What is research?

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1 author:

Larry M. Fritzgereld Adams Dr.

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What is research?

By Dr. Larry Adams

Merriam-Webster on research, Full Definition of research

1: careful or diligent search

2: studious inquiry or examination

especially: investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws

3: the collecting of information about a particular subject

research verb

researched; researching; researches

Definition of research

transitive verb

1: to search or investigate exhaustively

research a problem

2: to do research for

Synonyms for research

Synonyms: Noun

delving, disquisition, examine, examination, exploration, inquest, inquiry, inquisition, investigation, probation, probe, probing, study

Synonyms: Verb

delve (into), dig (into), examine, explore, inquire (into), investigate, look (into), probe

Recent Examples on the Web: Noun

The store is located in the first floor of the Illinois State Museum, which owns and operates the Shop to fund programs and research.

The categories include groupings like R1: Doctoral Institutions, which include schools like the University of Michigan where heavy research is the focus.

— David Jesse, Detroit Free Press, 23 Nov. 2021

First Known Use of research

Noun

1577, in the meaning defined at sense 1

Verb

1588, in the meaning defined at transitive sense 1

History and Etymology for research

Noun

Middle French recherché, from researcher to go about seeking, from Old French researcher, from re- + catchier, searcher to search — more at SEARCH

research a book

What research is – it's the thing we do when we want to find something out. It is what we are trained to do in a degree program. It's what comes before development.

Noun: systematic investigation to establish facts; a search for knowledge.

An etymologist might tell us that it comes from the Old French word catchier, to search, with re- expressing intensive force. I guess it is saying that before 1400 in France, research meant to search really hard.

If I was talking to a staff member at my university, though, it would say that searching hard was scholarship. The difference? Research has to have an element of discovering something new, of creating knowledge. While a literature search is one important part of a research project, it isn't research in and of itself. It is scholarship.

Another definition would be, Research is defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. This could include synthesis and analysis of previous research to the extent that it leads to new and creative outcomes.

This definition of research is consistent with a broad notion of research and experimental development (R&D) as comprising of creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications

This definition of research encompasses pure and strategic basic research, applied research and experimental development. Applied research is original investigation undertaken to acquire new knowledge but directed towards a specific, practical aim or objective (including a client-driven purpose).

Drawn from the 2012 Higher Education Research Data Collection (HERDC) specifications for the collection of 2011 data.

What research sounds like

Sometimes, however, don't want to talk about 'Research '. If it applying to a philanthropic foundation, for example, they may not be interested in new knowledge so much as the impact that work will have, the capacity to help them to solve a problem. Industry partners may also be wary of the 'R' word.

This creates something of a quandary, as the government gives us money based on how much research income we bring in. They audit our claims, so everything we say is research has to actually be research. So, it helps to flag it as research,

Instead, you might talk about innovation, or about experimentation. one could describe the element of risk associated with discovery. Investigation might lead to analysis. There might be tests that will undertake to prove hypothesis. one could just say that this work is original and has never been done before. They could talk about what new knowledge your work will lead to.

You might describe a new method or a new data source that will lead to a breakthrough or an incremental improvement over current practice. One could make it clear that it is the precursor to development, in the sense of 'research and development'.

What is the definition of a research study?

Research is conducted to learn new knowledge or to answer a question about how we learn, behave, and function, with the ultimate purpose of benefiting society. Simple tasks such as completing a survey, being watched in a group, or participating in a group discussion may be required in some research.

Definition: Research is defined as a methodical examination of a specific subject or problem using scientific methodologies. "Research is a methodical effort to characterize, explain, forecast, and manage the observable event," says American Sociologist Earl Robert Bobbie.

Human action based on intellectual application in the investigation of matter is classified as research. The discovery, interpretation, and development of methods and systems for the advancement of human knowledge are the primary goals of applied research.

Research is a method of systematic inquiry that involves gathering data, documenting key information, then analyzing and interpreting that data/information using methodologies established by certain professional professions and academic disciplines.

It really helps if you are doing something new.

What research looks like; Research is defined as the generation of new concepts, methodologies, and understandings through the development of new knowledge and/or the creative application of existing knowledge. This could entail synthesizing and analyzing past research to the point where it produces fresh and innovative results.

Why do we study research?

Research can find answers to things that are unknown, filling gaps in knowledge and changing the way that healthcare professionals work. Some of the common aims for conducting research studies are to: Diagnose diseases and health problems.

Sometimes, it isn't what you say, but what you do. If your work will lead to a patent, book or book chapter, refereed journal article or conference publication, or an artwork or exhibition (in the case of creative outputs), then it almost always fulfills the definition no matter what you call it.

What research isn't

Sometimes, it can see a thing more clearly by describing what it isn't.

Research isn't teaching. Don't get me wrong – you can research teaching; just like you can research anything else. However, teaching itself is generally regarded as the synthesis and transfer of existing knowledge. Generally, the knowledge has to exist before you can teach it. Most of the time, you aren't creating new knowledge as you teach. Some lecturers may find that their students create strange new 'knowledge' in their assignments, but making stuff up doesn't count as research either.

Research isn't scholarship. As I said at the start, a literature search is an important aspect of the research process but it isn't research in and of itself. Scholarship (the process of being a scholar) generally describes surveying existing knowledge. You might be looking for new results that you hadn't read before, or you might be synthesizing the information for your teaching practice. Either way, you aren't creating new knowledge, you are reviewing what already exists.

What is the purpose of research?

Research allows you to follow your passions, gain new skills, improve your problem-solving abilities, and push yourself in new directions. Learn vital life skills such as professionalism, time management, and how to use online research tools for both life and class.

Research isn't encyclopedic. Encyclopedias, by and large, seek to present a synthesis of existing knowledge. Collecting and publishing existing knowledge isn't research, as it doesn't create new knowledge.

Research isn't just data-gathering. Data-gathering is a vital part of research, but it doesn't lead to new knowledge without some analysis, some further work. Just collecting the data doesn't count, unless you do something else with it.

Research isn't just about methodology. Just because you are using mice, or interviewing people, or using a High Performance Liquid Chromatograph (HPLC) doesn't mean you are doing research. You might be, if you are using a new data set or using the method in a new way or testing a new hypothesis. However, if you are using the same method, on the same data, exploring the same question, then you will almost certainly get the same results. And that is repetition, not research.

Research isn't repetition, except in some special circumstances. If you are doing the same thing that someone else has already done, then generally that isn't research unless you are specifically trying to prove or disprove their work. What's the difference? Repeating an experiment from 1400 isn't research. You know what the result will be before your start – it has already been verified many times before.

Repeating an experiment reported last year probably is research because the original result can't be relied upon until it is verified.

Is development research? Development (as in 'research and development') may or may not be classified as research, depending on the type of risk involved. Sometimes, the two are inextricably linked: the research leads to the development and the development refines the research. At other times, are creating something new, but it is a new product or process, not new knowledge. It is based on new knowledge, rather than creating new knowledge. If the risk involved is a business risk, rather than intellectual risk, then the knowledge is already known.

– what are your favorite words that signal research?

Most research can be divided into three different categories: exploratory, descriptive and causal. Each serves a different end purpose and can only be used in certain ways.

In the online survey world, mastery of all three can lead to sounder insights and greater quality information. Let's do a quick overview of all three types of research, and how they fit in a research plan.

Exploratory research

Exploratory research is an important part of any marketing or business strategy. Its focus is on the discovery of ideas and insights, as opposed to collecting statistically accurate data. That is why exploratory research is best suited as the beginning of your total research plan. It is most commonly used for further defining company issues, areas for potential growth, alternative courses of action, and prioritizing areas that require statistical research.

Looking for the right audience to test your ideas on? Audience lets you build your desired panel of recipients who'll give you the feedback you need to make the right decisions.

When it comes to online surveys, the most common example of exploratory research takes place in the form of open-ended questions. Think of the exploratory questions in your survey as expanding your understanding of the people you are surveying. Text responses may not be statistically measureable, but they will give you richer quality information that can lead to the discovery of new initiatives or problems that should be addressed.

Descriptive research

Descriptive research takes up the bulk of online surveying and is considered conclusive in nature due to its quantitative nature. Descriptive research, as opposed to exploratory research, is preplanned and structured in design so that the information gathered can be statistically inferred on a population.

The main idea behind using this type of research is to better define an opinion, attitude, or behaviour held by a group of people on a given subject. Consider your everyday multiple choice question. Since there are predefined categories a respondent must choose from, it is considered descriptive research. These questions will not provide novel insights into the issues, as exploratory research would. Instead, grouping the responses into predetermined choices will provide statistically inferable data. This allows you to measure the significance of your results on the overall population you are studying, as well as the changes in your respondent's opinions, attitudes, and behaviours over time.

Causal research

Like descriptive research, causal research is quantitative in nature as well as preplanned and structured in design. For this reason, it is also considered conclusive research. Causal research differs in its attempt to explain the cause and effect relationship between variables. This is opposed to the observational style of descriptive research, because it attempts to decipher whether a relationship is causal through experimentation. In the end, causal research will have two objectives:

To understand which variables are the cause and which variables are the effect,

To determine the nature of the relationship between the causal variables and the effect to be predicted.

For example, a cereal brand owner wants to know if they will receive more sales with their new cereal box design. Instead of conducting descriptive research by asking people whether they would be more likely to buy their cereal in its new box, they would set up an experiment in two separate stores. One will only sell the cereal in its original box, while the other will sell it in its new box. Taking care to avoid any outside sources of bias, they would then measure the difference in sales based on the cereal packaging. Did the new packaging have any effect on cereal sales? What was that effect?

Appreciative Research

What is in this guide?

This guide is meant to provide a basic understanding of research and its role in development. It has the following sections:

1. What is research?
2. How is research used
3. Different ways of doing research
4. How do we do research?
5. Tools to analyses research
6. Important research terms

1. What is research?

Generally, research is the organized and systematic method of finding answers to questions. It is systematic because it is a process broken up into clear steps that lead to conclusions. Research is organized because there is a planned structure or method used to reach the conclusion. Research is only successful if we find answers, whether we like these answers or not. Development research is focused on relevant, useful and important questions. If there are no questions, there can be no research.

If government, business, institutions, labour, organizations and society in general are to function efficiently and effectively, it is important that the decisions they make are based on valid and reliable

information and thorough analysis. The search for this information is referred to as the research process. There may be an existing body of evidence (prior research, studies etc.) you can make use of. If there is not, there is a need for research.

For example, the Department of Health in planning a HIV and AIDS prevention programme may have to ask some of the following questions before agreeing on and rolling out the programme. The Department of Health may have an existing body of evidence that assists in finding the answers to some of these questions whilst others may require research.

Questions that could be researched are:

- Which are the most vulnerable groups and areas of high transmission? Here the Department of Health may rely on the annual ante-natal survey (existing body of evidence) to answer these questions.
- What are the most effective ways of changing sexual behaviour amongst the different vulnerable groups? Here little or no information may be available. The Department of Health would have to find answers to these questions through research.

Once a decision is made that research is required, the Department of Health must decide on the research methods and process that will be used to answer the questions.

2. How is research used

As indicated above, the primary purpose of research is to find answers to questions. Research allows us to find the right solutions to key issues in our communities by:

- providing facts that will help us to analyse the problem;
- testing the feasibility and the impact of programmes; and
- finding better solutions to the challenges.

Here are some examples of questions that research will help to answer in community development work:

- Is it feasible to start a new project? For example, the Department of Agriculture may want to conduct a study on whether food gardens are sustainable in drought prone areas of our country.
- What impact has a project or programme had on a community? For example, a community based organisation may want to measure the impact of its environmental awareness programme in the local community.
- What other interventions are needed to improve on a situation? For example, a civic may have initiated a poverty alleviation programme that is not having the desired impact. It needs to find other ways of impacting on poverty.

Research can play an important role in winning support for a programme or cause (sometimes called advocacy.) It helps make a case through strengthening arguments, providing information, and outlining cost benefits.

Research can confirm what you were already sure of.

Often people have firm beliefs about particular issues, but when they have to argue their case they lack reliable information to back up their beliefs. Research helps to clarify and strengthen beliefs especially in the face of opposition and doubt from others. Whilst research can confirm your views, it is important that the researcher remains open-minded and impartial even when the results fail to confirm your views.

Research can give your views and arguments substance.

Research produces hard facts that could support your arguments and beliefs.

Research gives you knew information.

Research often throws up other facts which you may not have been aware of that helps to strengthen, or even change, your arguments and beliefs. These facts make it easier to plan programmes and ensure that interventions are effective.

Research can show you what is most likely to address your issue successfully.

Research may provide key information that will enable you to develop clear strategies.

Research can provide you with anecdotes and examples to use.

In addition to providing statistics, research provides you with real life experiences that are more convincing than statistics organised into graphs and tables. For example, parts of a research report on poverty in a rural community can deal with actual case studies that will have a great impact on readers.

Research allows you to make cost-benefit arguments.

Often people are convinced that a programme or project justifies high amounts of money being spent. Research can confirm if this is correct or suggest other ways for the money to be spent.

3. Different types of research

There are different types of research activities than can assist you in undertaking research. In this section we touch on some basic methods:

1. **Desktop research** refers to seeking facts, general information on a topic, historical background, study results, etc., that have been published or exist in public documents. This information can be obtained from libraries, newspaper archives, government, university, websites, NGOs and CBOs etc. For example, most research undertaken by government departments is easily accessible on the internet or at government offices.

2. **Interviews and conversations** are used when you want to find out the community's past experience with an issue. The best way to find it is usually by talking to individuals. For example, it may be best to talk to local community leaders to collect information on the history of an area. You may use informal conversations, structured interviews, or a combination to get as much information as possible. Sometimes, it is useful to ask questions of a group of people (for example, in a workshop situation), as this can stimulate different views and discussion.

3. **Surveys** are used if you want to know what most people in the community think or feel about an issue. For example, how many people would take advantage of a service if it were available? A survey is a way to reach a lot of people in a short space of time. A survey usually consists of a list of simple questions on a topic, and may include some chance for respondents to express a broader opinion or comment on the issue. You can conduct surveys by post, phone, in person, by e-mail, on a web site, or by making them available in public places (See the CDW Skills Manual, p. 42, for more on doing your own surveys.)

The information that is collected through these methods is either quantitative or qualitative in nature. **Quantitative** research depends on numbers and statistical procedures. For example, a household income survey is a quantitative survey that looks at the average household income in an area.

Information can also be **qualitative** - based on observations of behavior, participants' reports of how they or their lives have changed, etc. For example, the Department of Transport may want to find out the impact of its Arrive Alive Campaign using a qualitative study in areas that are usually high accident zones. Here the researchers will observe how road users conduct themselves in these areas and in addition speak to a sample of them to find out what impact the television and radio advertisements have had on their behavior on the roads.

Some studies seek to understand **cause and effect** - what causes something else to happen or the connection between two factors. For example, the Department of Water Affairs may want to find the cause of certain rivers being highly polluted and the effect this has on the lives of people living along these rivers.

Some studies are conducted to find answers to **very specific questions**. For example, the Department of Agriculture may want to find out whether maize or pumpkins are the best crops to grow in a particular area as part of a poverty alleviation project.

4. **Community investigation** involves going to an area to establish facts about a specific problem or state of affairs. For example, councilors sitting on a Transport and Roads Standing Committee of a local municipality may visit an area to establish the extent of the problem in relation to the occurrence of potholes and sinkholes. This would require the councilors to talk to residents, examine the road conditions and make notes. This would enable the Standing Committee to make a decision based on facts they established first hand.

In some cases, community investigation may require actual detective work. For example, an advice office worker may want to report a factory owner to the Department of Labour for locking his workers overnight in the factory. The advice office worker may have to take photographs of the locked doors or film the workers operating behind locked doors. S/he can also get affidavits from worker to establish the facts and present a case to the Department of Labour.

5. **Case studies** that describe the experience of individuals or groups affected by an issue can be very effective for research that aims to change a situation or influence decision-makers. Politicians and the public are often more easily swayed by stories they can identify with than by statistics. Finding people who can provide convincing firsthand information is an important part of research. Key people and activists in the target

community are good sources for finding people who can provide first-hand information. For example, the Department of Social Services and Population Development may want to find out the impact of drought on a rural village. Local people who have lived in the area for a long time will be able to provide compelling stories and anecdotal information on the impact of drought in the area and how the community has coped with this over the years.

5. How do we do research?

As discussed previously, research is a systematic and organised process. It is about collecting information that answers a question. Throughout this process the researcher has to ensure that information is gathered in a systematic and accurate manner.

Information gathered must be cross-checked by using other sources and references, even when the researcher is convinced that the information already obtained provides a good answer to the question asked.

Below are guidelines and steps for a general research process, no matter the type or method or research being undertaken.

Step 1: Identify and define the issue or question

- What is the issue?
- Why is it necessary to research this issue?
- What do we want to find out?
- What information/evidence already exists?

This step assists in identifying the problem or issue that requires research. For example, South Africa has a high incidence of road death. Research already done shows that around 10,000 people are killed in road accidents each year. Now we need to find out what are the causes and impact of the high incidence of road deaths. We need to know what other facts and evidence already exist so that we can build on that.

Step 2: Deciding direction by identifying a focus and refining the question

- What will be the aim and focus of the research?
- What questions need to be answered?

In this step we set out the aims and objectives of the research. For example, the aim of the research may be to "assess the social and economic impact of road accidents on the South African population". The aim of the research may provide a title for the research, i.e. "*The causes of road accidents and the social and economic impact on the South African population".*

A clear aim will make it easier to develop objectives for the research, for example:

- To investigate the causes of accidents in South Africa.

- To ascertain which geographical areas in South Africa experience the most road-accident deaths.
- To measure the social impacts of road-accidents on the South African population.
- To measure the economic impacts of road-accidents on South Africa.
- To make recommendations arising from the study to interested groups.

The objectives will help you to decide which questions need answers. For example,
"What are the three most common causes of road accidents?"

Step 3: Organising the work plan to answer the questions

- What sort of information is needed to answer the questions? Where will it be found (sources)?
- What would be the best research methods to use?
- Who is best suited to do this research?
- What are the tasks and who will do what?
- When does the work need to be completed?

This step entails organising the work and choosing the methods that will be used to conduct the research. A terms of reference should be drawn up that that spells out the work needed. This is usually given to the researcher who must then prepare a proposal about how they will go about doing the research. A usually has the following sections: background, research objectives, methodology to be used, resources to be used (people, money for travel, etc.), and timeframes for completing the project (broken down into phases, e.g. when the fieldwork will be completed, when the report will be written).

Step 4: Collecting information to help answer the question

This step entails the actual collection of information. This may require fieldwork. The research example on *"The causes of road accidents and the social and economic impact on the South African population"* is a huge and difficult one that will require lots of resources. For example, 80,000 fieldworkers were employed to conduct the 2001 Census. In this case the fieldworkers were called enumerators.

Other research may be conducted on a much smaller scale and may include a team of 5-10 people and the amount of resources required would be less.

Step 5: organise the information collected and discard what is not needed

This phase entails organising and analysing the information gathered in the previous step. To analyse means to make calculations, such as adding up the different responses so as to get a full picture of the situation. For example, after analysis it might be that 70% of those that were interviewed may have been driving over the speed limit of 120km/hr. The analysis may be in the form of tables, graphs, percentages, etc. Similarities may emerge. For example, the incidence of road deaths may be higher during rainy days. Similarly, patterns may start to emerge. For example, the occurrence of drunken driving is higher during weekends and at the end of the month when people get paid.

Step 6: Drawing conclusions

This step entails discussing the findings and drawing conclusions.
Findings are often in table, graph, numeric or percentage form. The discussion involves using words to describe the findings. The discussion section is where the researcher gives opinions based on the findings of the research. The researcher then draws conclusions and may make recommendations based on the findings. The conclusion may be that *"Road deaths are mainly caused by drunk drivers, drunken pedestrians, un-roadworthy vehicles and poor driver behaviour. The main economic impact is on the productive workforce due to high death rate and the more than 100 000 economically active people who are disabled annually. Impact is most severe on individual families affected. "*

Step 7: Writing a research report

The writing of a report is important as it leaves a body of evidence that can be used by politicians, planners, community organisations and future researchers. A report generally has six sections: introduction, literature review, methodology, research results, discussion, and conclusions and recommendations (for more information, see section 5 of this chapter).

Step 8: Reflecting on and evaluating the work done

This step entails reflection to decide on what action is needed and what steps should be taken to use the research effectively. This may include a plan for communicating the research results to community members and decision makers. More research may also be needed to answer new questions thrown up by the research done.

5. Tools for analysing research

Government, community based organisations and other stakeholders work to create a better life for all. These stakeholders are often confronted by issues that require new or further research. With a number of institutions of higher learning and other private and public organisations conducting research, it can be difficult to differentiate between "good" and "bad" research. Research often informs the decisions that are made. Poor research leads to poor decisions.

This section provides some basic tools to help us understand research and the terminology and presentation used.

Research documents are usually organised in a similar way:

- Firstly, these documents contain an **"abstract"** which provides a clear summary of the document.
- This followed by an "**introduction"** that provides background information, the reason for the study and an overview of the work done.
- Often research reports will start with a review of existing information and analysis on the issue. In some types of research this is called a ***"literature review".***
- The report then deals with the **"method"** used in the study, including a description of the participants, the setting, the measures, and the procedures used to analyse data.
- This is followed by a **"results"** section in which the researcher describes the results.

- The next section of the document is the **"discussion"** that provides an interpretation of the results and the implications of the study.
- This is followed by ***"conclusions" and "recommendations***".

Here are some questions that can be used to decide whether research findings are valid, relevant and useful.

Analysing the introduction

As we noted, the introduction should explain the purpose of the research study. The introduction should be factual and not contain the researcher's opinions. It should also focus on the aims and objectives of the research.

In analysing the introduction, the following should serve as a guideline:

- Does the introduction sketch the context?
- Does the introduction offer specific research questions (that is, are the objectives of the research clear)?

Analysing the literature review

Does it give an overview of the existing body of relevant evidence and draw out the lessons we can learn from this evidence?

Analysing the method section

The method section should provide details of how the research was conducted, including descriptions of the participants and setting, the research and intervention procedures, and the data collection and analysis procedures.

The method section must provide clear details of the following:

- A clear description of the people interviewed in terms of gender, age, educational levels, income etc.
- The setting for the interviews and possible impact the setting may have had on interviewees. For example, people may have been interviewed in their homes, which allowed them to feel comfortable and answer honestly. It must describe the socio-economic setting, whether it is rural or urban etc.
- The research process should be described and the relationship between the researcher and interviewees should be outlined. This is important as it may impact on the outcome of the research. For example, an elder in a community may not get honest responses from teenagers when researching sexual behaviour amongst youth in the same community.
- Details should be provided on the methods used to collect information and the kind of information collected. It should also provide details of how the data collectors were trained and what steps the researcher took to ensure the procedures were followed.

Analysing the results section

The result section contains detailed statistics and complex terms. Many people tend to avoid the results section and move on to the discussion section for this reason. This is dangerous as it is meant to be a factual statement of the data whilst the discussion section is the researcher's interpretation of the data.

Understanding the results section may lead the reader to differ with the conclusions made by the researcher in the discussion section.

The results section must provide:

- The answers found through the research in words and graphics;
- It should use minimal jargon;
- Displays of the results in graphs or other visuals should be clear and accurate.

To understand how research results are organised and presented, you must understand the concepts of tables and graphs. Below we use information from the Department of Education's June 2003 publication "*Education Statistics in South Africa at a Glance in 2001"* to illustrate the different ways the information can be organised.

Tables

Tables organise the information in rows (horizontal/sideways) and columns (vertical/up-down). In the example below there are two columns, one indicating the learning phase and the other the percentage of students in that learning phase within ordinary schools in 2001.

Learning Phase	**Percentage of students**
Primary	63.2
Secondary	34.3
Pre-primary	2.3
Other	0.2
TOTAL	**100**

Table: Percentage Distribution of Learners by Phase in Ordinary Schools in 2001

This table indicates that for every 100 learners in ordinary schools in South Africa, a little more than two (2.3) were in pre-primary grades, 63.3 were in primary schools, and 34.3 were in secondary schools.

When you deal with big populations, findings are usually presented as percentages (or how many in a hundred). This makes it much easier to compare between different groups or issues.

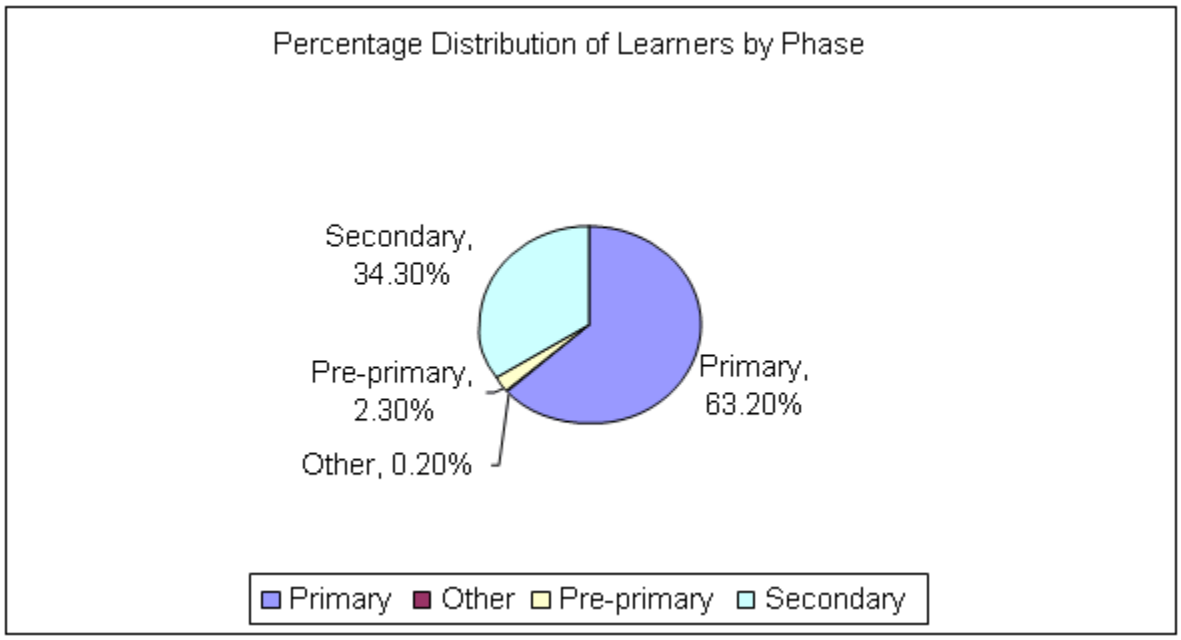
Types of graphs

Graphs help provide a visual representation of information, usually statistics. There are three main types of graphs: pie charts, bar graphs and line graphs.

Pie charts

A pie chart is like a big pie or cake that is divided into slices. Each slice represents one of the categories of your findings and it clearly shows the size of each category in relation to the others.

The information in the table above on the "percentage distribution of learners by phase in ordinary schools in 2001" can be organised in a pie chart that provides a visual description of the information (see next page). Pie charts show the relationship of each part (learning phase) to the whole (total percentage of students)

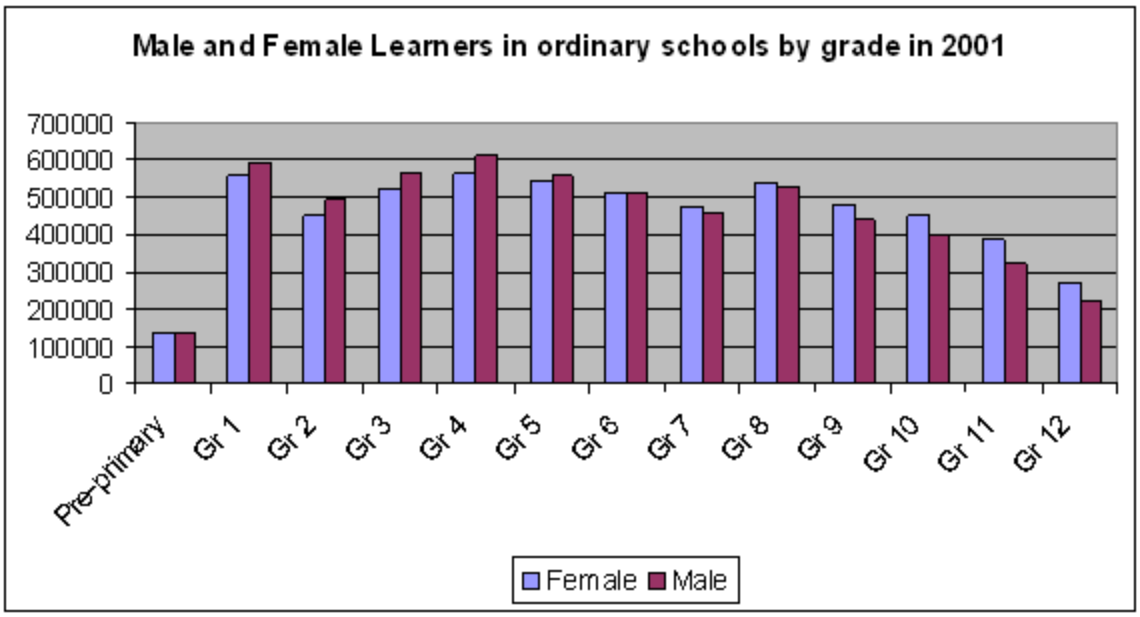


Bar graph

Bar graphs also compare values in a category or between categories. A bar graph allows you to compare more than one category of information. The bar graph below makes a visual comparison of male and female learner in ordinary schools and compares them for each grade in 2001. The categories in this case are male and female learners, and the different grades.

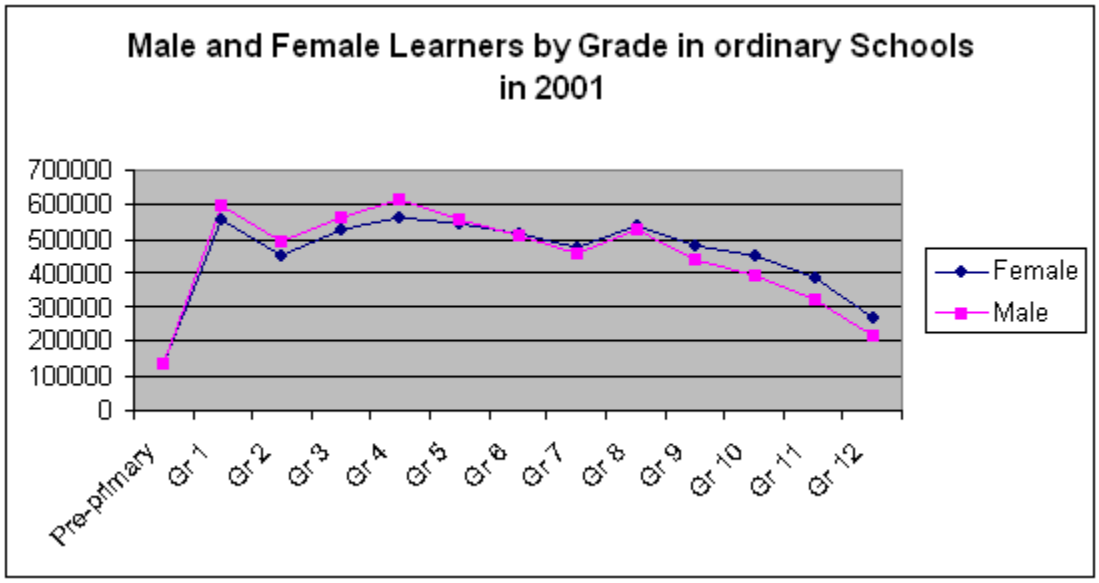
On graphs there are always two lines – one on the left and one at the bottom of the graph. They form an L and the left vertical line is called the x – axis and the horizontal line the y – axis.

In the example, below the x – axis indicates the number of students whilst the y-axis indicates the different learner grades.



Line Graphs

Line graphs are another way to show the relationship between two or more different categories. The same information from the bar graph can now be illustrated differently to show other information that is not easily visible from the bar graph. For example, the line graph at first glance immediately says to the reader that there are more female learners than male learners from Grades 8 to Grade 12 whilst there are more male learners than female learners from Grades 1 to 5.



Parts of a bar and line graph

- **Graph Title** -The graph title gives an overview of the information being presented in the graph. The title is given at the top of the graph.

- **Axes and their labels**- Each graph has two axes. The axis labels tell us what information is presented on each axis. One axis represents data groups (y – axis); the other represents the amounts or frequency of data groups (x – axis). For example, in the line graph above, x - axis is the number of students whilst the y – axis represents the different grades.

Understanding the discussion section

This section should provide an interpretation of the results. The reader must ensure that the researcher has not misrepresented or misinterpreted the results or applied them to a different setting from which the research was undertaken. The reader has to look out for the limitations of the study, implications for practice, and future research needs.

Understanding the conclusions and recommendations section

In this section we need to ensure that the conclusions and recommendations arising from the results and discussion sections provide a clear framework to address issues. In addition, we need to check on what follow up action is required and other research areas that have been thrown up

6. Research terminology What Is Research Methodology (Precisely)?

Much of the terminology that researchers use is unfamiliar to others. In this section we explain the terms most commonly used in research.

What is the research methodology?

Research methodology simply refers to the practical "how" of any given piece of research. More specifically, it's about how a researcher systematically designs a study to ensure valid and reliable results that address the research aims and objectives.

For example, how did the researcher go about deciding?

What data to collect (and what data to ignore)

Who to collect it from (in research, this is called "sampling design").

How to collect it (this is called "data collection methods")

How to analyse it (this is called "data analysis methods")

In a dissertation, thesis, academic journal article (or pretty much any formal piece of research), you'll find a research methodology chapter (or section) which covers the aspects mentioned above. Importantly, a good methodology chapter in a dissertation or thesis explains
not just what methodological choices were made, but also why they were made.

In other words, the methodology chapter should justify the design choices by showing that the chosen methods and techniques are the best fit for the research aims and objectives and will provide valid and reliable results. A good research methodology produces scientifically sound findings, whereas a poor methodology doesn't. We'll look at the main design choices below.

What are qualitative, quantitative, and comparative analysis?

mixed-method methodologies?

Qualitative, quantitative, and mixed-methods are different types of methodologies, distinguished by whether they focus on words, numbers, or both. This is a bit of an oversimplification, but it's a good starting point for understanding. Let's take a closer look.

Qualitative research refers to research that focuses on collecting and analysing words (written or spoken) and textual data, whereas quantitative research focuses on measurement and testing using numerical data. Qualitative analysis can also focus on other "softer" data points, such as body language or visual elements.

It's quite common for a qualitative methodology to be used when the research aims and objectives are exploratory in nature. For example, a qualitative methodology might be used to understand people' perceptions about an event that took place, or a candidate running for president.

Contrasted to this, a quantitative methodology is typically used when the research aims and objectives are confirmatory in nature. For example, a quantitative methodology might be used to measure the relationship between two variables (e.g. personality type and likelihood of committing a crime) or to test a set of hypotheses.

As you've probably guessed, the mixed-method methodology attempts to combine the best of both qualitative and quantitative methodologies to integrate perspectives and create a rich picture.

What are the main sampling design approaches?

As we mentioned earlier, sampling design is about deciding who you're going to collect your data from (i.e. your sample). There are many sample options, but the two main categories of sampling design are probability sampling and non-probability sampling.

Probability sampling means that you use a completely random sample from the group of people you're interested in (this group is called the "population"). By using a completely random sample, the results of your study will be generalisable to the entire population. In other words, you can expect the same results across the entire group, without having to collect data from the entire group (which is often not possible for large groups).

Non-probability sampling, on the other hand, doesn't use a random sample. For example, it might involve using a convenience sample, which means you'd interview or survey people that you have access to (perhaps your friends, family, or work colleagues), rather than a truly random sample (which might be difficult to achieve due to resource constraints). With non-probability sampling, the results are typically not generalisable.

What are the most common data collection techniques?

When it comes to gathering data for your research, you have a variety of possibilities. These possibilities, on the other hand, can be classified into the following categories:

In-depth interviews (which can be unstructured, semi-structured or structured)

Group interviews and focus groups

Questionnaires (online or physical surveys)

Observations

Records and documents

Case studies are used to illustrate a point.

The method you employ to gather data is determined by your overall study goals and objectives, as well as practical considerations and resource limits. If your study is exploratory in character, qualitative approaches like interviews and focus groups are likely to be appropriate. Vast-scale surveys that provide large amounts of numerical data, on the other hand, would be a better fit if your research wants to measure specific variables or test hypotheses.

What are the most common data analysis techniques?

Methods of data analysis can be classified based on whether the study is qualitative or quantitative.

In qualitative research, popular data analysis approaches include:

Content analysis (qualitative)

Thematic investigation

An examination of the discourse

Analysis of narratives

IPA based on grounded theory

Data coding is the first step in qualitative data analysis, followed by one (or more) analysis techniques.

In quantitative research, popular data analysis approaches include:

Statistics that are descriptive in nature (e.g. means, medians, modes)

Statistics that can be used to make inferences (e.g. correlation, regression, structural equation modelling)

Again, the method you employ to collect data is determined by your overall study goals and objectives, as well as practical considerations and resource limits.

What factors should I consider while selecting a study methodology?

As you've surely noticed, the research approach is heavily influenced by the study goals and objectives. Before making methodology decisions, take a step back and look at the big picture of your research as a beginning point for designing your research technique. The first thing you should consider is whether your study is exploratory or confirmatory in nature.

If your research aims and objectives are primarily exploratory in nature, your study will most likely be qualitative, hence qualitative data gathering methods (e.g. interviews) and analytic methods should be considered (e.g. qualitative content analysis).

If, on the other hand, your research aims and objectives are to measure or test anything (i.e. they're confirmatory), your research will almost certainly be quantitative, and you may want to investigate quantitative data collection methods (e.g. surveys) and analyses (e.g. statistical analysis).

Mean and median

For each of these terms, we will use the following set of nine numbers to explain the basis of our calculations:
1, 2, 3, 4, 5, 6, 7, 8, 54

Mean -The arithmetic mean is a commonly used term and is also referred to as the average. The mean is worked out by adding the numbers in a series and dividing the total by the number of items in the series. Adding our nine numbers and dividing by nine results in a mean (or average) of 10.

1+ 2 + 3 + 4 + 5 + 6 + 7 + 8 + 54 = 90
90 / 9 = 10
Mean = 10

Median -The median is the value which lies at the middle of a distribution: that is, 50% of the values are above (7, 8, 9, 54) and 50% (1, 2, 3, 4) below.
1 2 3 4 **5** 7 8 9 54
Median = 5

Sample

The group of subjects (people) from whom the data are collected.

Sampling Error

Maximum Sampling Error (MSE) is the highest possible percentage that the findings could be out by. For example, you might see the following statement in a research report: "Results are subject to a maximum sampling error (MSE) of + 5% at the 95% confidence level." This MSE tells you that the chances are 95 in 100 that the results are within 5 percentage points, higher or lower, of the true percentage for the entire population. The bigger your sample the smaller the MSE will be.

Statistically significant

This means that the research results are not likely to have occurred by chance. For example, research reports show that more people are applying for child support grants in ward 12 Phalaborwa after an education and awareness program run by the local councillor, and that these findings are "statistically significant." This means that the researcher is reasonably sure that increase in the number of people seeking child support grants was influenced by the education and awareness programme. If research findings are not statistically significant, any increase reported may be due to chance, rather than a result of the intervention.

Disaggregate

This means to take a general set of facts and break them into smaller, more meaningful pieces. For example you can find that 40% of people are unemployed in an area. When you break it down into gender you will find that only 20% of men are unemployed, but 60% of women are unemployed. Your

approach to dealing with unemployment will change. You can also disaggregate for age, class, educational level, etc.

Extrapolate

This means to take some proven facts and to make a prediction based on them. You could take the track record of Pirates and Chiefs and make a prediction that they will end up in the top half of the results table next year. This is extrapolation.

Hypothesis

This is a prediction of what the outcome of the research may be.

References and further reading

For each section we provide details of reference sources used in compiling this document.

1. What is research?
   www.linguistics.byu.edu/faculty/henrichsenl/researchmethods/RM_1_01.html
   Unpublished paper "Research for a changing South Africa" PhD Student Noel Chellan – University of Kwazulu Natal - 2004
2. How research is used?
   http://ctb.ku.edu/
3. Different ways of doing research
   http://ctb.ku.edu/
4. How do we do research?
   www.mcgrawhill.ca/school/subjects/history
5. Tools to analyse research
   www.cldinternational.org/c/@5xc8y15ndk8Io/Pages/scienceP4.html
   www.cstl.syr.edu/fipse/TabBar/RevBar/REVBAR.HTM– section on Parts of a bar and line bar
6. Important research terms
   www.helpforschools.com/ellkbase/forms/glossary_research.html
   www.b2bmrc.com/terms.htm