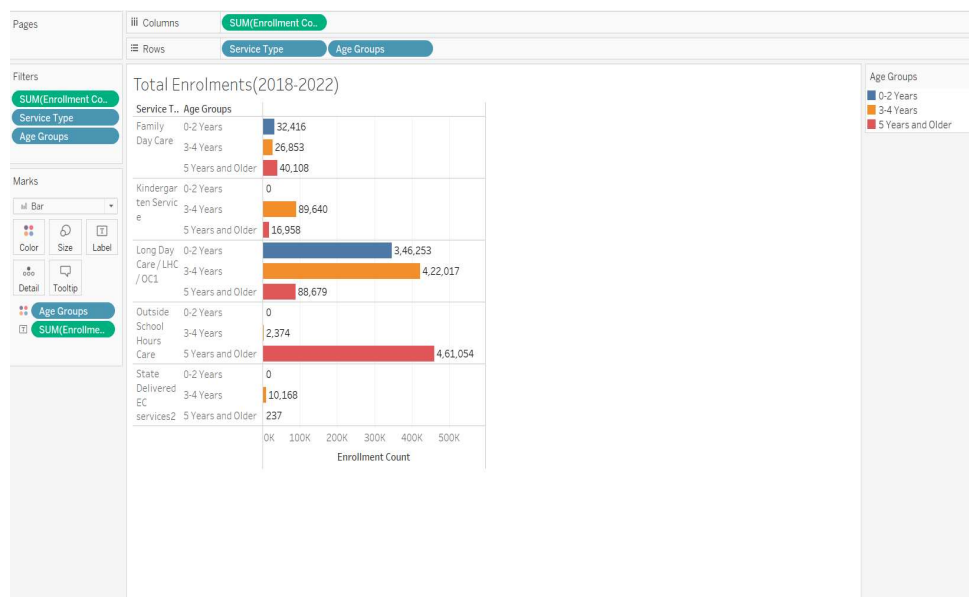
- What is the distribution of approved service providers across the state of Victoria?

The symbol map is used to visualize the data as maps work well with the data having location-based information like we had suburb, postcode etc. Colour encoding is used to differentiate between suburbs.

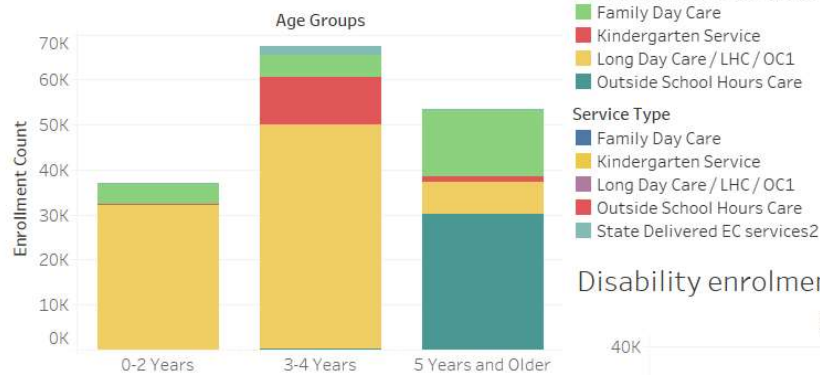


- What are the enrolment numbers for different service types?

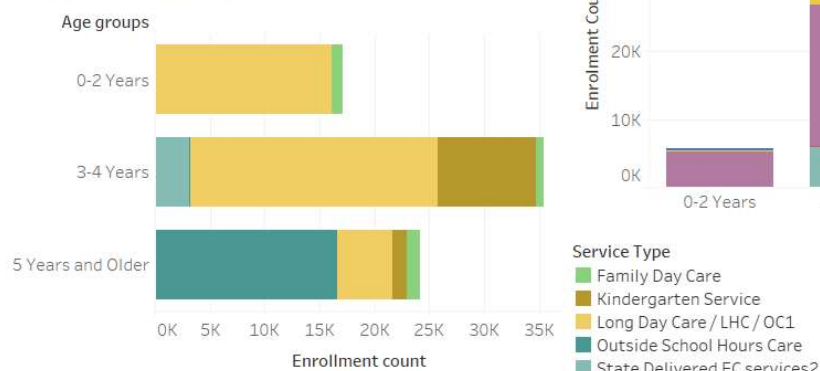
A horizontal bar chart depicts total enrolments with respect to age groups and service types. A stacked bar chart was used to depict for all three types of enrolments i.e., NESB, indigenous, and disability enrolments. Stacked bar charts can answer more than one questions at a time. In our case we create fields for age groups and enrolment count hiding excluding the total column. Segments of the bars denotes service types.



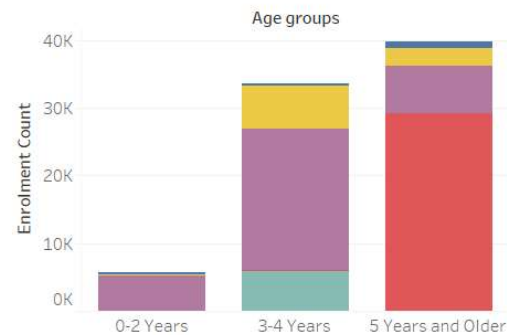
NESB Enrolments



Indigenous enrolments

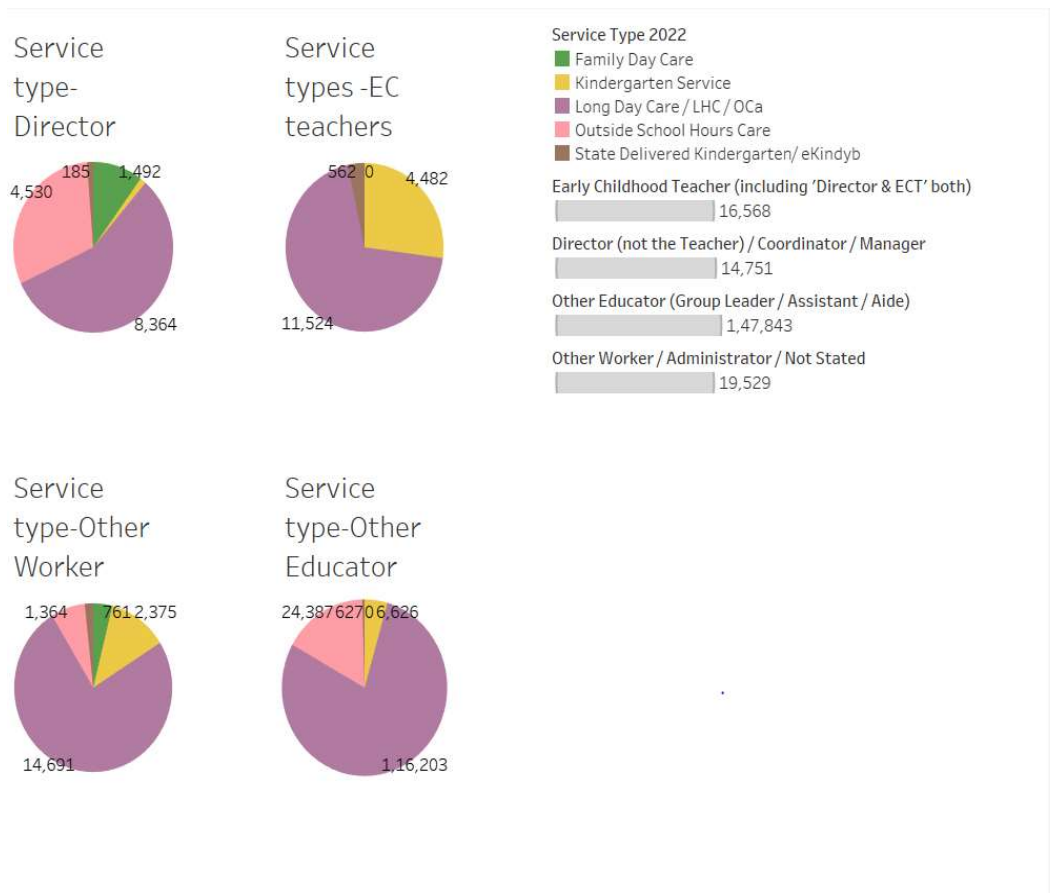


Disability enrolments



- What is the distribution of staff members for different service types?

Pie charts are used to show different types of staff members based on the service types as it is effective when we have to show proportions. Then a dashboard is created to show staff by positions combined. Where it can be inferred Long Day Care is having the most number of members.



- Is the staff holding any relevant questions? What proportion of the staff is studying?

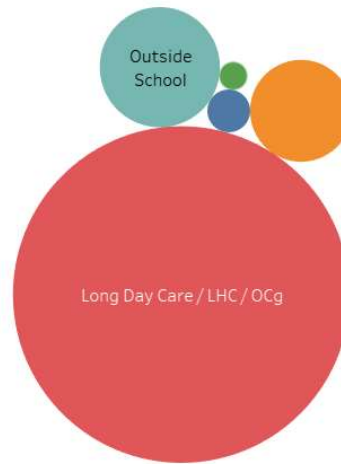
Bubble charts are created to depict this information as the size of bubbles denotes proportions of relevant and irrelevant qualifications with colour encoding to make it appeal visually. Similarly, staff studying and not studying is depicted using tree maps which is another way to show proportions of data, with colour density representing sum of studying and not studying staff.

Dashboards are created to draw comparison between both categories.

No relevant qualification



Relevant qualifications



Service Type 2022

- Family Day Care
- Kindergarten Se...
- Long Day Care / ..
- Outside School ..
- State Delivered ..

Staff Studying



Staff Not Studying



Studying

120 39,959

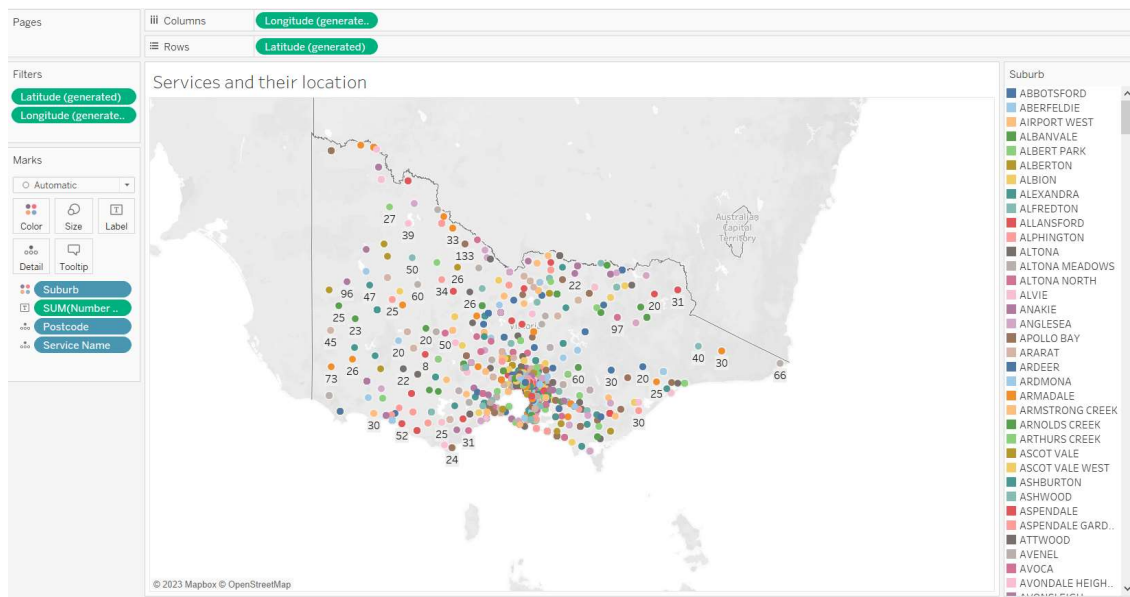
Not Studying

1,553 1,10,823

- What is the distribution of approved services across Victoria?

Again, we will use symbol maps to depict this information as it is location-based data.

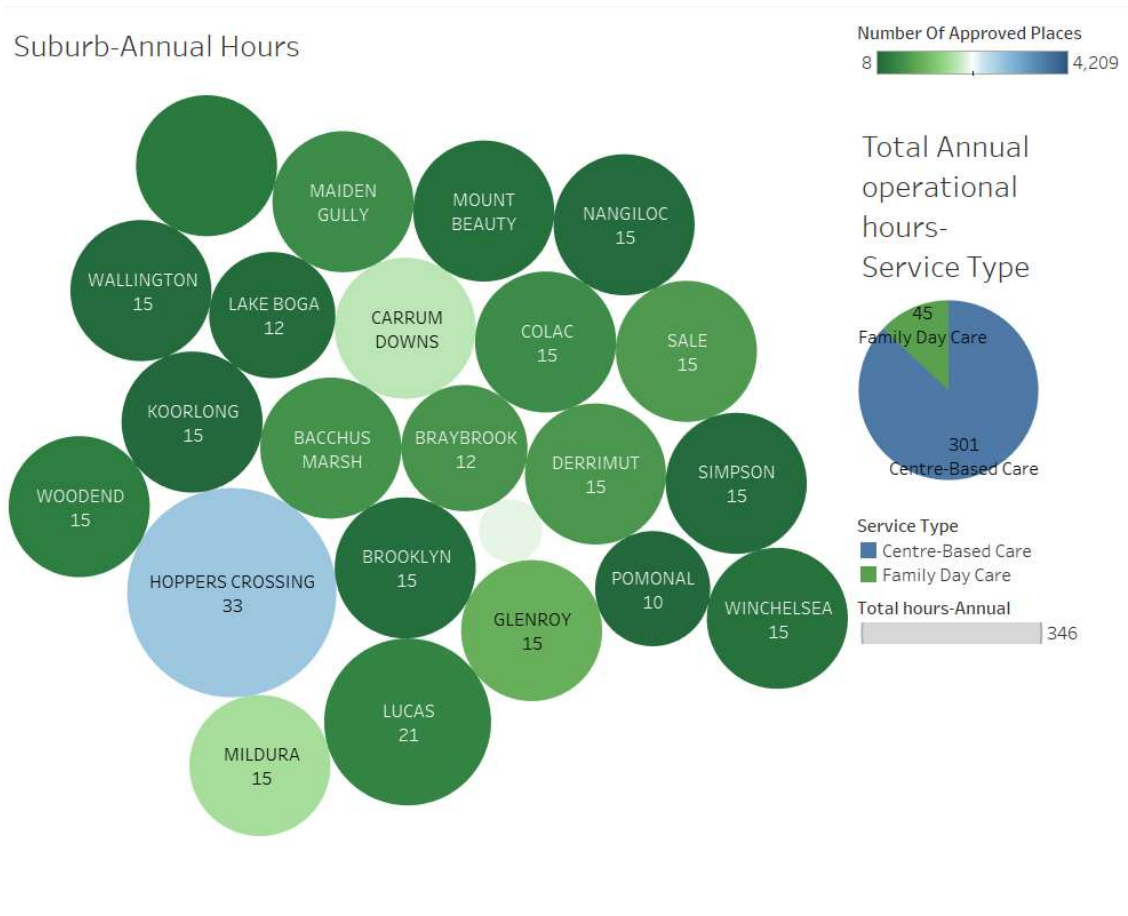
We used colour encoding to differentiate between suburbs.



- How are the annual operational hours and how are they varying with respect to location? For which service type more time annually is spent on?

For former, packed bubble chart is used to highlight suburbs and size of bubble denotes operational hours and colour density depicts number of approved places.

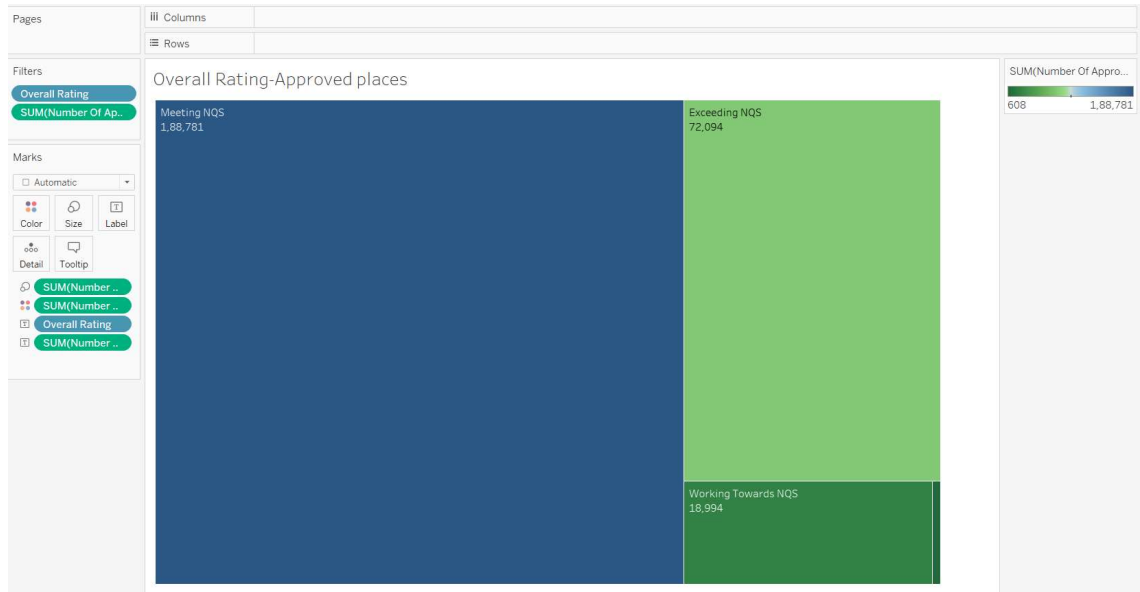
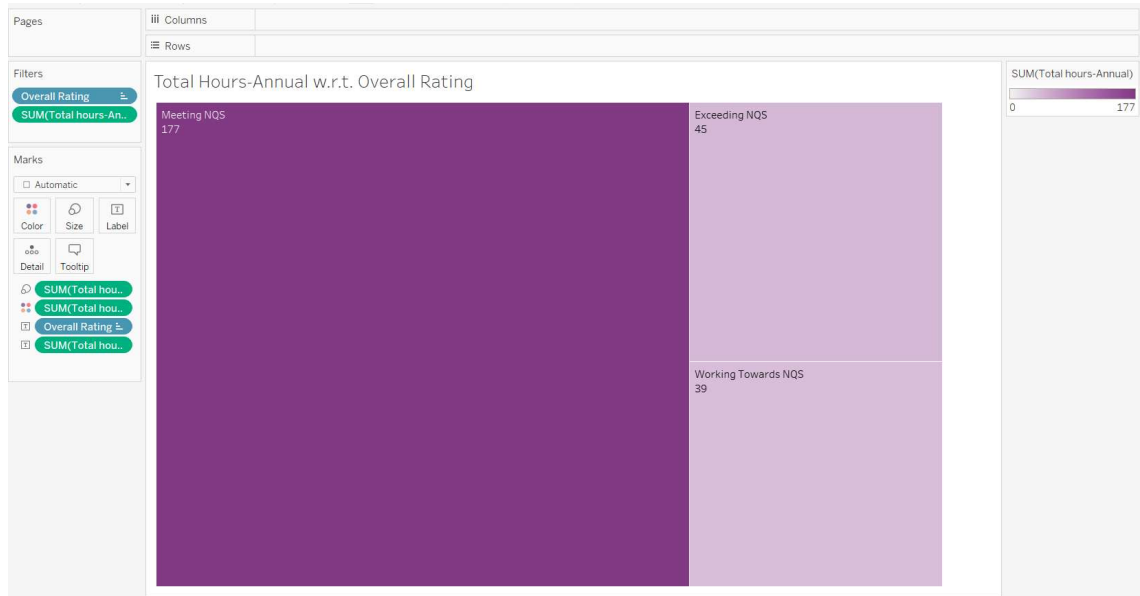
For later, a pie chart was suitable for this as we have two categories of service types and pie chart depicted the proportion of hours effectively for them.



A dashboard was created to combine these.

- What is the amount of time spent by services with respect to overall ratings received?
What is the correlation between overall ratings and number of approved places?

A tree map was used as it gives us the information of the proportions as a whole.
Where colour density depicted total annual hours work force puts to reach that standard for the former and number of approved places for the later.



- Finally, every visualisation was combined into a story for meaningful depiction of the topic. Starting with providers, then proceeding with enrolments, staff, and education services.

Conclusion:

The report aims to gain insights into the Early Childhood Education sector in Australia, particularly in the state of Victoria. Several datasets were chosen based on the topic. Visualizations were made to highlight the importance of Early childhood education sector in Australia, emphasizing on the number of education providers and services, ECEC staff, and ECEC enrolments.

Different chart types were used in the process which made us understand the data better.

Visualizations can answer-

- distribution of education providers and services across Victoria.
- which location is having maximum number of approved places.
- gained insights into number and type of enrolments along with service types and age groups, highlighting how educators are needed for the development of children.
- Staff were emphasized highlighting the positions and service types where they are prominent.
- whether staff have relevant qualifications or not depending on the service type and if the staff was currently studying or not.
- tried to infer the total annual hours devoted by the workforce and number of approved places depending on the overall ratings received.
- From the limited amount of timing information available in the data we tried to infer the overall annual hours devoted with respect to location of the services and number of approved places.
- Dashboards are created for data having similar attributes to give a general summary making it easier to draw comparisons.
- Then we combined these all visualizations in the form of story to communicate the information effectively.

References:

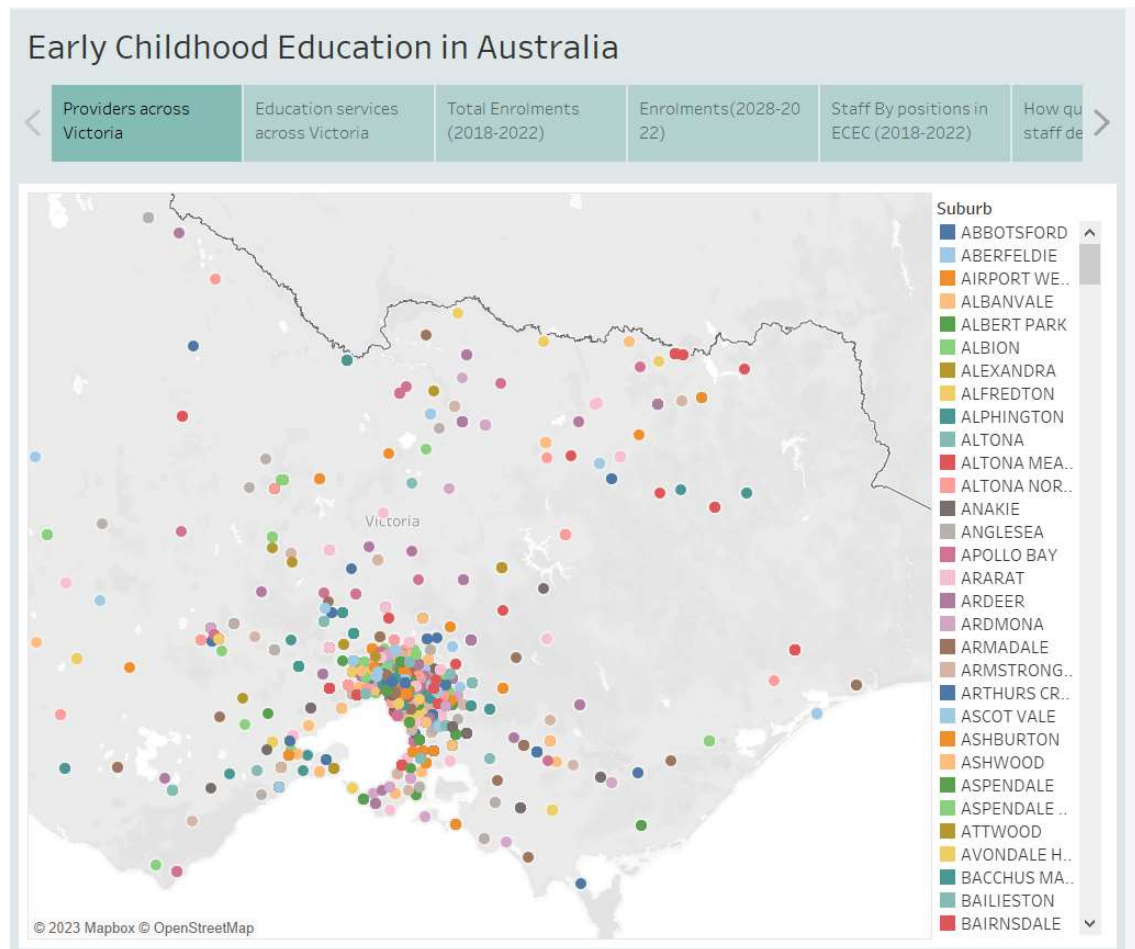
1. The Department of Education, About early childhood education and care in Australia (2023, September 26), Retrieved from

<https://www.education.gov.au/early-childhood/about-early-childhood-education-and-care-australia#toc-what-is-early-childhood-education-and-care->

2. Australian Children's Education and Care Quality Authority. (n.d.). National Registers. Retrieved from <https://www.acecqa.gov.au/resources/national-registers>
3. Queensland Government. (2022, December 15). Early Childhood. Retrieved from <https://qed.qld.gov.au/publications/reports/statistics/early-years/early-childhood>

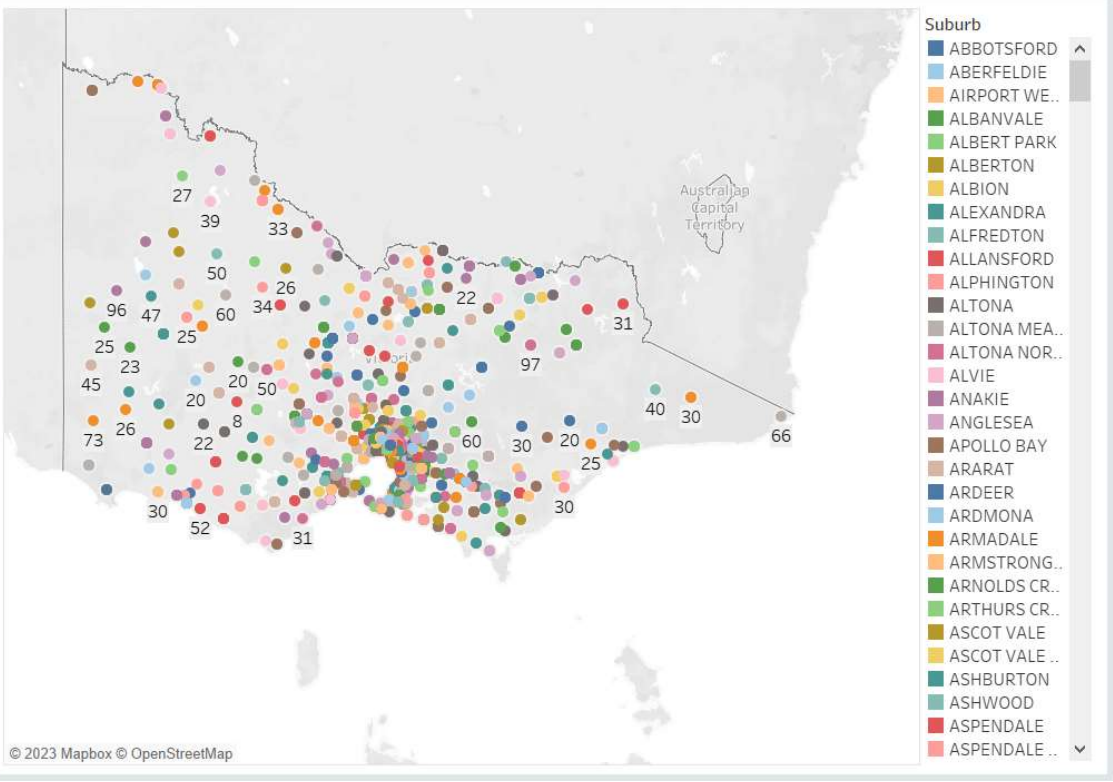
Appendix:

Story is created to convey the relevant information:



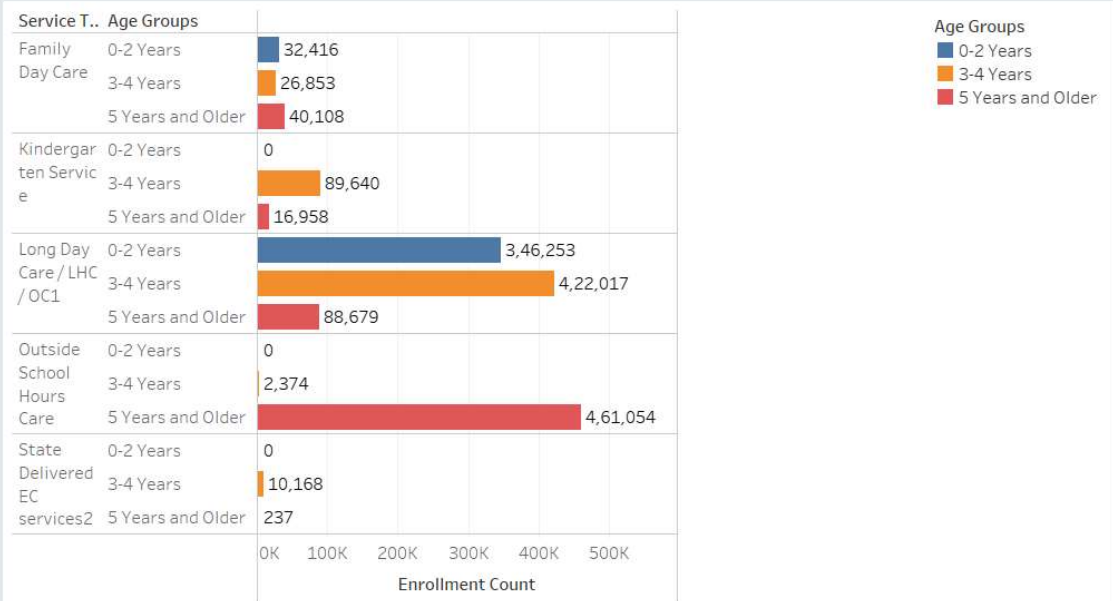
Early Childhood Education in Australia

<	Providers across Victoria	Education services across Victoria	Total Enrolments (2018-2022)	Enrolments(2028-2022)	Staff By positions in ECEC (2018-2022)	How qu staff de >
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Early Childhood Education in Australia

<	Providers across Victoria	Education services across Victoria	Total Enrolments (2018-2022)	Enrolments(2028-2022)	Staff By positions in ECEC (2018-2022)	How many staff de	>
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Early Childhood Education in Australia

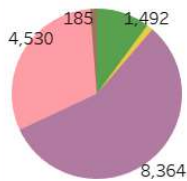
Providers across Victoria	Education services across Victoria	Total Enrolments (2018-2022)	Enrolments(2018-2022)	Staff By positions in ECEC (2018-2022)	How qu staff de
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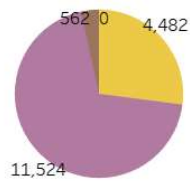
Early Childhood Education in Australia

< Providers across Victoria	Education services across Victoria	Total Enrolments (2018-2022)	Enrolments(2018-2022)	Staff By positions in ECEC (2018-2022)	How qu staff de >
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Service type-Director



Service types -EC teachers



Service Type 2022

- Family Day Care
- Kindergarten Service
- Long Day Care / LHC / OCa
- Outside School Hours Care
- State Delivered Kindergarten/ eKindyb

Early Childhood Teacher (including 'Director & ECT' both)

16,568

Director (not the Teacher) / Coordinator / Manager

14,751

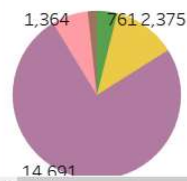
Other Educator (Group Leader / Assistant / Aide)

1,47,843

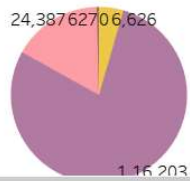
Other Worker / Administrator / Not Stated

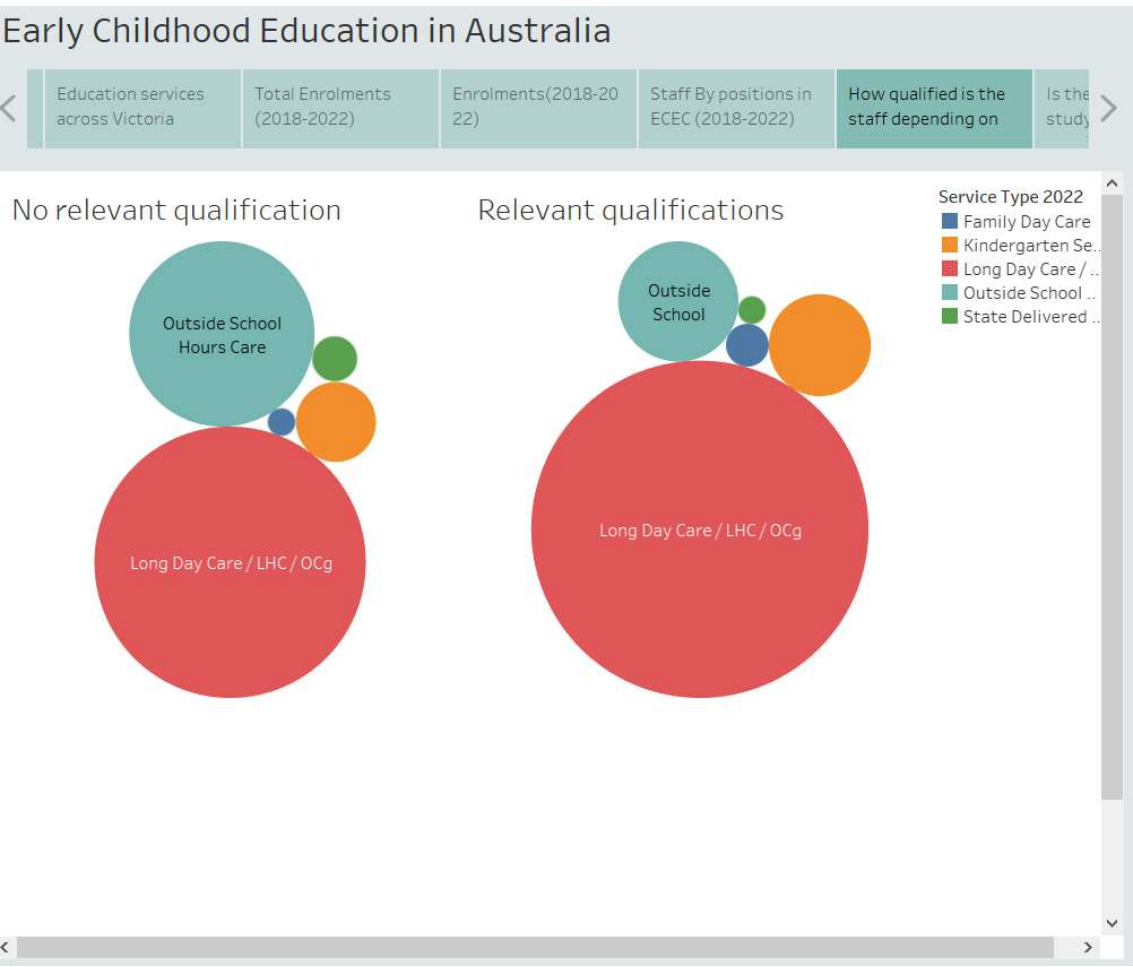
19,529

Service type-Other Worker



Service type-Other Educator





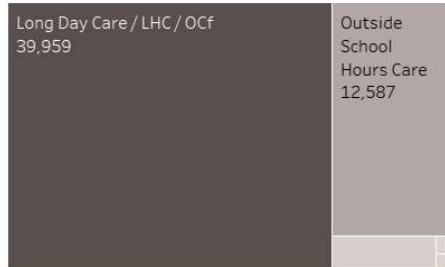
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Early Childhood Education in Australia

< Total Enrolments (2018-2022) Enrolments(2018-2022) Staff By positions in ECEC (2018-2022) How qualified is the staff depending on Is the staff currently studying w.r.t. service Total denot >

Staff Studying



Staff Not Studying

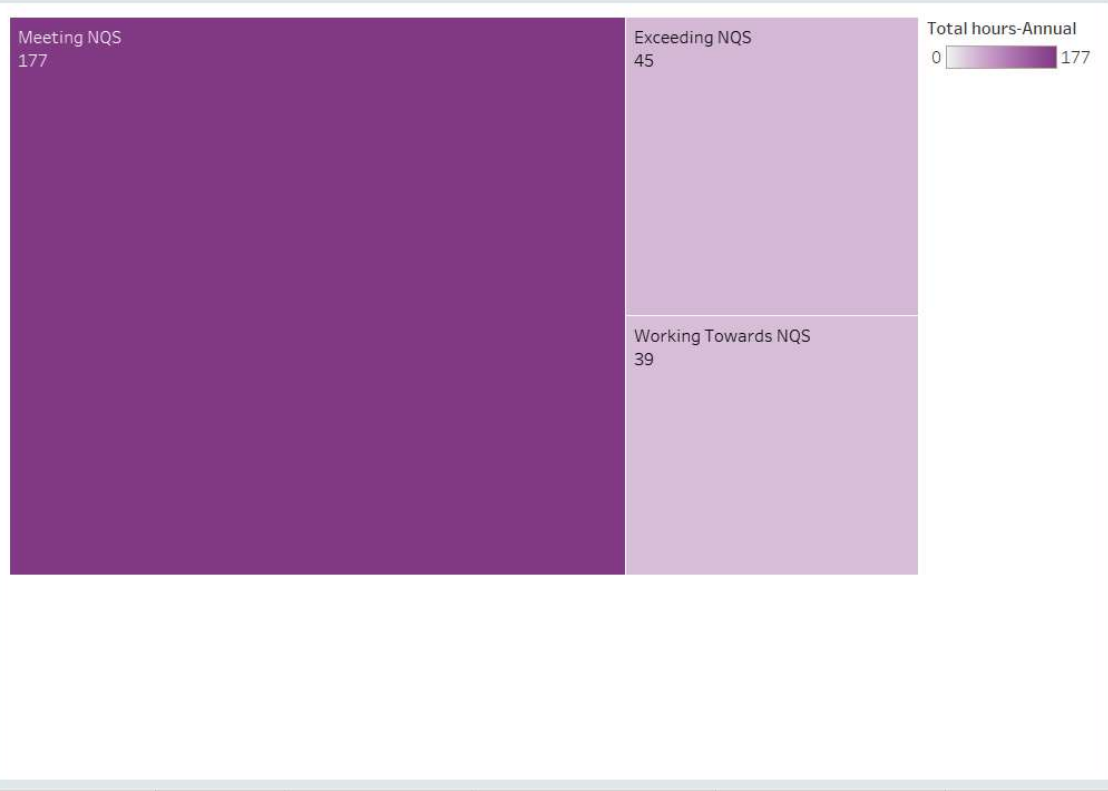


Studying
120 39,959

Not Studying
1,553 1,10,823

Early Childhood Education in Australia

<	Enrolments(2018-2022)	Staff By positions in ECEC (2018-2022)	How qualified is the staff depending on	Is the staff currently studying w.r.t. service	Total hours annually denoted by the	Numt place >
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Early Childhood Education in Australia

ons in (22)	How qualified is the staff depending on	Is the staff currently studying w.r.t. service	Total hours annually denoted by the	Number of approved places with respect	Total hours annually devoted by the
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Suburb-Annual Hours

