Data Visualisation with Google Looker Studio: A focus on Theses submitted by BLDE (Deemed to be University), Vijayapura, on Shodhganga

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LIST OF ABBREVIATIONS

Abbreviation	Full Form
BI	Business Intelligence
DS	Data Storytelling
CV	Conventional Visualisation
GA4	Google Analytics 4
API	Application Programming Interface
SQL	Structured Query Language
REST	Representational State Transfer
JWT	JSON Web Token
GUI	Graphical User Interface
UI	User Interface
R	R Programming Language
PNG	Portable Network Graphics
TIFF	Tagged Image File Format
PDF	Portable Document Format
SVG	Scalable Vector Graphics
CQI	Coffee Quality Institute
UMKM	Usaha Mikro Kecil Menengah (Micro, Small and Medium Enterprises - Indonesian term)
D4	Diploma 4 (Bachelor-equivalent technical program)
DS	Data Science
RDBMS	Relational Database Management System
DS	Data Studio (Formerly Google Data Studio, now Looker Studio)
GA	Google Analytics
ACE2	Angiotensin-Converting Enzyme 2
MMP7	Matrix Metalloproteinase 7
GJB2	Gap Junction Beta-2 Protein Gene
FIX	Factor IX (Coagulation Protein)
ANOVA	Analysis of Variance
CRP	C-Reactive Protein

BMI	Body Mass Index
DHF	Dengue Hemorrhagic Fever
ENT	Ear, Nose, and Throat
DNA	Deoxyribonucleic Acid
RNA	Ribonucleic Acid
GO	Gene Ontology
KEGG	Kyoto Encyclopedia of Genes and Genomes
TCGA	The Cancer Genome Atlas
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
LookML	Looker Modeling Language
Superset	Apache Superset (Data Visualisation Tool)
Next.js	React Framework for Web Applications
React	JavaScript Library for Building User Interfaces
SQL Lab	SQL Laboratory (Query Editor in Superset)
RBAC	Role-Based Access Control
NoSQL	Non-Structured Query Language (Database Type)
DS	Data Studio (Google Looker Studio)
MS Excel	Microsoft Excel
BLDE (DU)	Bharatiya Lingayat Development Education Association (Deemed to be University)
SMA	Sekolah Menengah Atas (Senior High School in Indonesia)

ABSTRACT

Background

Theses and dissertations are a crucial component of an institution's research outcomes, but their visibility and accessibility can be limited. The University Grant Commission (UGC) has resolved this issue by requiring that electronic copies of the thesis be submitted through Shodhganga – a digital repository facilitated by the INFLIBNET Centre. In general, open access has many advantages, including reduced plagiarism, increased engagement in Indian research, and greater accessibility of materials. The purpose of this paper is to introduce and highlight Google Looker Studio (formerly Google Data Studio), an advanced, free, cloud-based platform for interactive data visualisation and reporting. The use of Looker Studio enables the creation of effective, correlated information and the visualisation of large datasets, such as metadata related to theses.

Objectives

- To identify the main characteristics and functions of Google Looker Studio.
- To demonstrate the process of creating various dashboards, charts, and reports within Looker Studio.
- To visualize the metadata of theses submitted to Shodhganga from BLDE (Deemed to be University), Vijayapura.

Methodology

The methodology involves the use of observational research. Data were collected from Shodhganga regarding theses submitted from Shane College, BLDE (DU). The metadata were identified, organized and listed within Google Sheets, while the metadata consisted of year, researcher, title, guide, co-guide, and department noted from Shodhganga. A sample of the selected metadata was imported into Google Looker Studio for visualisation. Throughout the experiment, interactive dashboards and visual analytics of the databases were developed through the selection and use of various visualisation and presentation features and tools. Data visualisation tools in the Looker Studio allow for many forms of graphical representations, thereby improving the descriptive dimensions of simplistic datasets.

Results

The researcher used various capabilities of Google Looker Studio for data visualisations as follows:

Pie Charts - to illustrate department-wise thesis submissions with sections, colors, and percentage labels.

Bar and Funnel Charts - to display hierarchical or comparative data flow in an aesthetically pleasing way.

Donut Charts - to display a proportional representation of keywords or categories.

Interactive Filters - allowing users to explore data in a dynamic way based on their selection.

Potential for Theming and Layout - to customize the color, font style, and alignment as well as the look of the overall dashboard.

Data Blending and Control Opportunities - to efficiently combine and refine multiple datasets.

These features produced professional, readable, and interactive dashboards that improved the user's understanding of the data.

Conclusion

The study concludes by demonstrating that Google Looker Studio is a robust and user-friendly platform to transform raw data into visual data representations. Its interactivity and customization allow professional researchers, librarians, and academicians to effectively interpret, manage, and share data. The study concludes with the implementation of Google Looker Studio in an institutional context (BLDE (DU)), having the potential to enhance data visualisation for research, library analytics, and data use for decision-making.

Keywords

Data Visualisation, Google Looker Studio, Shodhganga, BLDE (Deemed to be University), INFLIBNET, Metadata, Dashboard, Visualisation Tools.

CHAPTER 1 INTRODUCTION

Theses and dissertations are considered the richest and exclusive data sources; in most cases, the only data sources that do not subsequently appear elsewhere in the publication record. Many dissertations and theses remain a wasted and untapped resource, wasting not just substantial amounts of money and human resources, but often resulting in unnecessary duplication and redundancy, the exact opposite of intermediation of research. The UGC Notification (Minimum Standards & Procedure for Award of M.Phil. / Ph.D Degree, Regulation, 2009, was amended in 2016) expects that researchers will submit electronic copies of their theses and dissertations to help facilitate open access and the visibility of Indian research literature. This is seen as a way to improve the quality of research and to eliminate duplication as well as provide access to Indian scholarly work to the world. INFLIBNET Centre has been given the responsibility to host and preserve the digital library. The name Shodhganga identifies the collection as important to Indian Electronic Theses and Dissertations (ETDs). Shodh means 'research' or 'discovery' and Ganga means 'river,' emphasizing India's cultural heritage as a riverine idea of intellectual productivity. Shodhganga is based on DSpace, an open-source application created by MIT and HP, which endorses international standards such as OAI-PMH and employs the Dublin Core metadata schema. The software enables universities and researchers to submit, store, preserve, and disseminate their theses in open access. Universities with good infrastructure facilities can host their own ETD repositories and employ Shodhganga as a backup. INFLIBNET also collects metadata from these dispersed repositories to provide unified access via a central server. The portal reflects each university's organizational structure, enabling navigation by centre, college, or department. It has features such as basic and advanced search, and browsing by subject or university. A semantic web interface is being developed to facilitate subject-based discovery. Shodhganga performs an important function in consolidating the research culture of India by making available, discoverable, and preserving long-term scholarly work. As of date 19-07-2025, Shodhganga has 616218 full-text theses in this collection, out of which, the Indian Institute of Science, Bangalore, is the top contributor,

i.e., they have contributed 1603 full-text theses (Shodhganga: A Reservoir of Indian Theses @ INFLIBNET, 2025).

Google Looker Studio, which was previously called Google Data Studio, is a free

platform for business intelligence and data visualisation created by Google LLC. It launched in 2016 to help users turn raw data into interactive and customizable dashboards and reports. In October 2022, Google renamed the platform to Looker Studio after buying Looker, a top business intelligence software company. This change supported Google's wider goal of offering unified data analytics and business intelligence solutions within Google Cloud (*Looker Studio*, 2025).

The platform is perfectly aligned with Google's ecosystem and that of its products like Google Analytics, BigQuery, Google Sheets, Google Ads, and YouTube Analytics, to name a few. It also allows more than 800 data sources via the native and third-party connectors, which makes it incredibly flexible and accessible for both tech-savvy and non-tech-savvy users alike. Looker Studio by linking various data sources allows users to group and display data from different platforms in a single cohesive report (*Looker Studio*, 2025).

The major characteristics of Looker Studio are its customizable dashboards, real-time collaboration, interactive controls (filters, date range selectors), and scheduled emailing of reports. The above-mentioned features are especially useful for performance metrics tracking, trends visualisation, and insights sharing among stakeholders for business, marketing, analytics, and education purposes. Reports are exportable as PDF files for off-line access and can also be embedded in web pages (Patel, 2023).

Looker Studio is very versatile and used in different ways, such as analysis of marketing campaigns, monitoring of sales, data visualisation in academia, and reporting in operations. Its features of collaboration enable teamwork on reports, similar to Google Docs. Organizations that prefer transparency and real-time data access have favored it because of the live, interactive dashboards that can be created (*Looker Studio*, 2025).

BLDE (Deemed to be University), established on the 29th of February, 2008, aims to provide quality healthcare services and medical education in the backward North Karnataka region.

Its constituent college, Shri B.M. Patil Medical College, Hospital & Research Centre, was established in 1986 and is located on a 71.2-acre campus with 24 departments and a 1218-bed teaching hospital. The University has been accredited with an 'A' Grade by NAAC (Cycle-2)

with a CGPA of 3.09 and is recognized in the ATAL Ranking of Institutions on

Innovation Achievements by the Government of India. The teaching hospital also has NABH accreditation at the entry level. The University has its foundation in the history of the BLDE Association, which was established in 1910 and now administers 83 institutions in different areas such as medicine, engineering, pharmacy, law, and education. Understanding the need for quality higher education, the Association founded the University under Section 3 of the UGC Act in the year 2008. The Medical College has MBBS (200 seats), MD/MS courses in 24 specialities, super-specialty courses (DM/M.Ch in Cardiology and Urology), and certificate and fellowship courses, all NMC-approved. With a faculty strength of more than 300 and students totaling 1500+, the University is also a research and innovation hub, publishing 1907 papers, having a Scopus H-index of 37, and receiving more than 5,947 citations. It has made 62 agreements with renowned national and international organizations such as those in Canada, the USA, and Iran. As a UNESCO Chair partner, it promotes global academic networking in Life Sciences. Research infrastructure has been increased through the addition of a 22,000 sq. ft. complex to accommodate Clinical Skill and Simulation Labs, a Central Research Lab, and Vascular and Genetic Labs. The University also emphasizes digital transformation, ICT development, and innovation labs. Some of the centres of excellence include those in Vascular Physiology, Social Determinants of Public Health, and a planned Pediatric Dermatology Centre in partnership with international partners. Apart from that, it also operates Government-sponsored Rehabilitation and Yoga Centres providing prosthetic and orthotic facilities. With a UGC-CARE listed journal published by Wolters-Kluwer, and a focus on purposeful research and community health, BLDE (Deemed to be University) continues to significantly contribute to the field of education, healthcare, and regional growth.

BLDE (DU) 's objectives are to make provisions for teaching and training in such fields of study and education as it may deem appropriate. To carry on extramural studies, extension programs and field outreach programs to help develop society. To do all such other acts and things as may be desirable or necessary for promoting the objects of the Institute.

Affiliated Colleges of BLDE(DU)

- Allied Health Sciences
- School of Physiotherapy
- School of Applied Science & Technology
- School of Law
- Shri B M Patil Medical College, Hospital & Research Centre

Statement of problem

Data Visualisation with Google Looker Studio: A Focus on Theses Submitted by the BLDE (Deemed to be University), Vijayapura on Shodhganga.

CHAPTER 2. OBJECTIVES OF THE STUDY

- To explore the features of the data visualisation tool – Looker Studio.
- To illustrate the process of creating views and reports in Looker Studio.
- To gather metadata related to the theses submitted by BLDE (Deemed to be University) on Shodhganga

CHAPTER 3. REVIEW OF LITERATURE

Ari Putra Wibowo's Study reveals that Electronic commerce platforms have significantly simplified transactions for the public, with Micro, Small, and Medium Enterprises (UMKM) increasingly utilizing e-commerce to sell products, thereby competing in the global market. Lookmanstore.id, a UMKM, has utilized e-commerce platforms for a year now, but there were times when sales were not significantly improved by various marketing promotions like ads, promotional videos, and discounted prices. This points to an urgent requirement for a thorough comprehension of sales data in the marketing strategy formulation process. Data visualisation, which is displaying of information and data in a visually appealing manner, is a method that makes complex datasets easier to read and understand. It is very important for recognizing the existing sales patterns, uncovering the potential business opportunities, perfecting the sales approaches, and controlling the product inventory. The efficient showing of data visualisation is the primary factor in revealing insights about sales trends, finding business opportunities, and fine-tuning sales and stocks strategies.

Looker Studio is a cloud-based solution that emphasizes data visualisation and the engagement of viewers. It allows dynamic, attractive reports to be made from both internal and external data sources. Fernando's (2018) and Wahyudi's (2024) studies acknowledge the need for such tools in sales performance summarization and in production data analysis, respectively. The present study is aimed at creating an interactive dashboard through Looker Studio for the analysis and visualisation of Lookmanstore.id's sales data with the objectives of boosting operational efficiency, refining marketing activities, and supporting data-driven strategic decision-making. The research approach consists of five steps: identification of the problem, review of the literature, gathering the data, processing the data, and presenting the data visually. The literature review component will involve rigorous examination of the relevant research, understanding the them, and acquiring knowledge of the analysis and data visualisation concepts(Wibowo et al., 2024).

In agricultural research, the analysis of vast datasets is very often the case, leading to the need for good data visualisation tools. Tableau and Power BI are two popular tools at the same time, able to process large datasets and create interactive visualisations

such as bar charts, line graphs, and maps; however, they have significant disadvantages due to the high costs of licenses and the difficulty of the learning process. Google Looker Studio emerges as an attractive alternative, being free and seamlessly integrated with familiar Google ecosystems (e.g., Google Drive, Gmail, YouTube), thus making it more accessible to a wider range of researchers and academics . Concurrently, climate change is a highly relevant and impactful topic in agricultural research, significantly affecting food crop production . Studies consistently show that altered precipitation patterns, rising average temperatures, and extreme weather events can negatively influence planting patterns, timing, and ultimately, the yield and quality of rice harvests . For instance, increased nighttime temperatures have been linked to reduced rice yields due to increased plant respiration, and erratic rainfall can lead to crop damage from alternating droughts and heavy rains In Sumatra, particularly, it has been noted that the main growing season's inconsistent rainfall and high temperatures have decreased rice output. Thus, climate change adaptation via the planting of extreme-tolerant rice strains along with the application of suitable technologies is essential for rice production continuity, thereby bringing to the fore the need for both mitigation and adaptation approaches in agriculture planning and management. This review emphasizes the twin significance of good data visualisation for both the analysis and the preemptive adaptation methods to lessen the strong impacts of climate change on rice production (Hesananda & Racma, 2024).

This literature review captures the main points of a thesis work that was directed towards finding the best data visualisation solutions for contemporary businesses, with special attention to the difficulties met by ContentWise. The project compares various methods such as custom web apps and hybrid solutions, but it gives utmost importance to the integration of a semantic layer that would help improve flexibility, performance, and data trustworthiness.

Data visualisation instruments are pointed out as a vital part of the process where firms turn mammoth amounts of data into simple-to-understand information and thereby get to the point of making good decisions. ContentWise, the firm known for its recommendation engines and metadata enrichment, has come up with 'Data Insights' which is a powerful tool to showcase the value of its software visually to the customers. The current 'Data Insights' application built on Apache Superset 1.0 delivered basic features but also came with issues such as dashboard instability

(different colors for the same chart after refresh), poor dashboard space management, absence of cross-filtering, unhelpful filter impact visualisation, and inadequate chart customization. The main objective of the thesis was to find out ways through which this product could be improved by looking into the market offerings and suggesting new architectures.

The project performed a market study on leading Business Intelligence (BI) tools like Qlik, Power BI, Tableau and Looker. Among the main pros and cons of Qlik (Qlik Sense) was the identification of 'Augmented Analytics' features as its key strength areas, including the Insight Advisor which suggests charts and natural language processing for data analysis, while on the other hand, it was also the one that took up a lot of memory on large datasets and had very high licensing costs as drawbacks. The main advantages of Power BI were its user-friendliness, drag-and-drop dashboard creation, and Microsoft product integration, however, distinguishing factor was its operating through separate Desktop (editing) and Web (visualisation/sharing) versions. Tableau was rated highly among the data visualisation tools offering good performance with large datasets and real-time data query through dragging, with separate products for desktop development and cloud publishing. Looker was praised for its web-native architecture, which meant that users would not have to install anything on their desktop. Its LookML language for data modelling was regarded as a key feature, despite its proprietary nature being a possible downside. Looker was the tool considered among all for having cloud deployment and semantic layer capabilities. However, the high licensing cost of the proprietary tools led to the search for the open-source alternatives.

The thesis talked about two principal solutions, both of which utilized Cube as a semantic layer. The first one was a custom web application that was completely developed from scratch using the Next.js framework. Its architecture consisted of a React-based frontend, a Next.js backend, Firestore for the application's data persistence, BigQuery as the data warehouse, and Cube as the semantic layer. Among the main development tools for this custom application were React for user interface development, Next.js for the framework capabilities such as code splitting, and rendering methods, Firestore for NoSQL data persistence, and Ant Design Charts for the creation of high-quality, interactive data visualisations. The custom application enabled users to connect to data sources, conduct queries, generate charts of different

types, and prepare dashboards, having a landing page for dashboard management, a dashboard page with visualisation and edit modes, and a chart builder page for query generation and chart rendering.

The second method was a hybrid solution, which aimed to incorporate a semantic layer to the existing architecture of ContentWise, that already used Apache Superset. The process involved the installation of Cube as a semantic layer between Google BigQuery and Apache Superset 2.0, with the two being set up in Docker containers. The general characteristics of Apache Superset are that it is an open-source, enterprise-grade BI web application that specializes in the visualisation, exploration, and analysis of data. The application gives users access to a vast number of chart types (almost 60 categories) and also has SQL Lab for data exploration and query construction. Furthermore, Superset comes with a Role-based Access Control (RBAC) system that includes Admin, Alpha, and Gamma roles for controlling data access and permissions. The 2.0 version of Apache Superset added a lot of features, such as stable dashboards (the same colors for the same charts), fully interactive cross-filtering, and a variety of new chart types and customization that users can apply.

The semantic layer, Cube, serves the same purpose in both solutions. Cube is basically a middleware that hides the complexity of metrics and gives a common view of data definitions from different sources. The way it works is aimed at eliminating various pain points in analytics applications, like SQL code organization, performance bottlenecks, and data access control. The primary features of Cube's framework are Data Modelling (where you define measures, dimensions, joins, and segments), Access Control (where JWTs provide security context), Caching (where in-memory and pre-aggregations are done), and APIs that include SQL, REST, and GraphQL among others. One of the most significant contributions of Cube to the whole process is its ability to pre-aggregate data, thus speeding up the queries more so when the data is from large datasets, it does this by capturing the most used queries in a form of cached data and presenting the least detailed (condensed) source data. This has been indicated by the completion times of the queries where a tremendous drop has been recorded for the times when pre-aggregations were in use. By bringing in Cube, the level of flexibility is quite high since the data model has been abstracted from the visualisation layer, thus changes in the data source only need updating Cube's data model without affecting dashboards or charts in Superset or other tools (*The Importance of Data Visualisation Tools in Modern Enterprises,*2025).

Child malnutrition is an acute global issue that ends up as a root cause of close to half the deaths of children under five years and at the same time retards the children's growth and development immensely. The problem, which could be viewed simply, is the result of many underlying factors such as poverty, poor economy, and limited availability of healthcare and nutritious food, especially in rural and urban regions of Asia. The problem is so big that only through collaboration between different stakeholders, governments, and organizations, can a holistic and effective solution come up which would include nutritional education and quality health services. Data visualisation especially with the use of interactive dashboards has been pointed out as the main tool for gaining a better understanding and raising the awareness of the complex data related to the topic of malnourishment. The typical analytical procedure consists of methodical data gathering, usually from agencies such as UNICEF. This is then followed by the second phase of data preprocessing also known as data profiling where the characteristics of the dataset are analyzed and missing values are identified; the next step is data cleansing which aims at finding and fixing corrupted or incorrect data. Finally, the application of statistical techniques like ANOVA (Analysis of Variance) is done for the purpose of revealing changes in response variables when particular conditions are applied. ANOVA assists in deciding whether the differences among the groups that were noticed are of statistical importance or just random, and is thus very common in the field of medical research. The research revealed that there is a pronounced influence of income classification on the rate of child malnutrition(Yeni Setiani et al., 2023).

SRplot is a no-cost platform that is web-based and mainly used for data visualisation and graphing in the areas of biomedical and bioinformatics research. Integration of more than one hundred standard functions and intensive plotting operations done on the server side are among the features that allow SRplot to reduce the computational power required locally. The inspiration behind the development of SRplot was the difficulties that researchers face with the existing tools, e.g., the requirement for programming skills (R, Python, Perl), the expenses of using commercial software (Excel, Origin, Graphpad Prism), and the problems with installation and user-friendliness, especially for wet-lab researchers. A lot of bioinformatics tools are focused on specific tasks, thus a researcher would need to use several packages just for a single publication. SRplot has an online solution that is easy to use and

comprehensive. Key Features and Advantages: One of the major benefits of SRplot is that it is not constrained by local installations; any modern web browser can access it. Another notable feature is the user- friendly GUI that comes with example data for assistance. The income classification has a significant impact on child malnutrition percentages. The tool provides more than 120 modules for different kinds of plots, such as basic, genome, transcriptome, epigenome, and clinical plots. Users have the option to customize the shapes, fonts, and colors as per their preferences and obtain the graphs in high-resolution formats such as PNG, TIFF, PDF, and SVG. Moreover, it has databases like human, mouse, and rat genomes/transcriptomes/GO/KEGG, and TCGA integrated within it. SRplot is a tool that gets constant updates with the help of user suggestions and is also used in more than 550 peer-reviewed articles. Limitations Despite all the merits, SRplot has its drawbacks. One of the main issues is the inability to process and visualize high- dimensional data because of the performance bottleneck related to large uploads. Besides, even though the user is given options of customization one might still have to use a third-party tool like Inkscape or Adobe Illustrator to get a perfectly beautiful graph. In addition, SRplot is a non-open-source tool though it can be availed at no charge for a non-commercial purpose(Tang et al., 2023).

Dashboards are, in fact, graphical user interfaces that display information in a more digestible way. Such a display is usually produced by software. Specific indicators are employed to visualize data which then forms the basis of information display. The main goal of having information dashboards is to speed up the decision-making process, evaluate the performance of organizations or institutions, oversee processes that are in-progress and to forecast what is likely to occur in the future. In addition, dashboards are tools that are utilized to assess ongoing processes, keep track of current performance, and foresee future situations. Visualisation of Data Importance. Data visualisation is something that helps to investigate data through the changing of its format into visuals such as tables, charts, graphs, etc. This change makes it easier to analyze and report complex data, thus, turning it into a more understandable and usable format. Good data visualisation is creating clear and efficient visual representations of information, just like good communication where the message is focused, gives clear answers, and avoids unnecessary detail. The fast visual

representation of intricate data enables one to gather conclusions from the existing data, and that underlines the necessity of fast decisions in industries and businesses like Hotel XYZ. Tools for Dashboard Creation and Data Input The research pinpoints Google's open-access and open-source tools as the ones that are mainly used for creating digital dashboards, particularly Google Data Studio (currently called Looker Studio). Google Forms is the one utilized for inputting data. It is an online service based on forms that lets users design their own questions or surveys, which makes it a very useful and convenient tool for collecting particular data. The mixing of Google Form for input and Looker Studio for visualisation is revealed to hasten information processes, decision-making, and performance measurement(Wijaya & Fitri, 2024).

The development of user-friendly web servers like ImageGP meets the growing difficulty of imaging complex biological and microbiome data for non-programmers. The traditional tools required extensive coding in R or some other programming languages; however, ImageGP offers a user-friendly interface that makes the process easier for the scientists to generate the ready-to-publish graphics almost effortlessly—sometimes just by copy-and-pasting the data and clicking on the button. ImageGP provides more than 16 subfunctions, which include common ones like heatmaps, boxplots and scatter plots, specializing in volcano plots, and function-specific microbiome analyses such as alpha diversity, functional profiling, and biomarker discovery. The inclusion of metadata, setting of parameters to exact values, and generation of reproducible scripts are features of the platform that make it more attractive for both exploratory data analysis and publication preparationImageGP is built up methodically using a combination of web technologies like JavaScript, HTML, Bootstrap as well as backend frameworks like ThinkPHP, and heavily relies on R packages including ggplot2 and vegan to generate various visualisations. The code that runs is open to the public through GitHub thus providing transparency and reproducibility which is an important factor for scientific validation. Furthermore, the platform's connection with popular bioinformatics pipelines such as PICRUSt, LEFSe, FAPROTAX, and BugBase further facilitates the analysis of microbiome and omics data thus reducing the researchers' burden of processing (Chen et al., 2022).

The literature highlights the potential of gamification as a powerful tool in increasing citizenship involvement in urban monitoring programs. One of the main features of game design, such as points, challenges, and leaderboards, is that they can really change the motivation, satisfaction, and active participation of users for the better. The findings are consistent across different fields, including educational platforms and public internet access issues, showing that gamification brings about a sense of competition and achievement, which in turn, motivates users to get more involved with the data concerning the city. Using the best datasets available, for instance, 3-dimensional point clouds with high resolution, multilingual speech records, and video with semantic annotations, helps in making the visualisations richer and more acceptable to the people. These advanced techniques of visualisation transform the complex urban data into simpler, more enjoyable, and more accessible forms that thus, aid the public to participate in a more informed manner. However, the literature also points out difficulties such as making the public stay interested continually, making services available for everybody, and balancing the fun with the truthful presentation of the data. While the design of the platform will be tailored and the research will be continuous, it will be possible to overcome these difficulties and reap the maximum social benefits from the gamified urban monitoring systems, subsequently, resulting in a smarter, more participatory urban space where residents are empowered to actively take part in and cooperate with the city governance(Li et al., 2025).

Prasiwiningrum explores the essential function of healthcare workforce planning in the provision of effective and efficient health services, especially in large countries such as Indonesia, where accurate estimates and visualisations are the basic tools for identifying inequalities, forecasting demands, and allocating resources in a timely and fair manner. It points out that the use of interactive dashboards greatly facilitates the process of decision- making by displaying the complex data in user-friendly visual forms like charts and graphs, thus making it possible for the users to easily grasp the information. The combination of tools such as Google Looker Studio with secondary data analysis is found to support the in-depth study of the distribution of the workforce, resource allocation, and the accuracy, efficiency, and engagement of the stakeholders in the healthcare planning process. The study itself is a secondary data analysis that relies on the Kaggle database for the 2015-2017 projections, which is a

money-saving method for obtaining insights from the current datasets that could help solve systemic issues in healthcare delivery. The conclusion drawn from the literature is that, without a doubt, a strong healthcare workforce planning backed by advanced data visualisation and secondary data analysis is vital for the realization of national healthcare objectives and the sustainable development of healthcare (Prasiwiningrum, 2017).

The study reveals that the data visualisation community has been actively engaged in developing the representation of data by means of Natural Language (NL) text for some time, including the Natural Language Interfaces (NLIs) as a major area of focus, to facilitate that. The main goal of an NLI is to let the user empirically and intuitively connect to data by allowing him/her to encapsulate his/her query into natural language and having the NLI convert this query into the visualisation of the data set the user is interested in. Different kinds of commercial NLIs have previously allowed the user a sort of interaction that was usually very limited and basically consisted of querying the data set or making use of the established chart types. Nowadays, the NLIs as we call them, are focusing on the neural end-to-end models that leverage the power of deep learning to integrate language understanding and reasoning with chart generation in one system. That is why these new models are steering clear of the symbolic models of the past, and to illustrate this point, many LLMs models like BERT have shown impressive results(Maddigan & Susnjak, 2023).

Purnama et al. state that prior research has recognized the advantages of Looker Studio and data visualisation techniques in several areas. In particular, the usage of Looker Studio has been reported to increase data storage capacity and file management, thus facilitating data access and speeding up the decision-making process. Besides this, the platform's LookML (Looker Modeling Language) enables the detailed definition of metrics and dimensions, hence giving a more accurate and deeper analysis of data. Dashboards that are interactive and made with tools such as Google Sheets and Looker Studio are shown to not only visualize real-time data but also to provide deep insights and have features like filters and drill-downs that are very helpful to the decision-makers. In general, the power of data visualisation is acknowledged in that it makes information appealing and understandable. This, in

turn, leads to the easier spotting of patterns, trends, and anomalies that would otherwise remain hidden in traditional tabular data (Purnama et al., 2025).

The literature review reveals that data analysis is an organized way of comprehending, interpreting, and getting meaning from data, which is the backbone of useful data. This process comprises different kinds of analysis such as descriptive analysis (characterizing data through the use of measures like mean, median, and standard deviation), sentiment analysis (getting the opinions in text data like product reviews), and exploratory analysis (detecting hidden patterns and relationships). Generally, data analysis goes through the phases of data collection, cleaning, analysis, and presentation.Product reviews, which are commonly found on the internet, are useful in comprehending consumer assessments and can also help buyers to make wise choices regarding their purchases. Looker Studio, which was previously known as Google Data Studio, is described as a free and powerful business intelligence (BI) tool with great flexibility for creating interactive dashboards and reports, which therefore provide the possibility of doing extensive data analysis and visualisation. Among other things, dashboards are vital things in business as they can easily monitor performance, analyze data, and manage operations, thus helping to detect issues early, and centralizing data to improve both customer service and business efficiency. Arabica coffee is a variety of coffee that is known all over the world for its complex flavor and high quality, and the reviews from consumers and the institutions like the Coffee Quality Institute (CQI) provide valuable information about its characteristics and where the consumers could be located. The application of data visualisation techniques such as bar charts, line charts, pie charts, scatter plots, heatmaps, and map visualisations is one way to assist in making decisions by presenting complicated data in an easily comprehensible and intuitive manner. Google Form is also recognized as a user-friendly, costless, and efficient tool for gathering data through surveys (Muktary, 2024).

The study by Ferawati points out that to rely on data, which is the main source, environmental and health conditions must be fully understood. The current age, which is information-oriented, puts a heavy demand on the public for processing data. Health data from such places as the Sukoharjo Regency Health Office is available for the public and can be used for analyses to find out the factors that affect the health of the region. For example, one of the health cards of the region could be the linkage of population density and anesthesia for diseases like Dengue Hemorrhagic Fever (DHF). A study in Kartasura, Sukoharjo, for example, has already established such a

relationship between the density of settlements and DHF outbreaks. Furthermore, population density also has a negative impact on the quality of groundwater. Birth records can be used to derive the health condition in the area, as for instance, stillbirths are often considered being due to maternal health and delivery assistance. Diarrhea, which is another health problem on the rise, is closely linked to the sanitation and water drainage situations, as well as the bacteriological quality of the water. Excel dashboards are shown as excellent tools for making different kinds of information available in one interactive place, thus turning complex data into visually attractive and meaningful forms. Besides R, which is another tool used for healthcare big data visualisation, Excel is the preferred software because of its user-friendliness and less powerful hardware requirements. This means the software can be used for broader community education, particularly among the student and teacher groups in the community(Ferawati et al., 2021).

The existing sources of information demonstrate the very positive effects of digital dashboards, a new paradigm for managing information. They are not only acting as tools for evaluating the progress of processes, but they can also be used for the purpose of monitoring the performance and foreseeing future conditions. The information provided by these dashboards is, according to software-generated user interfaces, often in a graphical form. There have been several different previous researches that have used Google Data Studio (which is now called Looker Studio) for creating dashboards, for example, showing the values of students' report cards in community service, making complex sales reports for business decision-making, and also helping managers with the visualisation of sales data. The mentioned applications indicate that Google Data Studio is a very good and qualitative alternative for the data visualisation process. As a result, the present study has utilized Looker Studio for the purpose of creating a performance dashboard for a D4 Multimedia and Network Engineering Study Program and then integrating it with Google Site for on-line data showing in compliance with internal audit requirements(*Pemanfaatan Looker Studio Untuk Visualisasi Kinerja Program Studi D4 Teknik Multimedia Dan Jaringan*, 2025).

This research is an extension of existing literature on the subject of waste management and data visualisation. It was noted in earlier studies that the Indonesian waste production problem was still there to be solved, and Tangerang Regency was no

exception; the area generated 1,200 tons of waste daily in 2020 which was the figure already anticipated to get larger. Data analysis and visualisation for policymaking have also been widely recognized as a necessity. Among the different platforms for data analysis and visualisation, Looker Studio and Big Query received one of the highest ratings based on previous research; through their use, the sales data for food and beverage products was suppressed, and health data was rendering insights. Information technology has also been used for waste data mining and processing, for instance, by the application of the web-based monitoring system for consumer awareness regarding waste sorting. The broad area of data processing and analysis as discussed in work like 'Data Science for Business' offers important references for this project as well. The research in sentiment analysis and academic information systems is an argument for the still growing relevance of data processing and visualisation in different fields. All these studies mentioned earlier thereby form a basis for the choice of methodology and tools for this research, which is to improve the speed and correctness of data processing for business decisions(Yanto et al., 2023).

Google Looker Studio, which was previously known as Google Data Studio, is an amazing application for visualizing data that makes the whole data management thing much easier and more accessible for the users who can now effortlessly link their data from different sources, perform analysis and show their results in an interactive and perfectly clear visual). This great advantage is especially important for the schools and universities that are to make instant reports and dashboards on learners' data, thereby to get good analyzing and reporting processes. In high schools, Google Looker Studio not only aids in monitoring student performance but also allows quicker and evidence-based decision-making which is very important for teachers to know the needs of the students and improve the quality of education. It serves as a good solution to SMA Pusri Palembang by making student data easy-to-get and informative through the application of Google Looker Studio. The study aims at mainly discovering how to utilize its capabilities in a qualitative descriptive way using the academic database of SMA Pusri Palembang for the years 2022 to 2024(Oktaviani & Nita Rosa Damayanti, 2024).

Data visualisation is a very important and necessary tool for converting difficult data into a simple and understandable graphic format, thus becoming a crucial part of

business and life management practices, especially because data is getting more and more complex. It is still to be considered as both an art and a science as its main goal is to visually bring forward the data to help understand it. Ultimately, data visualisation has come a long way since its early days; the first examples of its application can be found in maps created even before the 17th century, while the 'golden age' of the field came in the second half of the 19th century marked by such outstanding cases like John Snow's cholera map and Charles Minard's map of the Russian army. Nevertheless, the early 20th century saw the decline of the phenomenon with statisticians still giving more importance to figures than to visuals. The computer graphics introduction, and particularly the use of the Cartesian coordinate systems in the 17th century, was a major boost for the field, although their first phase of development did not concentrate on visualisation. Google Data Studio is a contemporary answer, and it is a cloud-based and user-friendly tool for presenting complicated data sets in a captivating and comprehensible way. It was first introduced as a feature of the Analytics 360 Suite in May 2016, and it got worldwide accessibility and free usage in March 2017. This tool uses cloud computing which is a method of managing both data and applications in multiple locations, thereby providing the advantages of improved data security, flexibility, centralized storage, and reduced costs. Google Data Studio offers easy integration to other Google products such as Analytics 360 Suite, BigQuery, and Sheets, from where users can tap data sources and then develop dashboards and distribute reports (Apriani et al., 2022).

Google Data Studio is a very modern and sophisticated tool that can be this way: a cloud-based, user-friendly, and a very good way of presenting complicated data in an attractive and understandable form. It was introduced in May 2016 as a segment of the Analytics 360 Suite and was available globally and at no cost in March 2017. The tool operates on the concept of cloud computing, which allows the management of ata and applications to be done from one place. Consequently, the data secured will be less prone to threats, there will be more convenient access, there will be one place for storage, and the company will save money.Besides, Google Data Studio works easily with various Google products such as Analytics 360 Suite and BigQuery and Sheets and it enables the users to connect to the data source, prepare the dashboards, and share the reports in a very efficient way.The means of presenting data in a manner that allows for communication, reasoning, and understanding of complex

amounts of information is critical to decision-makers. When data is presented in the form of both static and interactive visuals, data visualisation allows users to explore or engage with the data, which enables users to engage in analysis, recognize patterns and relationships, and engage in sense- making. This form of processing and reasoning is particularly important in higher education institutions that serve a mission of developing human capital and enhancing quality through continuous reasoning and analysis (e.g., shaping student t success as well as shaping faculty performance). Machine learning serves an important function in this regard in that it allows models to be generated automatically by computer systems that learn from experience to provide insights without explicit guidance through a process, or to automate decision-making processes through algorithms trained to recognize patterns in data. The main objective of studies in this area is often to uncover novel insights that help decision-makers formulate effective strategies to enhance institutional performance and stakeholder satisfaction. Data visualisation is an effective tool for helping people to process a huge amount of information, bypass cognitive barriers, and reach the right decision. it is done through the creation of such visualisations that allow the specialists to uncover the issues and the fixes(Llaha & Aliu, 2023).

In the realm of big data, data visualisation tools have played a pivotal role due to the pressing need to comprehend, assess, and harness the massive information resources in an efficient manner across various industries. These tools not only unravel the complex data but also render the insights easier to interact with, thus showcasing the value of data and supporting the decision-making process. The present paper presents a comparative analysis of three leading tools—Tableau, Power BI, and Looker discussing their pros and cons regarding different aspects like ease of use, data connectivity, visualisation capabilities, collaboration and sharing features, and customization and extensibility. Tableau's most praised feature is its intuitive drag-and-drop interface, which acts as a bridge between beginners and power users through scripting options, thus allowing even the most basic analyzes to be performed with very little effort. Looker, while being more visual and less technical, is still much more dependent on the expertise of the user for advanced tasks. Power BI comes up with a strong user experience, especially in Microsoft-centric settings, and it does so with a very nice interface and user- friendly features that make it easy to visualize without needing a lot of skill. All of the tools are similar in how much they

can connect to different data sources, but Power BI is the winner when it comes to integration with Microsoft products. Tableau is the tool that takes the prize in the visualisation aspect as it is famous for its stunning and elaborate visualisations, and it comes with storytelling and interactive dashboards. Power BI is another competitor in this aspect presenting an extensive range of customization and visuals, such as matrices, maps, and tree maps, plus the Q&A interactive feature allowing one to ask questions in natural language. Looker visualisations are also good but might not have the most advanced customized features. Power BI has the best integration with Microsoft tools concerning collaboration and sharing, along with role-based access control and app workspaces. Tableau has such collaboration abilities that are sure to include content management and publishing to Tableau Server amongst others. Looker allows for reporting and dashboard sharing easily, the granularity of control over permissions and user roles is such that it guarantees common understanding of data. In the end, the users' preferences when it comes to functions and features of each tool are what must be considered in order to make the right choice (Patel,2023).

Data visualisation has become increasingly important in educational settings, allowing for clearer understanding of student performance and for decision making. Compared to numeric displays, graphic visualisations are more effective in visually interpreting academic data that is presented in existing work using tools such as Tableau Big Data. Graphic visualisations are of additional value when presenting information using varied information or complexity, such as a sentiment analysis, and making the information accessible to stakeholders who might not have technical backgrounds or insights. There are visualisation tools that can retrieve, aggregate, and display data using graphic displays such as Tableau, Google Data Studio (now Google Looker Studio), and Power BI. In fact, Google Looker Studio ("Looker Studio") is recognized as an easy-to-use application that can manage complex datasets and that displays information in a clear manner, including its application to COVID-19 data visualisation in Yogyakarta City of Indonesia. Google applications are commonly used by researchers to visualize educational data, for example, using Google applications to visualize teacher numbers in West Java or display COVID-19 case data. The platform's flexibility and effectiveness have been proven through various industries, which significantly indicates this platform's potential in making education more comprehensible and data-informed decision-making by providing an

insight into how data is used. Additionally, studies point out that sophisticated analytics and graphic methods encourage teachers to discover unnoticed features in enormous data collections and web-based applications combined with machine learning produce inexpensive ways for visualizing K-12 state assessment data, among others in education. Again, the very characteristic of educational information platforms, particularly viz applications utilizing big data, gives teachers the chance to perceive the progress and patterns in learning of the whole class as well as of individual students(Pamungkas & Saprudin, 2025).

The section of the paper about the literature review has gone through previous work on data visualisation and the subject related to it thus, giving the study background and context. It tells how data visualisation underwent changes from simply reporting numbers to being interactive displays utilizing many data sources. Among the changing processes are the growth of the application of visualisation techniques such as the mid-nineteenth century advent. In mapping, for instance, visual artists have mirrored human societies since the Ancient World, where such drawings were already done for the purpose of giving meaning and transmitting information. Very gradually, these means of communication evolved and became more intricate and divided by the professions of their users like cartography, statistics, or science, which helped them even more in grasping complex information. The reviewer brings out the point that data visualisation techniques are at the core of data analysis, which allows for the swift spotting of trends, outliers, and patterns, and makes it possible to communicate the very complex information to a much larger audience. This also applies to the case of exploratory data analysis where the tools are of great assistance, plus they can integrate data from different sources setting the stage for AI- driven analytics to portray the relationships. All in all, the literature review conveys the message that data visualisation is indispensable for the purpose of extracting informed decisions and providing operational efficiency in various sectors.(Lavanya et al., 2023).

In the last few years, data visualisation tools have been increasingly used in the education sector and they are among the most modern techniques that have been introduced to publish information and also improve student learning. It has been a well-known fact that these tools have the capability to attract pupils' interest, increase understanding, and support the making of decisions based on data. Moreover, the

presence of data visualisation in education is a necessity since it enables students to become data-literate and thus develop the ability to read and analyze the huge amounts of data that they will come across in their academic and personal lives. Through visual means, interaction with students is greatly increased as attention is drawn more effectively than writing plain texts, thus leading to more motivated and interested persons. Moreover, the professora can offer the information showing the patterns, trends, and relationships, thus helping the students to develop their critical thinking and analytical skills.

The positive effects of aids in the form of visuals on student engagement, understanding and retention have been recognized in the studies done. However, the challenges related to this are still there, like the difficulties in technology being able to implement and keep the advanced visualisation tools, accessibility problems for specific students and schools, and also the lack of teacher training and professional development. The future points to the direction of the continuing development of technologies such as augmented reality (AR) and virtual reality (VR) to provide more realistic experiences, the setting of personalized learning environments, collaboration platforms, and further survey to improve tools and strategies. Through tackling these difficulties and utilizing the opportunities, data visualisation can revolutionize the education sector, giving power to not only teachers but also students to access and open up new ways of learning, exploring and discovering(Adarsh Bhavimane et al., 2024).

The organizations' competition is getting more intense and they have no alternative but to perform better and enhance their performance metrics. If they want to continue being part of the competition, good performance management systems are absolutely necessary for the performance management process of monitoring and improving employee productivity and the whole organization’s performance. KPIs or Key Performance Indicators are very much accepted as the most important tools for rating individual and team performance, marrying up activities with the organization’s aims, and pushing continuous improvement initiatives. It is very important to develop systematic frameworks for KPI management because of optimizing organizational performance, enabling proper tracking of the progress towards achieving strategic objectives, pinpointing areas for improvement, and wise allocation of resources. Moreover, performance indicators being aligned with organizational goals is a top priority in order to ensure their relevance and effectiveness. The application of

advance analytics tools, for instance, Google Looker Studio, is one way organizations can have a great advantage in the process of optimize performance management by being able to see their data-driven insights. In particular, Google Looker Studio is a very powerful tool that not only gives organizations the ability to monitor the performance of the business in real time but also provides them with the tools to analyze the data thereby making the organizations to take the necessary corrective actions or motivate them to continue doing what is right. This capability is especially useful for the management of performance metrics for offshore teams where the geographical separation and the cultural differences are the factors that present unique challenges, as these tools not only provide real-time visibility but also give actionable insights in such environments(Faculty, Graduate School, Nueva Ecija University of Science and Technology, Nueva Ecija, Philippines et al., 2024).

Data visualisation instruments, especially Google Looker Studio, are commonly employed a cross sectors to effectively reduce the complexities of data analysis, make decisions easier and improve operational efficiency. The versatility of Looker Studio is shown across diverse applications including the analyses of seasonal trends to commodity prices, visualizing student enrollment data, to improving retail marketing planning. Looker Studio has been used as a visualisation tool in environmental research to visualize climate pattern data, social impact research, (e.g., an inclusivity index and associated data), waste management systems, e-journal collection management, and data analytics training programs. It can also contribute to performing management and improve key performance indicators (KPI) systems, and provide business intelligence to support pharmaceutical sales and inventory management. Although many projects and studies mention these broad applications, this particular study will examine the use of Looker Studio to analyze and visualize sales performance of local products such as roasted kemplang, an unexplored area. This work is consistent with research highlighting Looker Studio's utility in improving operational efficiency and understanding customer preferences in the retail space for small and medium enterprises (SMEs). In focusing narrowly on kemplang sales data, this study (and project) provides unique insights into consumer behavior and optimizing sales over seasonal periods in a way that is different from the previous analyses of institutional or environmental data. The studies' similarities are noted in the conclusions that Looker Studio will provide easy to interpret visual aids when

analyzing data to make decisions, with this study adding new information on small business sales trends of analysis of products for identifying periods of peak sales and product variants that are popular(Fauzi & Sutomo, 2025).

In the marketing landscape, the digital era has greatly affected traditional ways and social media gradually becoming the main channel of all digital marketing activities. One of the main contributors to this change is the influencer marketing, which means that brands will have to make partnerships with people who are able to influence the followers on social media positively regarding their products/services. Such a partnership works well when the influencer's traits and values are similar to those of the brand. A company's branding strategy plays a vital role in deciding how to position itself in the market and involves creating identity, positioning, and brand assets for a sustained competitive advantage, as pointed out by Aaker and Moorman (2023).These strategies need consistency and uniqueness to be successful, and they involve the different stages like brand discovery, positioning, identity, communication, and performance monitoring. To evaluate the performance of the influencer marketing campaigns, metrics such as engagement rate (ER) are employed, which measure the audience's interaction with the posts; thus, a higher ER is interpreted as strong engagement. The ER calculation takes into account the number of views, likes, comments, saves, and shares. The use of tools like Google Looker Studio is very important in presenting this data in a more understandable way by turning raw information into informative dashboards and reports, which are then used to support brand strategy decision-making, especially in the monitoring and evaluation stages(Alsa Marsela & Hudi Santoso, 2025).

The application of Business Intelligence (BI) along with Google Looker Studio, which is a data visualisation tool, has emerged as a key factor in the timely presentation of data and in overhauling the visual data presentation challenge. The data visualisation tool Google Looker Studio provides the ability to visualize data with the help of tailored graphs, tables, and other visual components and at the same time, it promotes collaboration and report sharing. It is mainly beneficial for changing the unrefined data into visual formats, which is a support for villages to comprehend their social landscape. Previous studies point out that BI technology is the one capable of handling and analyzing the data completely, the outcome is the dashboards that present fund allocations, project implementation and local impacts, thus allowing the

stakeholders to keep track of the efficiency of public service. The Data, Information, Knowledge, and Wisdom (DIKW) framework is a tiered model that demystifies the transformation of raw data to meaningful information and ultimately becomes wisdom through deeper comprehension. This framework portrays the phases of information processing where data are basic facts without context, information is produced when data is organized and given meaning, knowledge is obtained by deciphering the information and wisdom is the use of knowledge for prudent decisions. Business Intelligence as a technique draws off the operational data and warehouses it for fact-based, rather than intuitive, decision-making. BI systems target to deliver different kinds of information according to the requirements of clients by tapping into different sources such as spending history and reporting data. The use of BI technology is perceived as a practical way to handle and process data(Yesa et al., 2025).

Acknowledging the sales data as a key asset for manufacturers, it provides information on the whole development of the business and performance evaluation; strong demand is signaled by high sales and low sales may indicate the need for product improvement. In a market where competition is getting tougher day by day, knowing the exact consumer demand through consumer data and adjusting product availability accordingly is a must to have improved efficiency in operations. Visual tool kits like Looker Studio (previously Google Data Studio) are extremely powerful in making such a complicated data set understandable and thus they also get to engage a much wider audience. The Looker Studio platform that is hosted in the cloud offers features for collaborating and free functions, which together allow for the creation of informative visuals via different charts like bar charts, area charts, and even geographic maps in real-time. Earlier, the analysis of sales data was one of the approaches used in research that, among others, commonly employed the K-Means Algorithm as a technique to discover the best-selling products and improve sales. This present research, however, is going to visualize the sales data of an Indomie stall using the Looker Studio Platform in order to analyze factors such as best-selling and non-best-selling products, payment types used most, income fluctuating, and the type of orders that are popular, by following a methodology that encompasses data collection, data preparation, and exploration from secondary sources. (Purwenti et al.,2025).

It is now unavoidable for educational institutions to switch from the traditional way of recording student achievement data on paper to the adoption of digital systems. This change will allow schools to perform better in terms of tracking, managing, and analyzing students' progress. The digital records can be used not only to communicate and register but also to offer real-time updates, which can be very helpful for teachers who wish to perform a quick analysis of their students' performances and know those areas of performance in which students are either doing well or where extra help might be needed. The capability of using technology for instructional records contributes significantly to the organization's consistency and accuracy of records, thus providing a full account of a student's academic journey and allowing the teacher to support the student by adjusting the instructional strategies to the individual's needs. Digital records also provide immense assistance outside the classroom, by creating an academic portfolio of the student's progress that can be viewed by colleges, scholarship committees, or even employers. Furthermore, parents are not only informed about their children's achievements digitally but also involved in the education process, as they are free to access their children's progress and talk to teachers on their children's behalf, because they can do so independently. Moreover, educational institutions can leverage this information to evaluate and select programs based on data, which in turn, is reflected in the student’s overall achievement. All these contribute to students' learning success and the perpetual enhancement of teaching methods and programs (Akbar et al., 2024).

A drug use and addiction literature review presents important aspects that are drug consumption and addiction. According to Volkow et al., drug addiction is a chronic medical disorder characterized by compulsive drug-seeking behavior which the authors explain in terms of neurobiology along with the role of genetics and environmental factors. Their study reinforces the need for combining both behavioral and pharmacological treatments to achieve successful recovery. Degenhardt et al. primarily discuss the health implications of cannabis use, providing an extensive account of both its immediate negative impacts like remembering and motor skills impairment, and the long-term risks such as addiction and mental health disorders, thus they recommend public health strategies that are justified by scientific evidence. Bohnert et al. investigate the complicated, simultaneous relationship between drug use and mental health disorders, pointing out that people with mental health problems

are more likely to get addicted to drugs and that the reverse is also true, hence the need for integrated treatment approaches to dispel stigma and enhance patient outcomes. The SAMHSA report offers a thorough summary of the substance use and mental health trends in the United States which shows considerable percentages and differences among different demographic groups, therefore the report highlights the pressing requirement for treatment that is comprehensive and accessible. Lastly, Marlatt et al. A relapse prevention plan is to be suggested that is well-organized and consists of the above maintenance techniques that give the person strength via cognitive-behavioral, mindfulness, and other strategies including identification of and fortification against relapse for long-term sobriety (Kongara & Kothakonda, 2025).

Data storytelling (DS) is gaining traction as a novel approach that combines data, images and narratives to convey the main ideas to the audience, especially those who are not very skilled in visualisation, in a very fast and smooth way. While conventional visualisations (CVs) mainly show the raw data for exploring and interpreting, they can sometimes not be able to carry the deeper stories, especially if the audience is not expert in the subject. DS wants to eliminate this problem by turning raw data into the whole story that the audience can understand and even take action on. The first data storytelling efforts can be traced back to the 18th and 19th centuries, while modern-day uses are already found in different fields such as journalism, business, and education. Some advocates claim that DS improves communication by simpliing the matter and highlighting the core, thus possibly leading to more efficient and effective information retrieval and insights comprehension. Still, the amount of empirical evidence backing this assertion has been slight and inconsistent, with some studies indicating increased engagement, empathy, and memory recall, while others found no significant influence. A notable deficiency in the literature is whether DS really facilitates faster and better extraction of vital data insights than CVs and how the individual visualisation literacy might affect its overall effectiveness and efficiency(Shao et al., 2024).

The work describes a new methodology to visualize enormous scholarly data to reveal concealed patterns and facilitate academic development. Data is obtained by web scraping Google Scholar since there is no official API, pre-processed, and saved in a Neo4j graph database. Scholarly entities are modelled as nodes and relationships,

which allow concealed insights to be extracted. Different scholarly indicators, i.e., author-level and journal-level self- citation and ratios of international collaborations, are calculated and saved as database properties. This research suggests the use of the Cobb-Douglas econometric model to compute the 'Internationality' index of a journal which measures its effect in different countries and research communities. The study utilizes data visualisation tools like D3.js scripts, pie charts, line graphs, and area graphs for dynamic data display and resolving information overload. These visual representations help to recognize trends such as the shift of author domains, cooperative research, and knowledge transfer. To sum up, this approach unlocks the potential of advanced data modeling and visualisation techniques in providing deep insights into academic impact and success (Ginde, 2025).

The literature review for this survey on AI approaches for data visualisation, or AI4VIS, was performed through a relation-search method, which uses graph traversal over citation and reference networks. The process started with a linear scan of the full papers presented at the 2020 IEEE Visualisation Conference, which gave us an initial set of 9 papers. This initial corpus was searching for the citations made in each selected paper. In total, this method created corpus of 98 interdisciplinary papers across 10 research areas. Visualisation was the dominant area, consisting of nearly one-third of the total corpus. Analysis of the corpus revealed that papers applying AI methods to data visualisation (AI4VIS) has steadily increased over the last decade, especially since 2018 and peaking in 2020. The survey will discuss and organize AI4VIS research in a `what-why-how' framework, which is a well-known framework in visualisation. (Wu et al., 2021).

List of theses uploaded to Shodhganga

(*Shodhganga@INFLIBNET*, 2025)**.**

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
1	Effect of bioactive molecules from phytochemical data base as possible therapeutic agents on aortic tissue proteins ACE2 and MMP 7 in hypertensive rat model using in silico and in vivo methods		Patel, Sanakousar	Das, Kusal K	Patil, Sumangala		Allied Health Sciences - Biotechnology
2	Genetic and Molecular Profiling of GJB2 Gene in Deaf Mute Population of North Karnataka	2023	Hegde, Smita	Bulgouda, Rudragouda	Gai, Pramod B		Allied Health Sciences - Human Genetics
3	Genetic and Molecular Profiling of Neuroligin3 Neuroligin4X and Neuroligin4Y Genes in Autism Spectrum Disorder among the Population of North Karnataka	2023	Veerabhadra Hegde, Rajat	Das, Kusal K	Gai, Pramod B		Allied Health Sciences - Human Genetics
4	Genetic and Molecular Profiling of FIX FACTOR 9 Gene of Haemophilia B in Karnataka	2023	Kulkarni, Sujayendra	Bulgouda, Rudragouda	Kolagi, Sanjeev I	Gai, Pramod B	Allied Health Sciences - Human Genetics

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
5	Multidetector Computed Tomographic morphology of Olfactory Fossa and its correlation with Body Mass Index in North Karnataka Region	2022	Naikanur, Anandagouda. V. Naikanur	Bannur B M	Kolagi, Sanjeev I		Department of Anatomy
6	Evaluation of Neuroprotective Role of Drugs That Modify Renin Angiotensin System on Histoanatomical Structures of Brain in Animal Models of Parkinson s Disease	2022	Prakash K G	Bannur B M	Madhavrao C		Department of Anatomy
7	Evaluation of Preventive Role on Microanatomical Changes in Brain and Anticonvulsant Properties of Calcium Channel Blockers in Experimental Animal Models	2022	Saniya K	Patil B G	Madhavrao C		Department of Anatomy
8	Comprehensive Immunophenotypic Expression Analysis of Phospholipid Binding Proteins in Renal Organogenesis and in Kidney Carcinoma	2020	Roshni Sadashiv	Bannur B M	Praveen Kumar Shetty		Department of Anatomy
9	Effect of antistress drugs alprazolam buspirone and fluoxetine on stress induced changes of brain and other organohistopathology in male albino rats	2018	Kori, Rohini Sharanappa	Desai, S D	Das, Kusal K		Department of Anatomy

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
10	Computed tomographic study of morphometry of sella turcica in north Karnataka region	2020	Shaha, Lohit V	Patil, Babasaheb G	Kolagi, Sanjeev I		Department of Anatomy
11	Effect of nigella sativa seed extract on glucose lipid profile liver function tests oxidative stress and histological changes in pancreas kidney liver and tibial nerve in normal and streptozotocin induced diabetic rats	2018	Shaik, Hussain Saheb	Desai, S D	Das, Kusal K	Mavishettar, G F	Department of Anatomy
12	Effect of terminalia arjuna and emblica officinalis extract on cardiovascular system in albino wister rats	2015	Patil, Bheemshetty S.	Desai, S D			Department of Anatomy
13	Aphrodisiac effect of mucuna pruriens and withania somnifera and their effect on male reproductive organs of albino rats	2015	Hadimani, Gavishiddappa A	Desai, S D	Das, Kusal K		Department of Anatomy

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
14	Pro angiogenic vascular endothelial growth factor VEGF placental growth factor PIGF and anti angiogenic factor soluble FMS like tyrosine kinase 1 sFlt 1 in preeclampsia A case control study	2023	Kashinakunti, Sangappa V	Devaranavadagi, Basavaraj	Mallapur, Ashalata		Department of Biochemistry
15	Study of Inflammation Oxidative stress and Cardiometabolic Markers in Psoriasis	2023	Mannangi, Neela B	Devaranavadagi, Basavaraj	Ankad, Balachandra		Department of Biochemistry
16	Evaluation of Daboia russelii Venom Induced Biochemical Changes in Calotropis gigantea L R Br Treated Mice	2021	Vikram P	Devaranavadagi, Basavaraj	Menon, Achutan Raghava		Department of Biochemistry
17	Evaluation of serum cystatin C mycloperoxidase and other biochemical markers for the early detection of renal failure in diabetic and non diabetic patients in Karimnagar Telagana	2020	Sangeeta S	Ambekar J G			Department of Biochemistry

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
18	Influence of L arcorbic acid on chronic hypoxia induced alteration of cell signalling pathways on cardiovascular system in male wistar rats with or without exposure to heavy metal nickel	2020	Chandramouli R	Basavaraj Devaranavadagi	Das, Kusal K		Department of Biochemistry
19	Study of dyslipidemia glucose homeostasis and nitrosative stress in diabetes mellitus patients with and without coronary artery disease	2020	Kavitha M M	Ambekar J G	Kashinakunti S V		Department of Biochemistry
20	Salivary levels in interleukin 21 and Ig A as good indicator in chronic periodontitis and its correlation with C reactive protein and bicarbonate levels	2020	Lokhande Rani Vilas	Ambekar J G	Kishore G Bhat		Department of Biochemistry
21	Heart type fatty acid binding protien in early detection of acute myocardial infarction comparison eith CK MB troponin I and myoglobin	2018	Anand	Devaranavadagi, B B			Department of Biochemistry

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
22	Isolation production purification characterization of fibrinolytic enzyme from fungal source	2019	Shilpa H K	Ambedkar, Jeevan G	Siddalingeshwara, K G		Department of Biochemistry
23	Influence of oxygen sensitive Vascular endothelial growth factor VEGF Gene Expression in Pulmonary Tuberculosis and its correlation with erythropoietin and tumor necrosis factor alpha	2019	Bhat, Harish K	Ambedkar J G	Das, Kusal K	Anandkumar, N	Department of Biochemistry
24	Metabolic syndrome in Kurnool district in adults 20 60 years a cross sectional study using modified NCEP ATP III criteria	2018	Pandit, Vinodh	Ambekar, J G	K Durga Prasad		Department of Biochemistry
			Bandela				
25	Hypolipidemic effect of diallyl disulphide in alloxan induced diabetic rats	2015	Kumar, Naveen S.	Ambekar, J G			Department of Biochemistry
26	The study on occupational risk factors in the manifestation of cardiometabolic syndrome in and around Bijapur	2015	Walvekar, Sanjeev Srinivas	Ambekar, Jeevan G			Department of Biochemistry

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
27	Effects of Micronutrient levels on the maternal mitochondrial DNA copy number mtDNA CN in apparently healthy term pregnant women above 37 weeks and in turn its effect on birth weight of the baby A Mixed Methods Research Study	2024	Manjula R	Udgiri, Rekha S	Mallapur, Ashalata		Department of Community Medicine
28	A prospective study to assess the factors affecting nutritional status of people living with WITH HIV AIDS PLHA receiving anti retro viral therapy ART	2021	Hiremath, Ravishekar N	Patil, Shailaja S	Kadam D B		Department of Community Medicine
29	Development of a tool to objectively identify normal human voice	2020	Lathadevi Hassan Thotappa	Guggarigoudar S P			Department of ENT
30	Cytokine analysis and drug resistance associated genetic polymorphism in asmodium vivax	2021	Muktayakka G	Sajjan, Annapurna	Kashid, Ragini Ananth		Department of Microbiology
31	Serodiagnosis and Molecular Characterization of Rickettsia in and around Vijayapura North Karnataka India	2020	Hegde M.L, Shriharsha	Basavaraj V	Peerapur		Department of Microbiology

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
32	Serological and Molecular Characterization of Dengue Virus in a tertiary care hospital of North Karnataka	2020	Manthalkar, Pramod S	Peerapur, B V			Department of Microbiology
33	Biofilm formation in uropathogenic escherichia coli strains relationship with virulence factors and antimicrobial resistance in tertiary care hospital in north Karnataka region	2019	Kulkarni, Sudheendra				Department of Microbiology
34	Detection of methicillin resistant staphylococcus aureus MRSA in tertiary care hospital of north Karnataka	2019	Metri, Basavaraj C				Department of Microbiology
35	A comprehensive study on cryptosporidiosis in HIV AIDS patients in Raichur district Karnataka	2018	Papabathini, Sandhya	Sajjan, Annapurna G	Bhat, Kishore G		Department of Microbiology
36	Serological and molecular diagnosis of chikungunya in and around the region of Bijapur Vijayapura North Karnataka	2017	Bharath M D	Peerapur, B V			Department of Microbiology
37	Effect of 1 25 OH 2D3 on pathophysiology of heart aorta and lungs in male albino rats exposed to chromium VI	2024	Yendigeri, Saeed M	Arakeri, Surekha U	Das, Kusal K		Department of Pathology
38	Sensitivity and specificity of diagnostic biomarkers in thyroid diseases from circulating chemistry to molecular cytogenetics	2019	Javalgi, Anita P		Das, Kusal K		Department of Pathology

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
39	Pharmacological Screening of Antioxidant Hypolipidemic and Antidiabetic Activities of Novel Synthetic Flavonoid in High Fat Fed Followed by Low Dose Streptozotocin Induced Diabetes Mellitus in Rat Model	2022	Bhixavatimath, Prabhulingayya S	Naikawdi, Akram A	Maniyar, Yasmeen		Department of Pharmacology
40	An Evaluation of Role of Vitamin D in The Pathophysiology of Streptozotocin induced Type II Diabetes Mellitus in Rats and its Impact on Oral Hypoglycemic Antidiabetic Agents	2022	Gurudatta, M	Naikawdi, Akram A			Department of Pharmacology
41	Effect of cilnidipine as an antihypertensive agent on two forms L NAME and L NAME plus 4 percent NaCl of hypertension in rats	2022	Shaikh, Gouher Banu	Das, Kusal K	Majid, Dewan S		Department of Physiology
42	Implication of oral contraceptive use to phenotypic expression pattern of receptors in breast cancer	2022	Vitthalsa Khode	Sumangala Patil	Praveen Kumar Shetty		Department of Physiology
43	Plasminolytic Components And Their Receptors In Pathogenesis Of Preeclampsia	2022	Komal Ruikar	Manjunatha Aithala	Praveen Kumar Shetty		Department of Physiology

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
44	Role of nitric oxide synthase 3 NOS3 gene expression in patients of pre eclampsia with special reference to cardiovascular and renal pathophysiology	2022	Anita Herur	Manjunatha Aithala	Das, Kusal K	Ashalata Mallapur	Department of Physiology
45	Influence of antioxidant vitamin L ascorbic acid on hypoxia induced oxidative and nitrosative stress in physiological system of male albino rats exposed to sodium fluroide NaF	2021	Reddy, Jaya Simha	Das, Kusal K	Taklikar, Raju H		Department of Physiology
46	Study on occupational health of petrol pump workers and automobile mechanics in western Maharashtra with special reference to cytogenetic alterations	2019	Patil, Smita Vitthal	Patil, Sumangala	Kanitkar, Sampada S		Department of Physiology
47	Hypoxia and cell signalling cardiovascular remodelling glucose homeostasis and role of calcium channel blocker Cilnidipine	2019	Bagali, Shrilaxmi	Das, Kusal K	Naikwadi, Akram		Department of Physiology
48	Vitamin D influences calcium dependent cardiovascular functions with reference to NOS3 and VEGF	2019	Mullur, Lata M	Das, Kusal K	Biradar, M S		Department of Physiology

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
49	Relationship between oxygen tension oxidative stress and vascular ageing among the general population of Vijayapur urban area a cross sectional approach	2018	Khodnapur, Jyoti P	Das, Kusal K	Aithala, Manjunatha R		Department of Physiology
50	Study on relationship between thyroid hormones and glucose homeostasis among post menopausal diabetic women	2018	Ch, Kalashilpa				Department of Physiology
51	Effect of nigella sativa seeds extract on the reproductive system in normal and streptozocin induced diabetic male rats	2018	S, Haseena	Aithala, Manjunatha	Mavishettar, G F		Department of Physiology
52	Maternal myocardial performance in first and second trimesters of pregnancy with iron deficiency anemia	2017	Tangeda, Padmaja	Patil, Sumangala and Shastri, Neerja			Department of Physiology
53	Effect of ethanolic extract of emblica officinalis Amla on intermediary metabolism of albino rats fed with hyperlipidemic diet	2017	Kanthe, Pallavi S	Das, Kusal K	Aithala, Manjunatha R		Department of Physiology
54	Effect of chronic stress on lactogenesis in humans	2017	Vandali, Jyothi	Aithala, Manjunath			Department of Physiology
55	Effect of occupational exposure on cardiovascular and hematological parameters of individuals working in rice mills around Raichur urban area	2017	Patil, Praveen S		Pujari, Vijaykumar M		Department of Physiology

SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
56	Studies on prevalence of cardio metabolic risk factors and anaemia in relation to antioxidant status of postmenopausal women from different ethnic communities	2015	Chakraborti, Soma	Aithala, Manjunatha R			Department of Physiology
57	Effect of yoga on endothelial function, vascular compliance and sympathetic tone in elderly subjects with increased pulse pressure: a randomized clinical study	2014	Patil, Satish G	Das, Kusal K	Aithala, Manjunatha R		Department of Physiology

CHAPTER 4. SIGNIFICANCE OF THE STUDY

The main purpose of this study is to visualize data of theses, submitted by BLDE (DU) to the Shodhganga using Google Looker Studio. To know the process of interpreting the data into graphs, charts, pie charts, etc. These patterns are more effective in understanding the data. The study will be helpful in the data visualisation of the library in a more effective way

CHAPTER 5. RESEARCH METHODOLOGY

The Observational study is going to be used to conduct this study.Data were collected from Shodhganga regarding theses submitted from Shane College, BLDE (DU). The metadata were identified, organized and listed within Google Sheets, while the metadata consisted of year, researcher, title, guide, co-guide, and department noted from Shodhganga. A sample of the selected metadata was imported into Google Looker Studio for visualisation. Throughout the experiment, interactive dashboards and visual analytics of the databases were developed through the selection and use of various visualisation and presentation features and tools. Data visualisation tools in the Looker Studio allow for many forms of graphical representations, thereby improving the descriptive dimensions of simplistic datasets.

CHAPTER 6. RESULTS

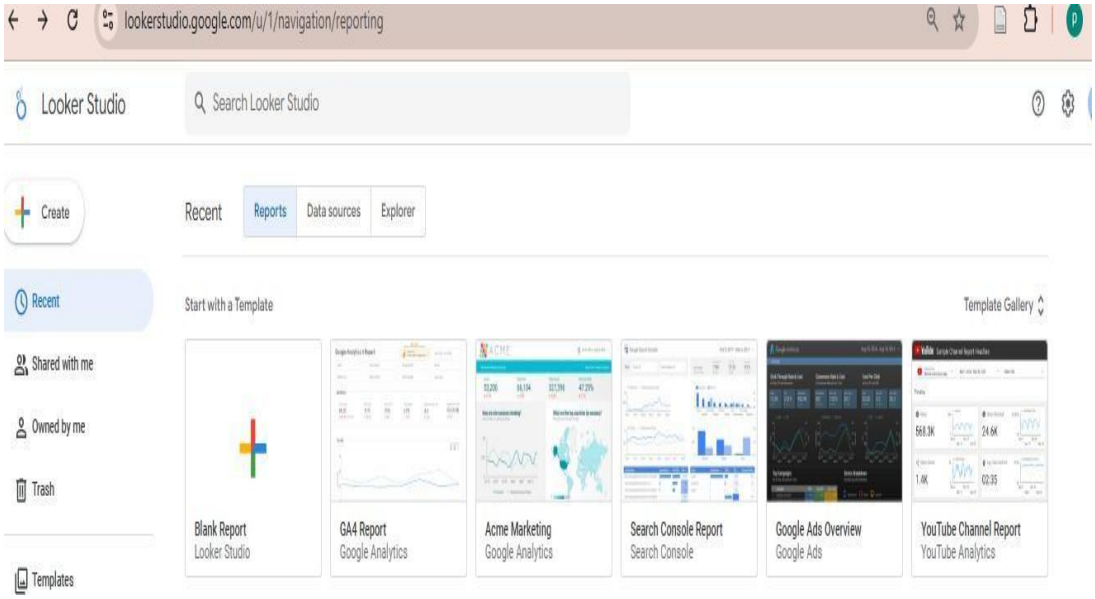
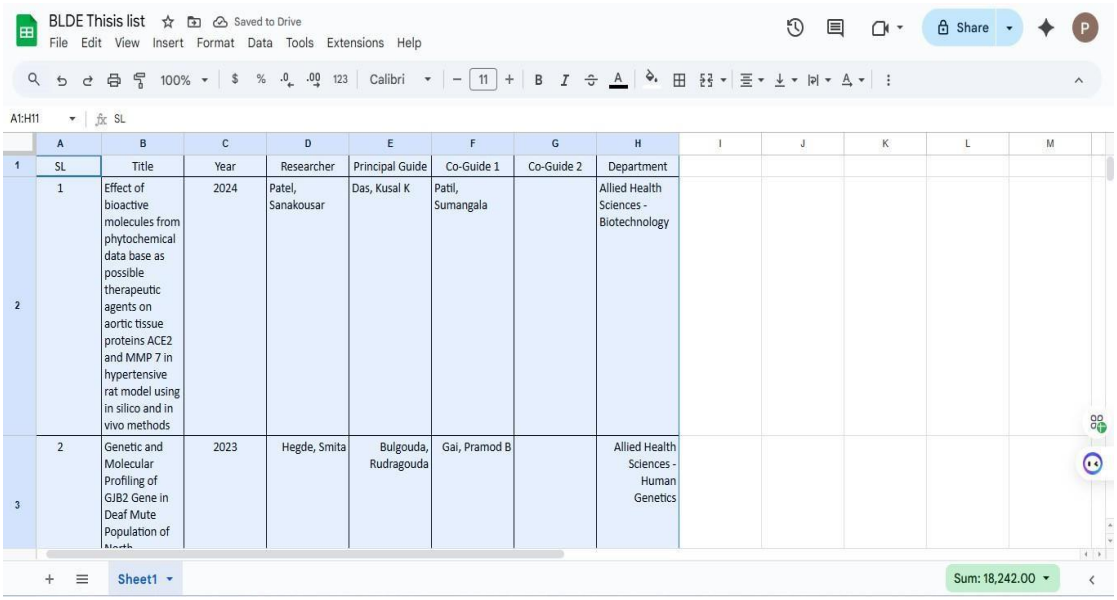


Figure 1: Home page of Looker Studio

Google Looker Studio is a free application for creating interactive dashboards and reports by the combination of several different data sources. At the top, there is a search field to find reports, data sources or explorers, as well as some help and settings icons on the right. The left sidebar provides you with a number of options, including Create, which allows you to create new reports, data sources, or explorers, as well as recent, shared with me, owned by me, trash and templates, which provide easy access to your work or management capability. Tabs like Reports, Data sources, and Explorer in the main section are there to categorize your projects. Under that, a section called Start with a Template demonstrates pre-made templates such as a blank report for beginning from scratch and pre-designed ones like the GA4 Report, Acme Marketing, Search Console Report, Google Ads Overview, and YouTube Channel Report, which allow users to quickly visualize Google Analytics, Ads, Search Console, or YouTube Analytics data. Generally speaking, this screen serves as a central point from where users can either begin creating custom reports or utilize templates in order to analyze information cost- effectively



SL	Title	Year	Researcher	Principal Guide	Co-Guide 1	Co-Guide 2	Department
1	Effect of bioactive molecules from phytochemical data base as possible therapeutic agents on aortic tissue proteins ACE2 and MMP 7 in hypertensive rat model using in silico and in vivo methods	2024	Patel, Sanakousar	Das, Kusal K	Patil, Sumangala		Allied Health Sciences - Biotechnology
2	Genetic and Molecular Profiling of GJB2 Gene in Deaf Mute Population of	2023	Hegde, Smita	Bulgouda, Rudragouda	Gai, Pramod B		Allied Health Sciences - Human Genetics

Figure 2: Data set of a Google Sheet

This image displays a Google Sheets file named "BLDE Theses list", which is an organized report of research theses at BLDE (Deemed to be University). The sheet is divided into columns containing the serial number, title of thesis, year, researcher's name, principal guide, co-guides, and the department in which the research is conducted. For instance, one of the 2024 entries describes a thesis on the impact of bioactive molecules from phytochemical databases as therapeutic agents against aortic tissue proteins ACE2 and MMP7 in hypertensive rat models, completed by researcher Patel, Sanakousar, under the supervision of Das, Kusal K with co- guide Patil, Sumangala, in the Department of Allied Health Sciences – Biotechnology.

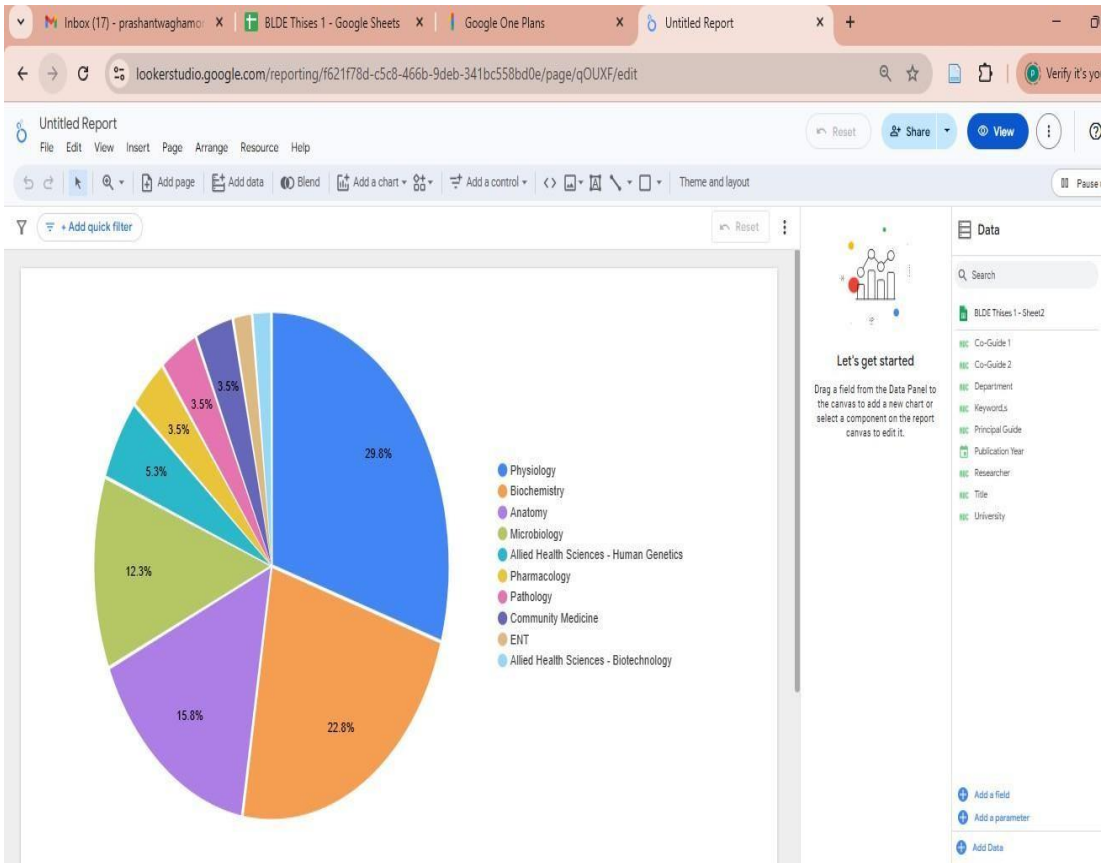


Figure 3: Visualisation of Department-wise theses using a Pie Chart

The picture utilizes some of the capabilities of Google Looker Studio, including pie chart visualisation with clear color coding to separate categories, percentage labels on the slices, and a legend for identification purposes. The right side displays available fields in the data panel, while the toolbar offers capabilities such as adding a chart, control, or data, blending data, sharing, viewing, resetting, and adjusting theme & layout. It also includes an 'Add Quick Filter' feature for interactivity. As for design, the chart employs vibrant contrasting colors such as blue, orange, purple, green, and yellow for better readability, with a simple and clean font style that is similar to Looker Studio's default style, and a simple and minimalist layout with well- balanced spaces that make the report neat and professional.

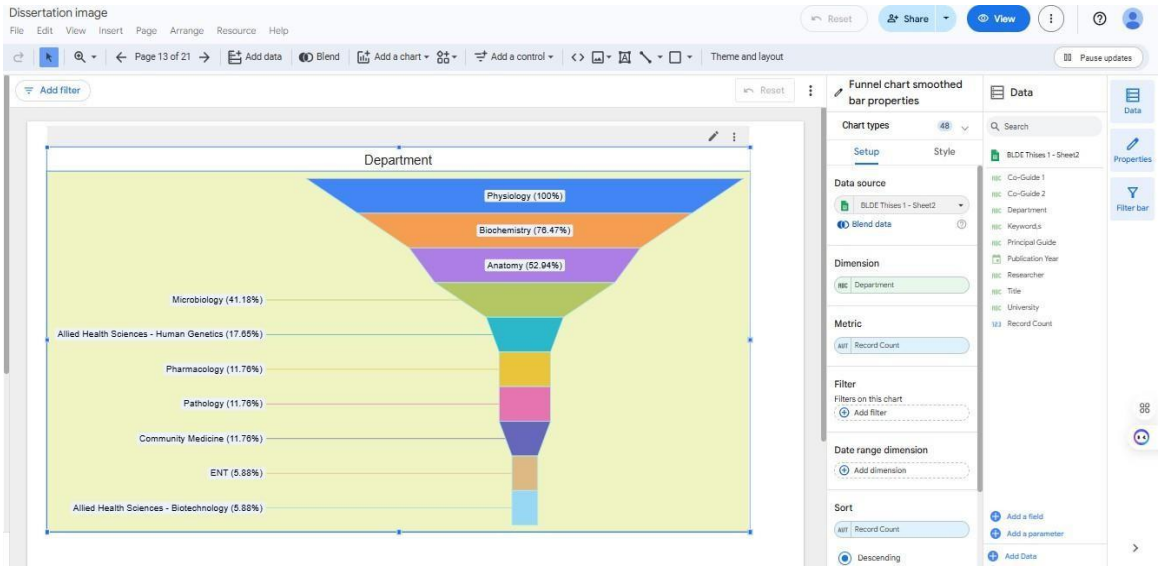


Figure 4: Visualisation Department-wise theses using Funnel chart-smoothed Bar

The figure shows an information graphic in the shape of a horizontal stacked inverted pyramid chart or more popularly referred to as a funnel diagram. Its shape is defined by a top-down nature, beginning wide at 100% total and gradually becoming smaller, graphically depicting a sequential breakdown or flow. The funnel consists of several horizontally stacked segments, each described by a solid color (e.g., blue, orange, purple, cyan) over a light yellow background. One readability element of the chart is dynamic label placement: broader segments at the top have category names and percentages within the bars, whereas narrower, smaller segments have their labels positioned externally to the left and joined with thin lines. This allows the proportional width of each segment to convey its value distinctly while keeping all data points uncluttered and readable.

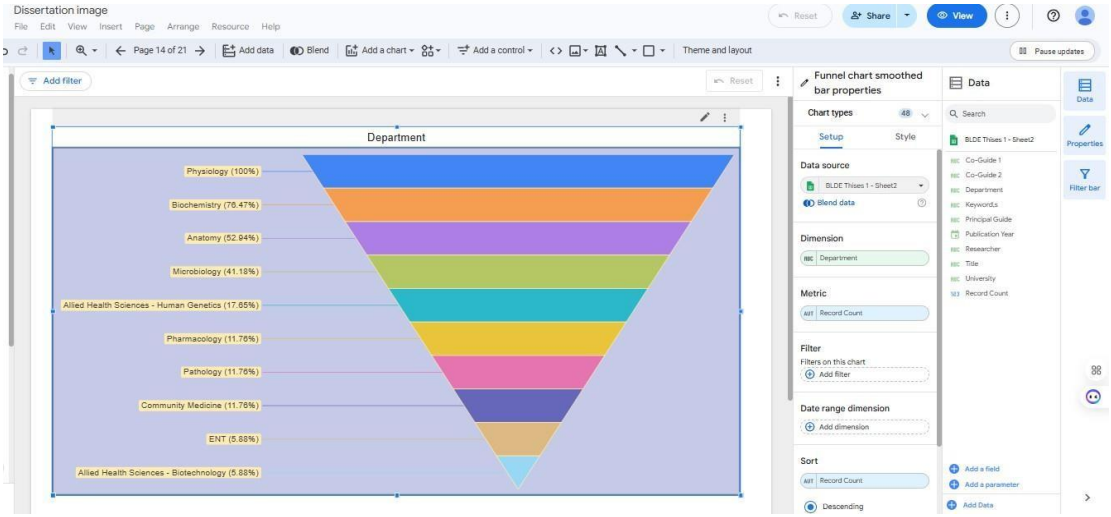


Figure 5: Department-wise theses visualisation-Funnel chart Inverted Triangle

The picture shows a visual that has been made for a particular purpose, a horizontal stacked inverted pyramid chart or a funnel diagram. It consists of a figure starting from a broad 100% total and then very slowly turning to a point at the bottom, which thus demonstrates a stepwise breakdown or filtering process. The funnel consists of different discrete, stacked horizontal sections, and the width of each segment corresponds exactly to the percentage value it represents. The categories on the light background are visually distinguished from each other very sharply as a vibrant solid color palette that is used for color-coding helps a lot. Another interesting thing is that dynamic labeling is used throughout the chart: wider segments are labeled inside the bars, while the labels for all narrower segments are provided outside to the left and connected by narrow lines—a method which is important to keep the text legible and to prevent it from getting squeezed in the narrow bottom part. It may assist in analyzing as the pie chart does by offering a close look at the distribution of contributions among medical and allied health sciences, it will also be clear that most of the work is done in the basic sciences. Physiology is the largest discipline which occupies 29.8% of the total and that is because medicine needs physiology both for teaching and researchBiochemistry is the second largest area taking 22.8% which indicates that a lot of effort is put on understanding biological processes and their medical applications. Coming next is Anatomy with a percentage of 15.8%, thus underlining its basic role in medical education and the knowledge of human body in regard to anatomy. In short, these three together are responsible for around 70% of

the total pointing to the basic sciences being the major part of the curriculum. Microbiology accounts for 12.3% meaning a great emphasis on the microorganisms, infectious diseases, and diagnostic methods. Allied Health Sciences-Biotechnology is 5.3% showing that the applied sciences and interdisciplinary approaches are getting more and more important. Human Genetics, Pharmacology, Pathology, Community Medicine, and ENT each have a share of 3.5%, which means their contributions are small in terms of quantity but still important in terms of impact. These subjects, reflected in percentages, even though they are small, still reveal a classic case of different research and academic interest. Their presence confirms that the attention is not only on the traditional core but also on other key areas of medicine. The clinical and applied topics share relatively lower percentage; thus, a probable gap or underrepresentation is indicated. Also, this means that basic sciences got more attention than clinical sciences in the past. Nevertheless, the recent progress of biotechnology and human genetics is a signal of moving to modern and advanced areas of research. This interaction of previous dominance and later diversification forms the character of medical education and research as dynamic.It also alludes to the potential for development of the neglected areas in future years. The data indicates that allied health sciences are slowly but surely making their presence felt in the total medical research picture. Meanwhile, microbiology's strong position guarantees that the study of infectious disease has been and will continue to be of importance. The graphic presents not only a momentary view of what is being investigated but also a glimpse of trends that will determine the direction of future studies. In general, the graphic indicates the major continuous dominance of physiology, biochemistry, or anatomy, but there is a slight and gradual movement towards applied, clinical, or interdisciplinary areas that is not yet significant.

Keywords wise data visualization

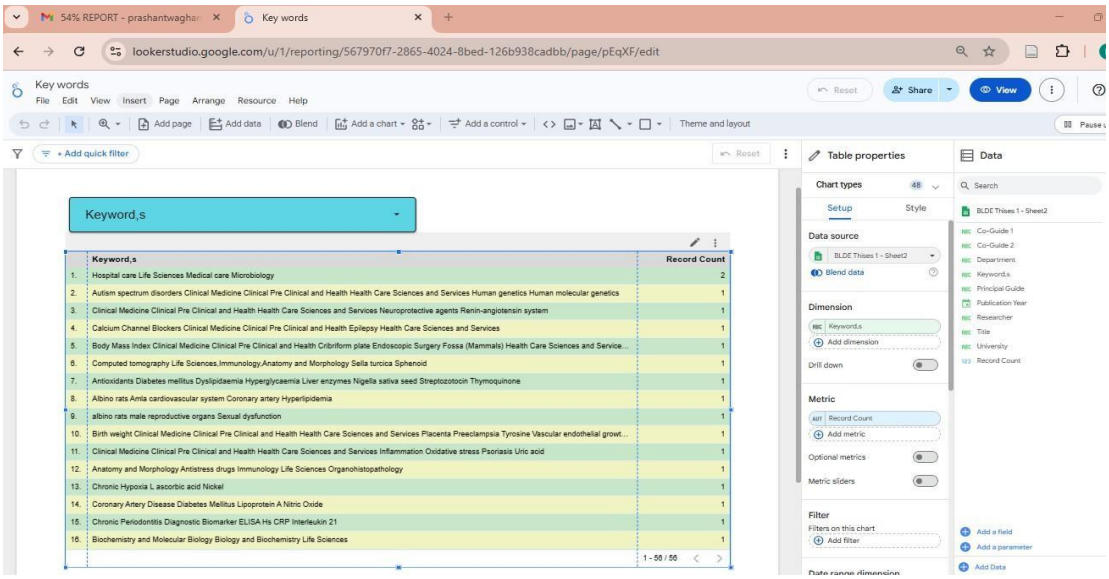


Figure 6: Keywords wise theses data visualization - Table

The picture incorporates several functions of the Google Looker Studio; these include the visualisation using table chart and its display columns, the interactive selection using drop- down filter controls, and the record count metrics in the table. The table properties panel on the right side provides customization options for the chart's type, setup, style, dimensions, metrics, and filters. The toolbar consists of the following: Add Chart, Add Control, Add Data, Blend Data, Share, View, Reset, and Theme & Layout. In the design, the table uses swapping row background colours (light green and yellow tints) for better readability, a header row in bold typeface with a large size, a common-look sans-serif font style used in Looker Studio, and a plain bordered layout that keeps the report's structure and professionalism intact.

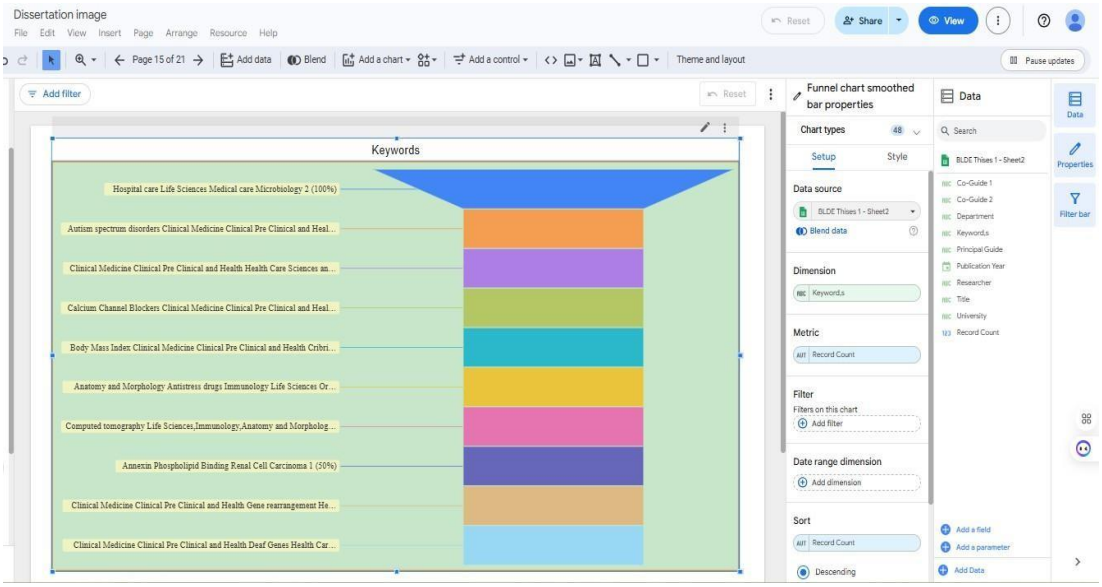


Figure 7: Keywords-wise theses visualization: Funnel chart - smoothed Bar

The illustration is a visual representation using a pyramid or funnel diagram with vertical stacking and an inverted pyramid chart as the main concept. Its main feature is a very wide, blue, and inverted triangle at the top displaying the total of 100% and then immediately, it gets narrower and then drains vertically into the main data breakdown of the widest area showing the least. The large starting amount is visually highlighted by this format, which is then cut up into tiny, sequential parts. The vertical column is divided into several small stacked parts with each part being shown on a light green/yellow background using a solid color (e.g., orange, purple, teal, pink) for clarity. One of the features that improve readability is external labeling: all lengthy category names are put outside of the narrow left column and connected with thin lines so that the text does not get crushed, and the reading of each part is easy.

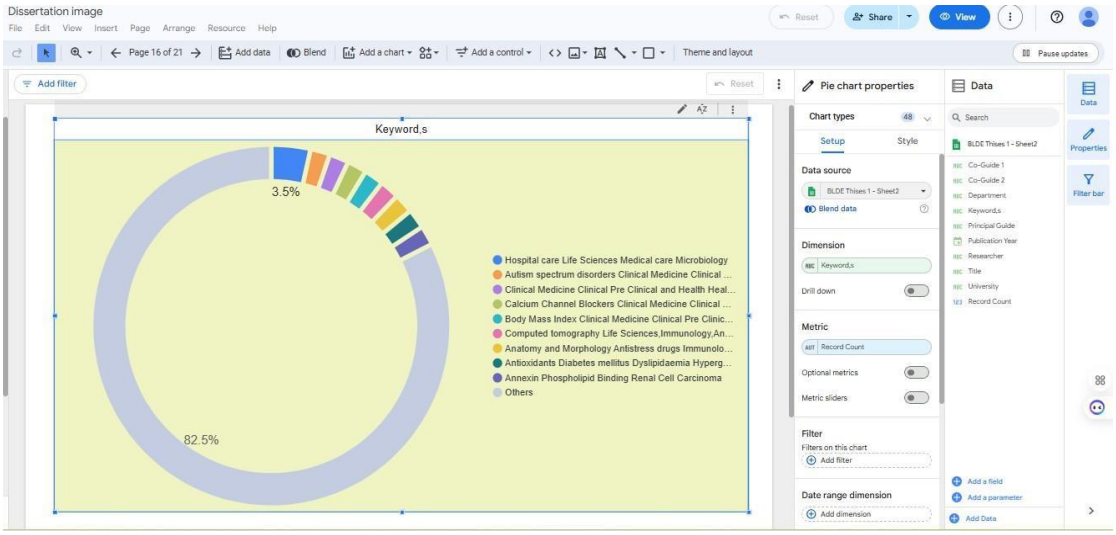


Figure 8: Keywords-wise theses data visualization - Doughnut chart

The image represents a Doughnut Chart (or Ring Chart) which is a graphical method of showing proportional distribution of data. The main feature of this chart is the large circle with the light yellow background and hollow in the middle. The chart shows a very strong skewness in its distribution where the main feature is dividing the whole into two; one large segment together and the whole of the rest together. The biggest segment is covering the whole ring nearly and shown in a faded pale purple shade, with its percent value displayed inside the ring. The small minority segments are using different high-saturation and opaque colors (like blue, orange, green, yellow, pink, teal) at the top-right of the circle, where they are grouped together, to make them visually distinguishable. A full legend is positioned next to the ring, which employs small, color-coded circular markers to link each color slice with its respective long categorical label thus making the whole thing easily readable even though the categories are complex. It will be a big aid in the analysis; for example, the chart shows a table of 56 keyword records pertaining to the medical and life sciences research fields, where each row signifies a distinct keyword phrase and its frequencyThe vast majority of the Keywords are found just one time each, which shows the dataset's great diversity, whereas one keyword "Hospital care Life Sciences Medical care Microbiology," is seen two times only. The different topics cover an extensive area of disciplines ranging from clinical medicine and microbiology to immunology, anatomy, biochemistry, and healthcare sciences, besides the conditions and diseases like autism, epilepsy, diabetes, hyperlipidemia, psoriasis, and coronary artery disease.

From the entries, one can understand how certain molecular and biological markers like CRP, Interleukin 21, liver enzymes, antioxidants, and others such as thymoquinone and nickel are studied along with physiological or anatomical aspects like body mass index, birth weight, cribriform plate, and male reproductive organs being focused on in other research work. This distribution indicates that the dataset has been derived from biomedical research articles covering both clinical care and molecular investigations. The prevailing trend in the overall pattern is a wide and multidisciplinary scope with little repetition, hinting at niche and specific studies in the different branches of the health sciences.

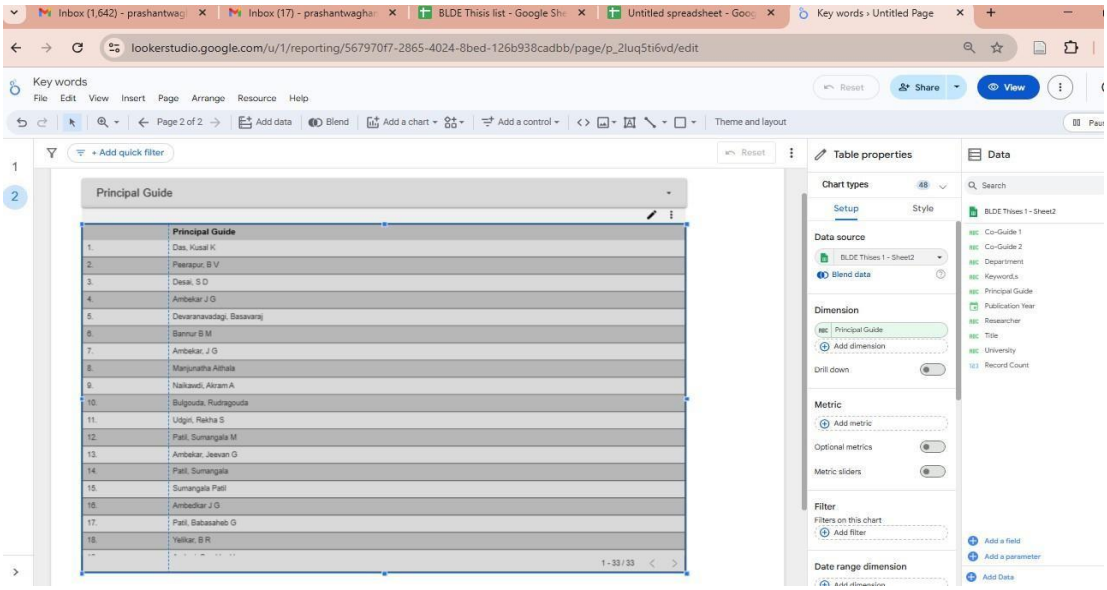


Figure 9: Research Guide-wise data visualisation - table chart

The picture displays a wide range of functionalities of Google Looker Studio, among which are the visual display of table charts with row numbers, the advantage of scrolling through long lists, and the header row for indicating the column names. To facilitate user interaction, a drop- down quick filter control is placed while the right side of the table properties panel can be used to change the chart type, style, size, metrics, and filters. The toolbar has the following functionality: Add Chart, Add Control, Add Data, Blend Data, Reset, Share, View and Theme & Layout. The table uses alternating grey and white background rows, horizontal divider lines to separate entries, a simple bordered layout, and a clean sans-serif font type which are all in line with Looker Studio's default styling to enhance readability.

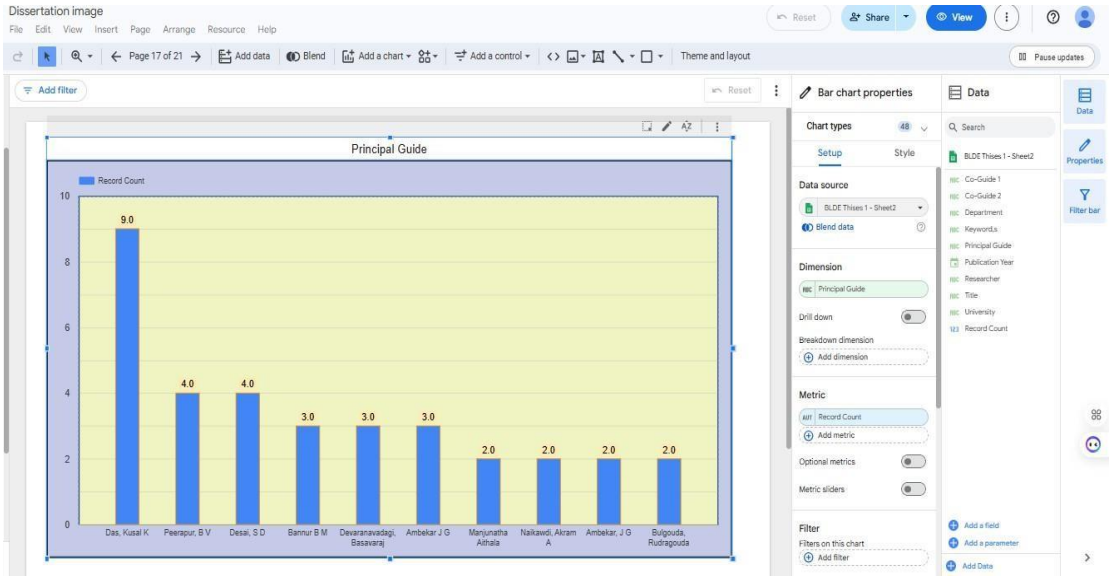


Figure 10: Research Guide-wise visualisation- Vertical Bar Chart

The bar chart illustrates a vertical bar chart that is meant to show a distribution of records among different categories. The layout of the chart employs a quantitative vertical axis (Y-axis) with a scale from 0 to 10 and a categorical horizontal axis (X-axis) representing the names of the entities. The vertical bars are all painted in a solid bold blue color with a yellow/cream plotting area behind them, which is surrounded by a pale lavender border. The height of each bar is proportional to its value, thus it is very clear that the distribution represented has one bar (the first one) towering over the rest. The proper labeling is one of the factors that enhance readability: the number of counts is indicated in bold, contrasting type above each bar, and the bars have a very faint orange-red border around them.

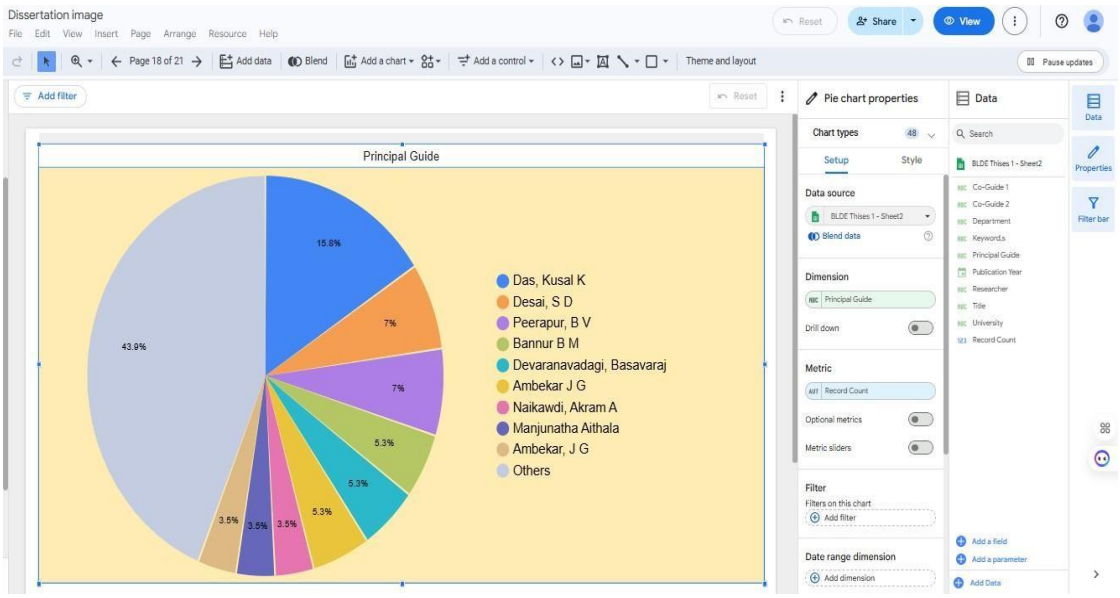


Figure 11:Research Guide-wise visualisation- Pie-chart

The picture shows a Pie Chart to illustrate a proportional distribution of categories, labeled "Principal Guide." The primary design element of the chart is the round shape set against a pale yellow background. It is characterized by an extensive skew in distribution, with one large, solitary slice, named "Others," occupying almost half the entire area of the chart and being colored in a big, toned-down pale purple/lavender hue. The remaining space is broken up into several smaller pieces, differentiated by a variety of vivid, solid hues (blue, orange, purple, green, cyan, and gold). Each slice has its percentage value within its corresponding segment. An explicit legend is located to the right of the chart, utilizing small, color-coded round markers to connect each color slice with its corresponding categorical label, allowing all elements to be easily identified. It will help to analyze, as the above Google Looker Studio chart illustrates, an organized list of major guides in relation to thesis or research work, presented in a numbered list from 1 to 33. Each row stands for the name of a teacher who is the principal supervisor of one or more theses, examples including Das, Kusal K, Peerapur, B V, Desai, S D, Ambekar, J G, Devaranavadagi, Basavaraj, and many more. There are several repeated names, i.e., Ambekar, J G and Patil, Sumangala, suggesting that these Principal Guides have guided more than one project. The title of the chart header clearly indicates the column as Principal Guide, and at the bottom of the table is "1–33/33", which ensures that the table displays all 33 entries. Overall, this chart is an ordered synopsis of the faculty members who have served as the principal guides, underscoring their participation and contribution toward the supervision of the research work.

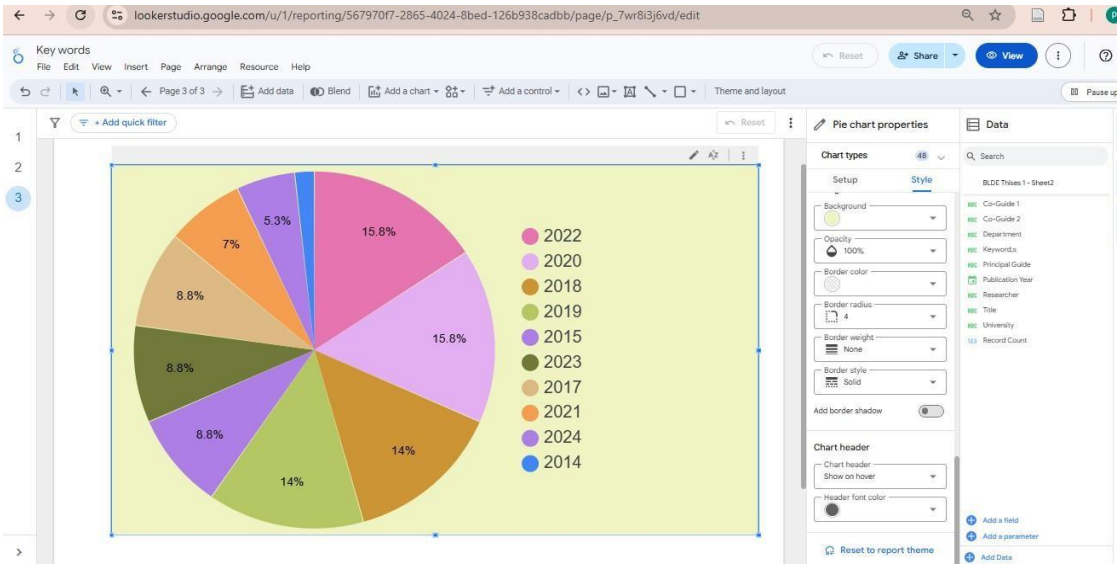


Figure 12: Year-wise Theses submit to Shodhganga- Pie-chart

A Looker Studio report can be said to have a soft multi-colored color scheme with very subtle typography. The background of the canvas is a very light yellow-green color that is not very different from the inner content of the chart. The pie chart is the most vivid element of the report and it is very colorful but in a very wide palette using such colors as magenta, lavender, olive and orange to distinguish the ten categories (years) very well. The percentages for the slices, the labels for the legend, and all text elements are in a simple, readable and tiny black sans serif font, where the clarity of data has priority over the ornate design. The chart container has a very thin border around it and its corners are very gently rounded, thus together they are creating a soft and less austere visual presentation that is very unobtrusive. It will be helpful for the analysis, as the pie chart shows the distribution of values over different years in direct comparison. The two years that contributed the most are 2022 and 2020, both having a share of 15.8% that shows their predominance in the dataset. 2018 and 2019 are next in line with lower but still considerable shares of 14% indicating that these years were also marked by good performance. The three years that are at the middle of the contributors' range are 2015, 2023, and 2017, each having a contribution of 8.8% which means that they had moderate but consistent contributions. After that comes 2021 with its 7% that is less but still significant.In 2024, at the very least, is 5.3% representing a decline in its contribution when measured against oher, mostly other years, except for a few. The year 2014 is the least contributor less than 1% and similarly the least contributor in the years shown on the chart. By analyzing both years,

the highest contributions are seen in the years between 2018 and 2022, or even for these years. The graph depicts these years as being a more stable, increasing trend that peaked in both years of 2020 and 2022. The graph also shows that there were some years that performed moderate contributions, evenly, although, there were years that lagged considerably behind. Meanwhile, an equal Low from 2015, 2023 or the previous years contributed durability. In opposition to that, for 2021 and 2024 experience merely small decreases in contribution amounts. While the low contribution share for 2014 shows very little utilization versus the current figures, and the trend we find shows how much more active the engagement was recently compared to the previous year for other years. The occurrence of more than one high shared year in is shorter proximity would show a concentration of dominance. Alternatively past years like 2014 were very low. In fact, the difference between those highest and lowest contributions are quite larg.

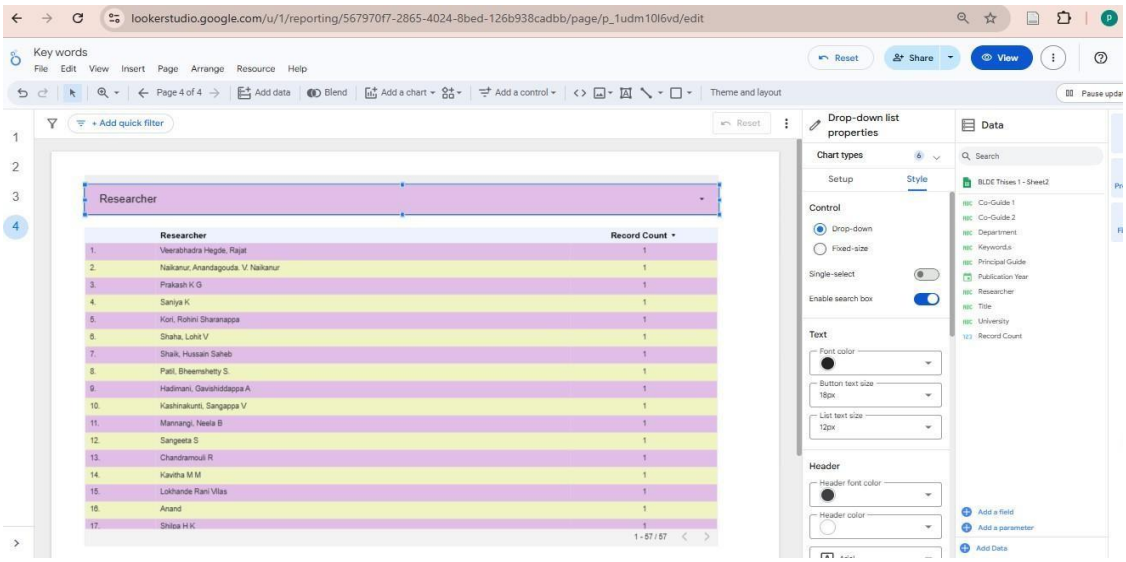


Figure 13: Researcher-wise data visualisation- table chart

The table stands out through its soft and friendly visual impression which would not be a problem for the eye thanks to the alternating colors' palette. The list shaped a special character row by row that was not strict due to the gentle light purple/lavender background and the light, creamy yellow that were alternately used. The header bar that has the "Researcher" control is in a soothing lavender color. For all text, including names and record totals, the same 12px simple, readable black sans-serif font is used to guarantee visibility and to guide the eye to the data without any visual distractions.

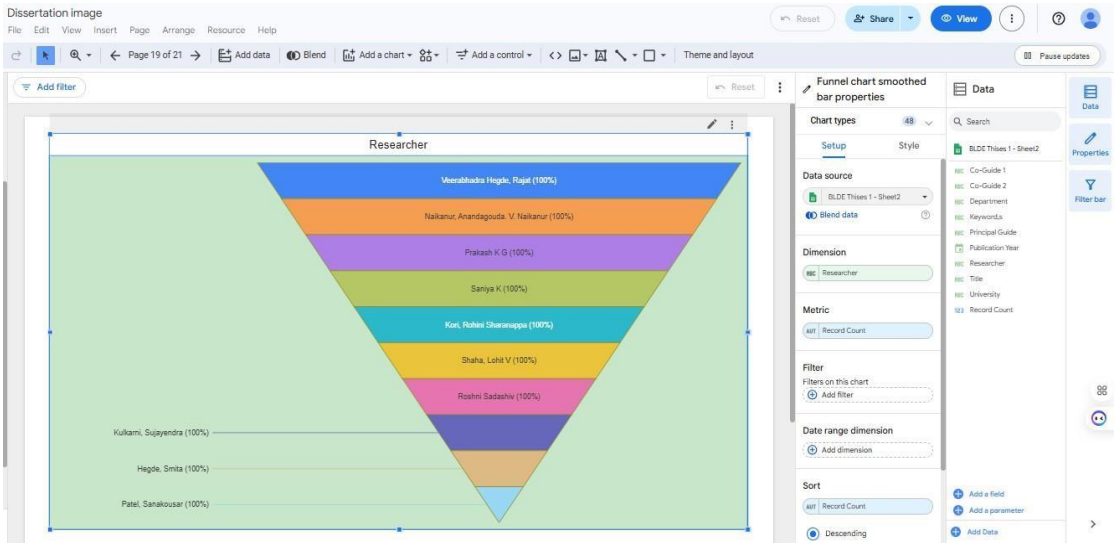


Figure 14: Researcher-wise data visualization: Funnel chart - Inverted Triangle

The diagram represents the information graphically as a horizontal, stacked, inverted pyramid chart, which is also known as a funnel diagram. The visual approach to this information is a top-down, starting with the biggest part at the top and coming down to a point at the bottom, showing visually a sequential progression or a hierarchical breakdown. The funnel is made up of several distinct layers of the same width, visually one from another, which indicates a uniform total worth throughout the whole breakdown. The external labeling is another important factor for maintaining readability: although it is possible to have labels in the higher segments, the ones in the narrower lower part are given their category labels and 100% value outside the central structure, connected by thin horizontal lines. This technique keeps all the sections, even if they are in the narrowing structure of the chart, readable.

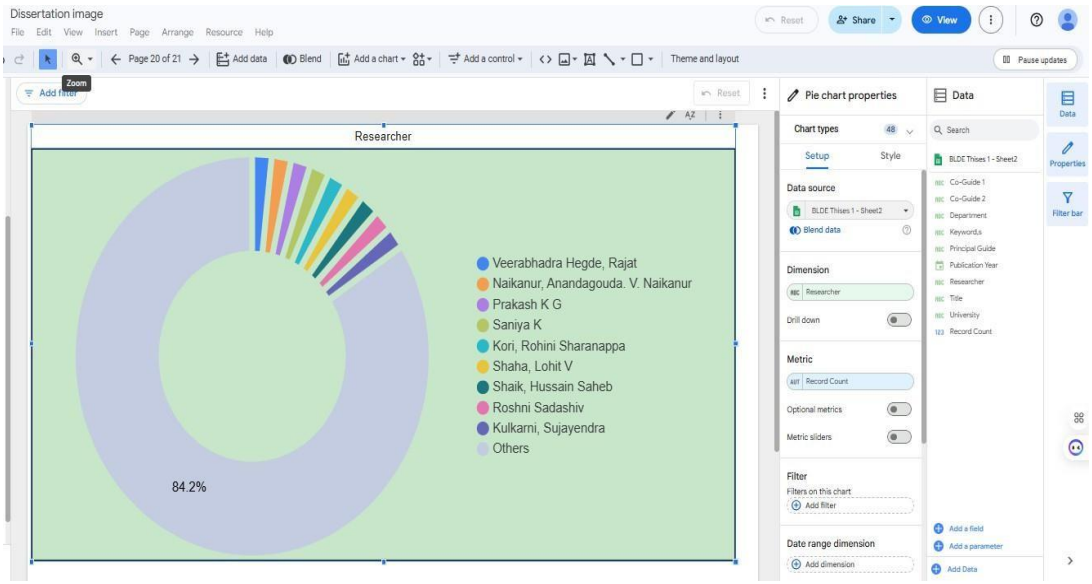


Figure 15: Researcher-wise data visualisation- Donut chart

The picture shows a Doughnut Chart (or ring chart) intended to show proportional distribution. The main design element of the chart is the big, round ring against the light green background, with the center left empty. The structure of the chart is defined by a high skew in its distribution, with one very large segment that takes up the overwhelming majority of the ring's circumference. The rest of the ring is composed of numerous minute, visually similar-sized segments, all bunched together. The percentage value of the largest, dominant segment is clearly placed within the ring. A full legend is provided to the right of the ring, utilizing small, color-coded circular markers to connect each slice with its corresponding categorical label, ensuring all pieces are easily recognizable. It will help to analyze, like the chart used here is a tabular list of researchers with their respective record counts. Each research in the table, e.g., Veerabhadra Hegde Rajat, Naikanur Anandagouda V., Prakash K G, etc., the table has 17 names on this page, but the footnote at the bottom ("1–57/57") indicates that there are 57 researchers in total on the full dataset. The contrasting purple and yellow stripes alternating between each row probably serve for easier readability.

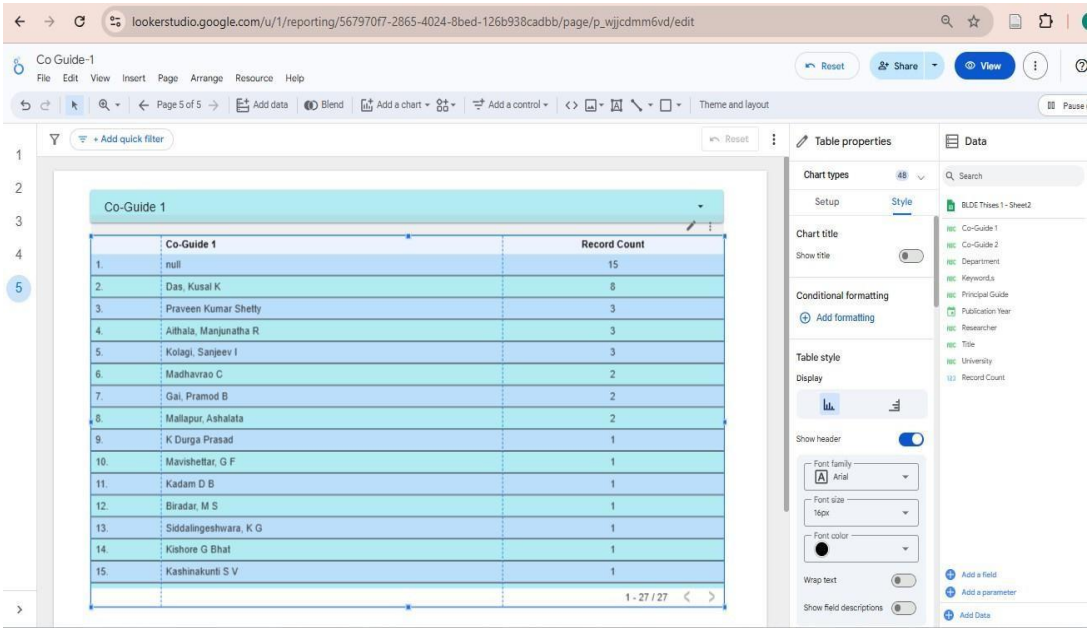


Figure 16: Data visualisation by Co-Guide-1: Table chart

This table has a professional, cool feel largely thanks to its widespread application of blue hues. The whole data region is bathed in a soothing, even light blue/aqua color, so the table itself appears tidy and ordered, but a slightly richer blue marks out the column headings ("Co-Guide 1" and "Record Count") like a bright banner. Everything, from the counts and names to the arrows pointing in every direction, is displayed in clean black lettering utilizing the Arial font, which is a legible and well-known font making it so that each dataset shines with utmost visibility.

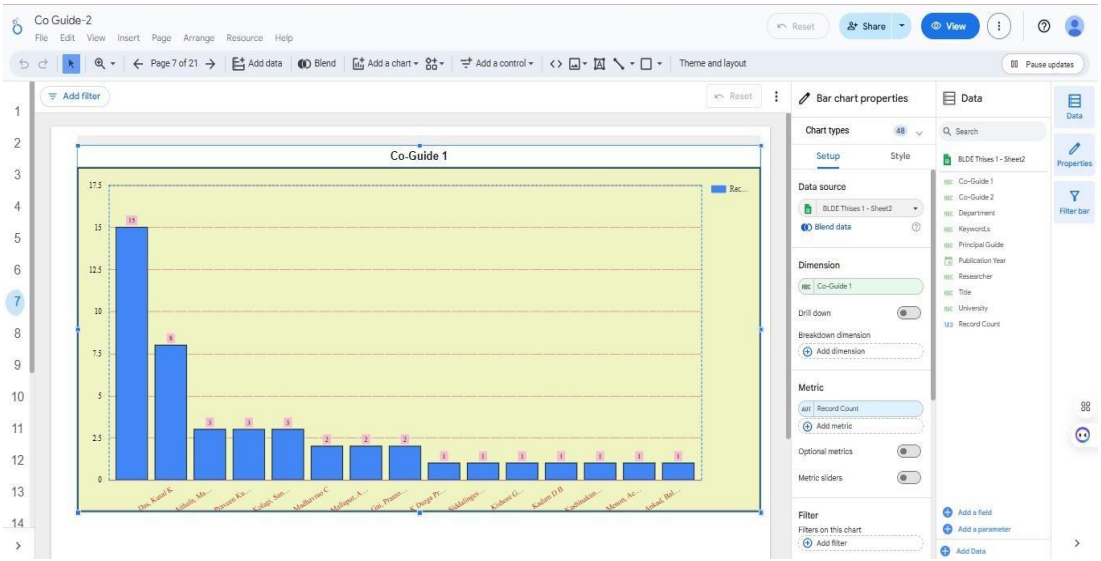


Figure 17: Data visualisation by Co-Guide-1: Vertical Bar Chart

The picture plots data on bar graphs by utilizing archaeosurvey and pixel leakage to extend compatibility.The chart comprises vertical blue bars indicating the values, each bar symbolizing a distinct person whose name is given on the X-axis. The X-

axis tick marks are slightly tilted for better readability, and along the Y-axis there are numbers ranging from 0 to 17.5, which permit a comparison on a scale. Also, pink rectangular data labels show the exact values on the top of each bar, thus it is very easy for one to tell the distribution just by a glance. Furthermore, at the top right corner, there is a legend on the chart that portrays "Rec..." as the representation of the bars. Light red grid lines have been drawn over the chart background so as to help the comparison of the heights of the bars.The overall color of the background is light yellow which contrasts with the blue bars and enhances the overall aesthetic of the visualisation and makes it more understandable as well as pleasant to look at.

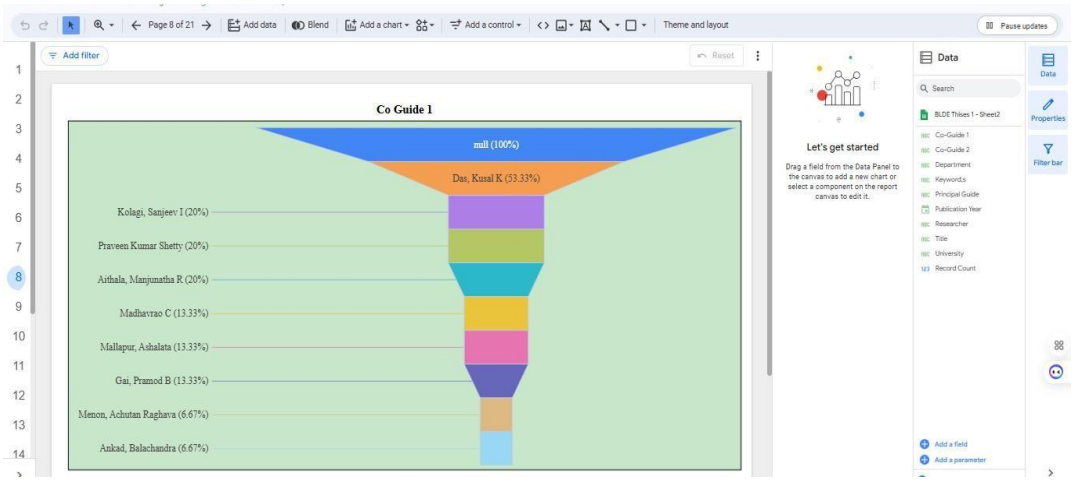


Figure 18: Data visualisation by Co-Guide-1: VisualisationFunnel Chart

The chart employs the use of a funnel chart that has a funnel-type shape to display data in a stepwise decrease format. Every segment is shown in a different color, which aids in categorically distinguishing between them. Labels with names and percentages appear either inside or beside the funnel segments, making the data readable and comparable. The chart at the top starts with the overall value represented as 100%, and then gradually smaller portions representing declining proportions. The background is a light green foreground that makes the funnel and colored portions more visible. This kind of chart is usually used for displaying how values decline through stages or categories, and hence it is commonly applied for displaying proportions and where the biggest declines take place.

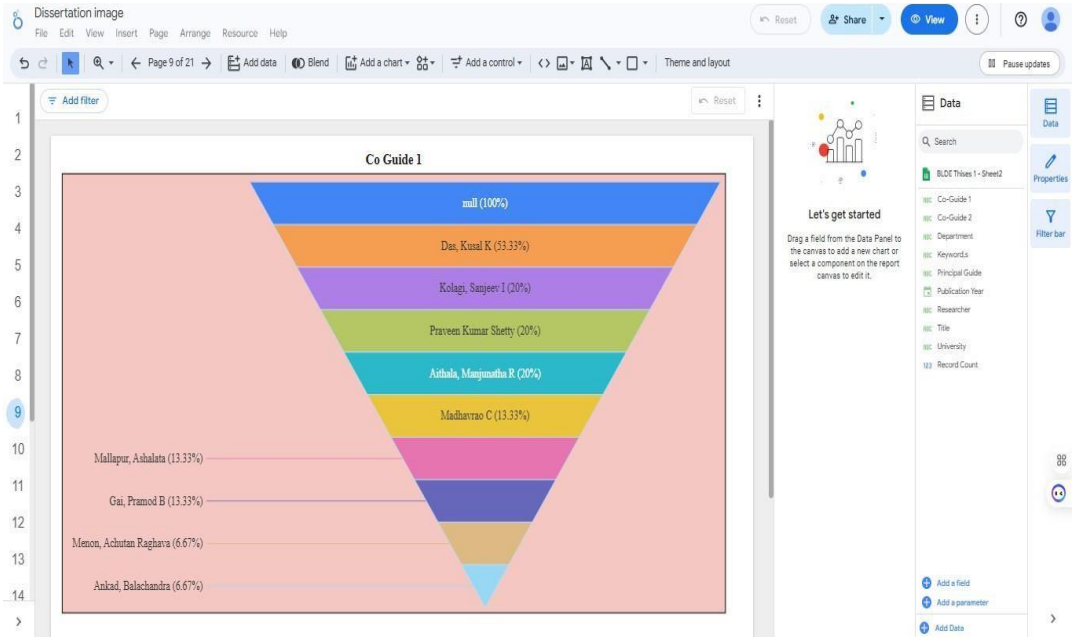


Figure 19: Data visualisation by Co-Guide-1: Funnel chart - Inverted Triangle

The photo shows an information graphic in the form of a horizontally stacked inverted pyramid chart. The design overall employs an inverted triangular format to visually represent a breakdown or hierarchy, with the 100% total on the widest top and shares tapering at the bottom. Color-coding is a prominent feature, a series of individual, solid colors—blue, orange, purple, and green—used to distinctly differentiate the layers. One of the most important features of readability is external labeling for the thinner bottom segments, with names and percentages drawn out to the side and joined by slender lines to avoid illegible compression of the text. The ratio of the width of each colored segment serves to naturally convey the extent of the share in proportion to the total, and hence, the chart is a useful device for representing unequal proportions. The chart above, labeled 'Co-guide 1, helps to analyze the data. There are a total of 27 co-guides, but they are distributed very unevenly across the records. The highest number of records is in the "no co-guide record" category, which totals 15 and accounts for 55.6% of the total, reflecting an enormous deficit in data entry or assignment. Of the co-guides named, Das, Kusal K., contributes the most with 8 records (29.6%), followed by Praveen Kumar Shetty, Aithala Manjunatha R., and Kolagi Sanjeev I., each with 3 records (11.1%). Another set consisting of fewer members, namely, Madhavrao C, Gai Pramod B, and Mallapur Ashalata, is attached to 2 records each (7.4%). The remaining 19 co-guides are involved to a minimal extent, with each having 1 record (approximately 3.7%). This strongly indicates an imbalance in workload, where Das, Kusal K, has an overwhelmingly large proportion

compared to the majority, with almost 70% of co-guides connected to only one record.

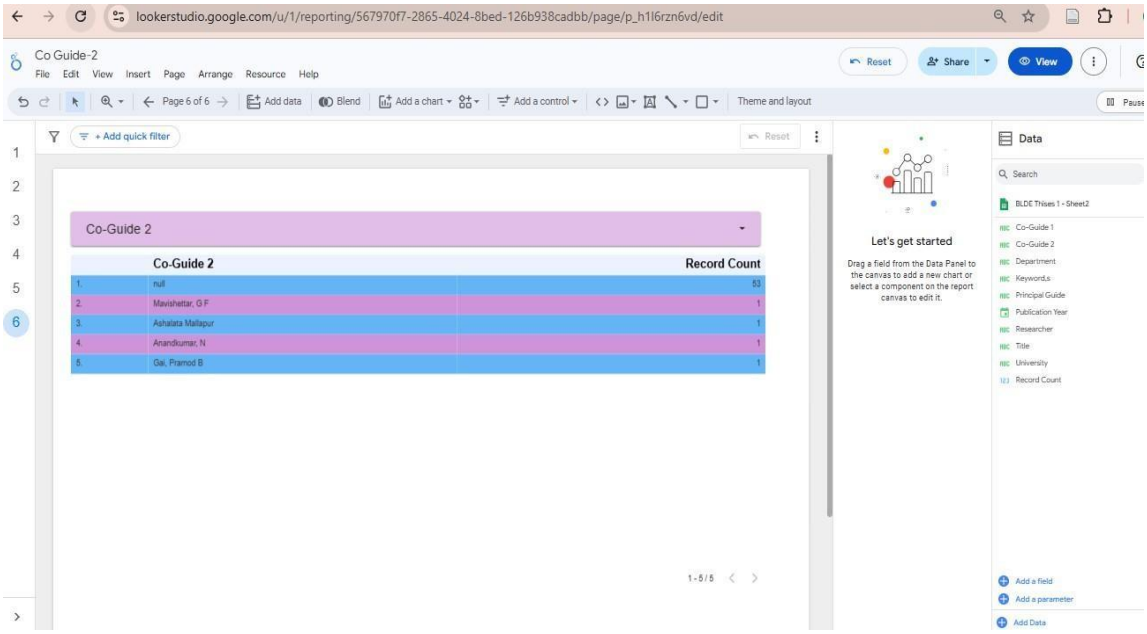


Figure 20: Data visualisation of Research Co-Guide 2 - table chart

The table exhibits a very vivid and almost like a fairytale color combination, which however, differentiated the data very well. Instead of using subdued colors, it has a bright contrast of a sunny, vibrant pink and a relaxing, cool light blue. This maximum contrast makes every co- guide record instantly recognizable. The header row labeled Co-Guide 2, which is the second co-guide, is placed on top of this colorful mixture in a block of the same light blue. The font used for all the important information such as names, numbers, and records is very plain and formal: a clean black sans-serif font makes the numbers readable even with the bright colors underneath. It is as if a report decided to replace the usual corporate gray with something much more vibrant.

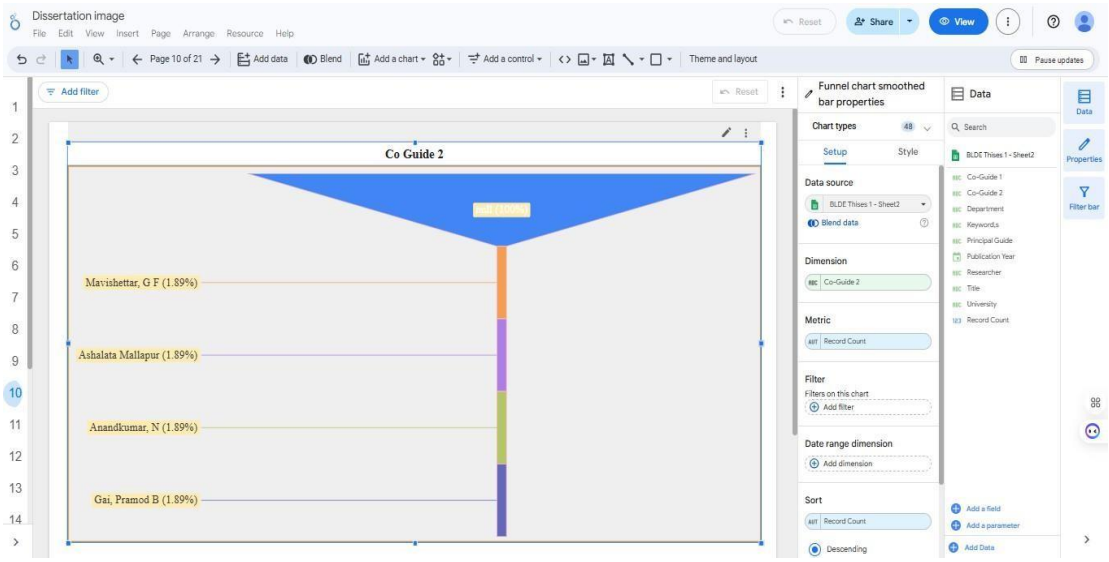


Figure 21: Data visualisation of Research Co-Guide 2: Funnel chart-stepped bar

The image shows a specialized stacked inverted pyramid chart, which has a very wide, sharply inverted blue triangle at the top (showing the 100% total) that immediately narrows down to an extremely thin, vertical column. The shape is used visually to highlight a sharp decrease from the total. The major design option is employing a narrow column as the major data segmentation, and this is subdivided into a number of tiny, visually evenly sized horizontal blocks. In order to ensure readability, external labeling is used for all segments: the percentages and names are placed to the left and are linked with their corresponding blocks by thin horizontal lines since the segments themselves are too narrow for inline text. The small blocks are differentiated by unique, light color-coding (for example, orange, purple, green, slate blue) on a plain light background, providing visual distinction even though they are so narrow.

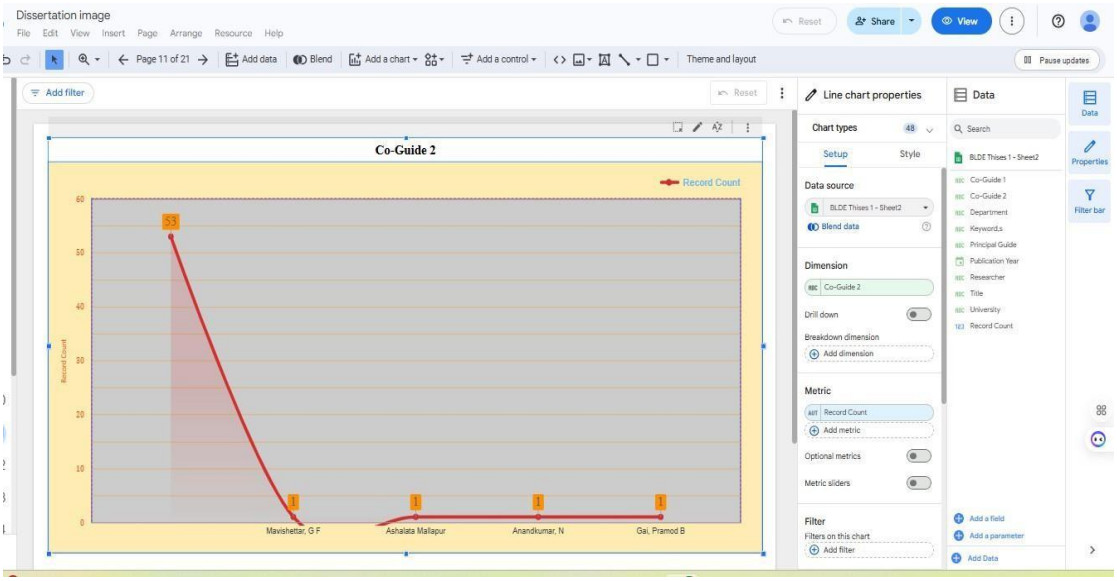


Figure 22: Data visualisation of Research Co-Guide 2: Smoothed line chart

The image shows a line graph specifically designed to represent the Record Count by different categories on the x-axis. One of the most prominent design elements is the color contrast between the light background and the grey plotting area, which encompasses a thick red data line with a shadowed, light red gradient area below it. The thick red line is highlighted by the presence of the shadowed, light red gradient area, giving emphasis to the size of the count. Every data point is distinctly marked with a bright orange square marker having the exact numerical value, which is highly readable for the exact counts. The most striking visual characteristic of the graph is the steep, dramatic fall in the line from the initial high count to lower, very low counts, and thereby it conveys strongly the highly skewed distribution of the records.

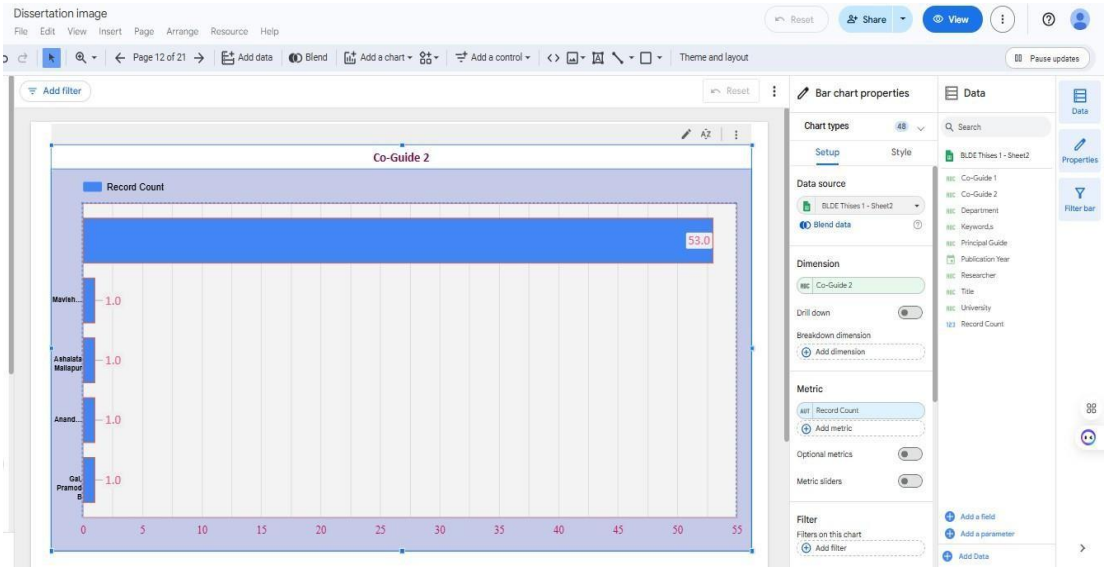


Figure 23: Data visualisation of Research Co-Guide 2- Bar chart

The chart portrays a horizontal bar graph that aims to provide a clear visual of the various categories' Record Counts. The horizontal axis represents quantity while the vertical axis represents categories, and all the bars are depicted in the same solid bright blue color against a light background of the plot. A very important feature of the structure is that it shows the presence of a very asymmetrical distribution where a single bar is extremely longer than all others and thus the very plot is dominated very clearly. To make it easy for the readers to comprehend, the exact numerical value of the count (for instance, '53.0' or '1.0') is given in words in the termination and within area of each blue bar, and the bars are also marked by a very faint pink/red border for the purpose of visual distinction. The visualisation legend, which is akin to the Co-Guide 2 legend, above signals very strongly that the "no co-guide recorded" category is the one where the greatest records of 53 out of 57 or 92.98% of the total, are found. The Co-Guide 2 category being indicated signifies a major data quality concern as most of the records have no second co-guide assigned, thus marking them as either unprocessed or the Co- Guide 2 field not being used effectively. In comparison, the named co-guides were hardly involved at all, and only four of them, that is Mavishettar G. F, Ashalata Mallapur, Anandkumar N, and Gai Pramod B, who each made a contribution to one record, represented 1.75% of the total. Considering the whole, the distribution indicates that the Co-Guide 2 is mainly unrecognized and only received minimal input from the named co-guides.

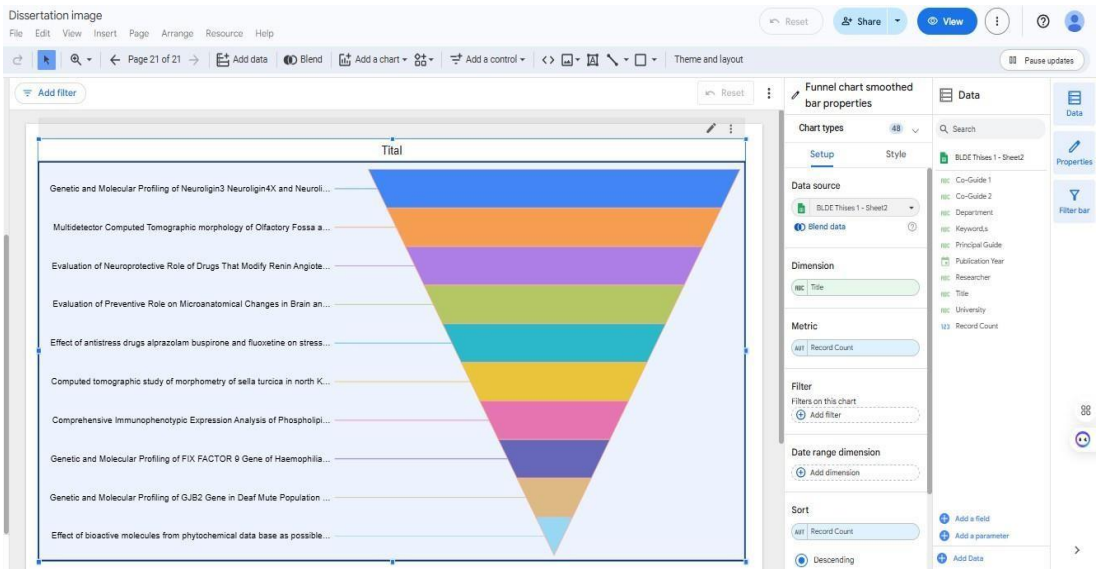


Figure 24: Title-wise data visualisation- funnel chart

The picture shows a professional information graphic, as a horizontal stacked inverted pyramid chart or a funnel diagram. Its structure is characterized by a top-down format that begins with the largest elements and becomes progressively smaller, culminating in a single point, visually depicting a sequential process or categorization breakdown. The funnel consists of several clear, stacked horizontal sections, whose widths are clearly proportional to their values, producing a clear tapering effect. One of the most important features of readability is the ubiquitous use of external labeling: all category labels are placed outside the core structure on the left side, linked with thin horizontal lines to their respective blocks. This approach is important since the titles of the categories are lengthy phrases which guarantee that the entire text is still very readable and neat, even though the chart's merging style is a bit confusing. It will contribute to the analysis, for instance, the central inequality among all the elements is the examination of academic or research documents, where the central quantitative measure is the ―Record Count.‖ The count is broken down and displayed along four major dimensions: time, as indicated by the ratio of records per Publication Year in the pie chart; topic hierarchy, where the funnel charts sort records by Title to emphasize the most predominant research areas by volume; and personnel contribution, detailed in the tables which rank the record counts belonging to individual Researchers, Co-Guide 1, and Co-Guide 2 individuals. In essence, the whole report quantifies and allocates the quantity of scholarly production according to its year, topic, and the people who are accountable for producing it.

CHAPTER 7 FINDINGS AND SUGGESTIONS

The Research Data Visualized with Google Looker Studio, has clearly shown the strong potential of the platform through its different features and how these features can be used effectively to make dashboards that are dynamic, interactive, and full of insights. The entire procedure—connecting data and presenting—shows the flexibility and friendliness of the Looker Studio for academic and institutional analysis.

1.1 Visualization Features Charts and Graphs: The researchers utilized different visualization tools such as bar charts, pie charts, column charts, doughnut charts, and funnel charts to visualize various parameters in a way that is both aesthetically pleasing and easy to understand. Tables and Scorecards: The comprehensive records were displayed by means of tables presented in a structured manner, whereas scorecards conveyed the essential indicators or counts at a glance. Interactive Controls: The filters, dropdowns, and search boxes made it possible for the users to take part in the report, and this option led to the customized exploration of the visualized data. Dynamic Legends and Labels: The readability and the correctness of the interpretation were ensured by the clear legends, labels, and titles that were provided for each chart.

1.2 Design and Layout Features Color Scheme: The combination of colors that were different but still consistent through the use of meaningful colorics was applied throughout the different sections of the dashboard to indicate and highlight the key metrics. Thus, the visual aspect of the dashboard was kept harmonious and clear. Font and Typography: The report was prepared with easy-to-read sans-serif fonts along with the sizes and styles that were able to emphasize titles and headings of sections. Alignment and Spacing: The charts and the tables were aligned accurately while providing enough space among them, this resulted in a clean and professional look. Dashboard Organization: The multiple pages and sections were designed in a logical way—each dashboard page dealt with a particular aspect of visualization, therefore the coherence was maintained.

1.3 Connectivity and Data Handling Features Data Source Connection: Looker Studio's Google Sheets integration was the data entry method chosen, thus necessitating no

manual interventions and allowing for continuous system syncing of the source and dashboard. Automatic Updates: The platform's feature of automatic data refresh and update ensured that visualizations always displayed the latest information without requiring any human intervention. Calculated Fields and Metrics: The ability to present data in different ways (i.e. through major computation and comparative visualization) was established through the creation of custom fields and formulas.

1.4 Customization and Analytical Features Filter Controls: Interactive filters were available to users who wanted to narrow down their analysis to a specific attribute or field thus making the dashboard versatile for detailed investigation. Chart Styling: The visual quality was enhanced through the adoption of options like border styles, background color choice, gridline modifications, and shadow effects. Theme and Layout Settings: Uniformity in color, layout, and typography was maintained across all charts and pages by applying both built-in and custom themes. Navigation and Interactivity: The report utilized page navigation buttons along with linked elements for easy transit between the different visual areas.

1.5 Sharing and Accessibility Features Sharing Options: Looker Studio's online sharing and embedding features were the main ways that enabled easy sharing of reports with faculty, researchers, and administrators. View and Edit Permissions: Control-based access was allowed by the platform ensuring secured data and limited editing rights for the selected users. Exporting and Downloading: The dashboards could be transformed into PDFs or embedded reports making them fit for presentation and documentation.

2. Suggestions

2.1 Enhancing Visual Design For a professional presentation, consistent color themes and typography should be maintained across all pages. Using contrasting colors will make it easy to see important elements or sections of the dashboard. Visual elements are to be balanced and kept clear of clutter, assuring that each chart gives a single message that is easy to grasp.

2.2 Improving User Interaction The addition of interactive filters, date selectors, and drill-down options will allow users to dynamically explore the details of their choice. Allow hover-over tooltips to display additional information without the visual space

becoming crowded. Develop cross-filtering, in which selecting one chart automatically filters the related visuals.

2.3 Expanding Analytical Capabilities Make use of calculated fields and custom metrics in order to perform deeper analysis that could be comparative or ratio-based. Add trend lines and reference indicators in the charts to inform about the progress or deviation of the data. Apply conditional formatting in the tables to visually highlight the key performance indicators.

2.4 Enhancing Accessibility and Collaboration Mobile responsiveness is to be provided so that dashboards can be easily viewed on different devices. Google Drive sharing settings are to be used for efficient collaboration among researchers and supervisors. Data connections are to be updated periodically for the purpose of maintaining real-time accuracy and reliability.

2.5 Future Improvements The integration with other Google tools like BigQuery, Google Analytics, or Google Forms is to be explored for richer data sources. Custom themes and brand-specific templates are to be created for institutional reports. The implementation of report-level filters and navigation menus for improved usability will be done in multi-page dashboards.

CONCLUSION

In sum, the research asserts that Google Looker Studio is a first-class, no-cost, and easy-to-use data visualizing tool which gives academics the possibility to effortlessly present their complex data as meaningful and eye-catching visuals. The authors of the study applied this tool for analyzing the metadata of the theses that BLDE (Deemed to be University) submitted to Shodhganga and so they were able to show that institutional raw data could be transformed into interactive charts, dashboards, and reports that are pleasing to the eyes and easy to interpret. Different types of charts were used in the visualisation process including pie charts, funnel charts, bar charts, and donut charts which together depicted the distribution of research activities among the departments. It was found that most of the research output came from basic medical sciences and Physiology (29.8%), Biochemistry (22.8%), and Anatomy (15.8%) were the major contributors indicating strong support for basic medical research. At the same time, Biotechnology, human genetics, pharmacology, and community medicine, which are represented by fewer publications, are gradually becoming part of the university's interdisciplinary and applied research areas. The analysis also revealed the patterns of collaboration among guides and co-gides, thus disclosing the research dynamics inside BLDE (DU).The use of Google Looker Studio made data visualisation very helpful and very engaging at the same time with its features like real-time data connectivity, customizable dashboards, and easy sharing options, thus enabling the users to have a deeper data exploration. The research declares that the data visualisation not only ensures the accessibility of the scholarly information but also helps in the understanding of it, thus facilitating the identification of research trends, strengths and gaps by the researchers, librarians and administrators. In addition, the project highlights the need for academic libraries to adopt digital tools like Looker Studio in order for research communication, transparency and decision-making to be improved. One of the main aspects of the university's plan to foster open access, prevent overlapping publications, and elevate the presence of its research works in worldwide platforms is the proper visualisation of the data.All in all, this research proves that Google Looker Studio is not just a tool in the hands of the academic and administrative staff but rather as their ally that connects them with the raw data informed insight, hence turning institutional research management into a more efficient, transparent and data-driven process.

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