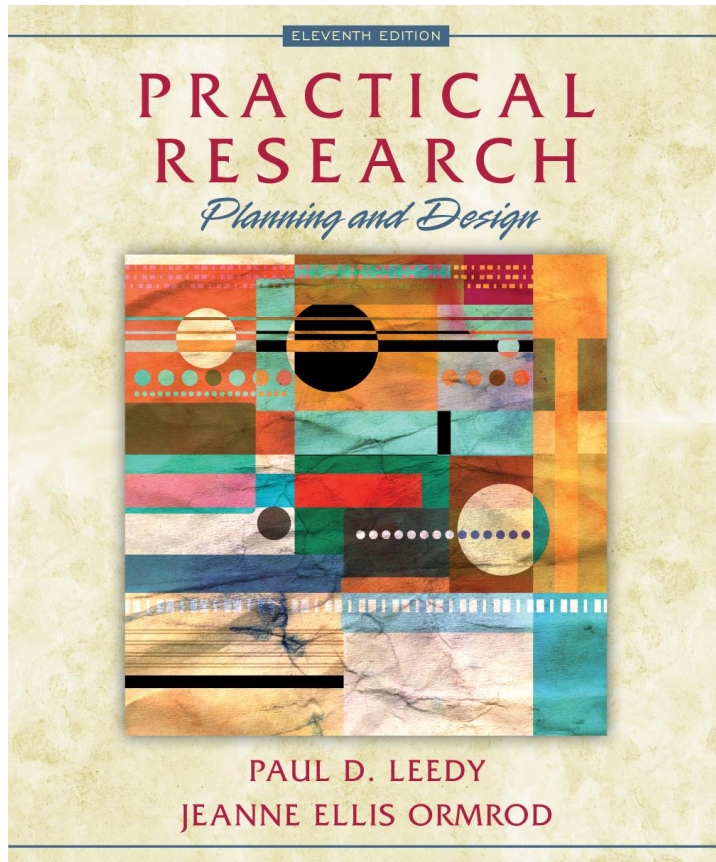


Practical Research

11th edition

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Chapter 1

The Nature and Tools of Research

Research is:

- Method/Process of **evolution of human knowledge of nature**
- Trying figure out the **answers of unknown + Book page 23 another definition**
- A systematic process of
 - Collecting
 - Analyzing
 - Interpreting information (data)
- Goal: increase understanding of a phenomenon about which we are interested or concerned

Research is not merely:

- Gathering information (**gathering info, referencing**)
- Rummaging around for hard-to-locate information (**self alignment about a field**)
- Transporting facts from one location to another (**fact assimilation or review process**)

Hypothesis

❖ An hypothesis is a limited statement regarding cause and effect in specific situations.

❖ it also refers to our state of knowledge before experimental work has been performed and perhaps even before new phenomena have been predicted.

Model

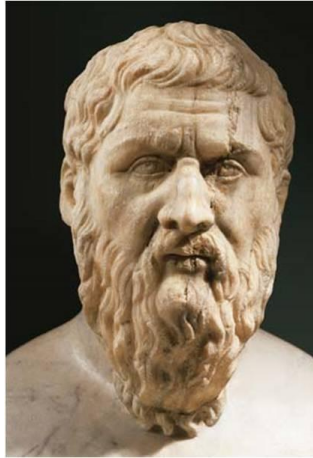
❖ The word model is reserved for situations when it is known that the hypothesis has at least limited validity.

□ A often-cited example of this is the Bohr model of the atom, in which, in an analogy to the solar system, the electrons are described as moving in ~~circular orbits around the nucleus.~~

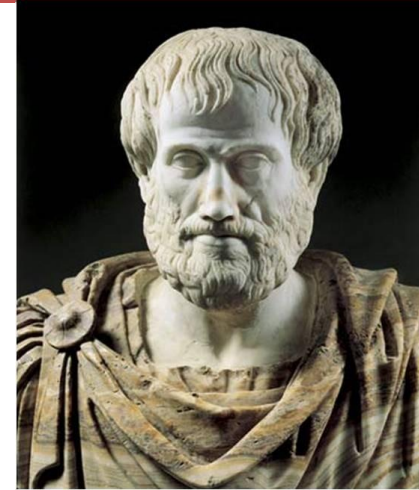
Theory or Law

A scientific theory or law represents an hypothesis, or a group of related hypotheses, which has been confirmed through repeated experimental tests.

Philosophers

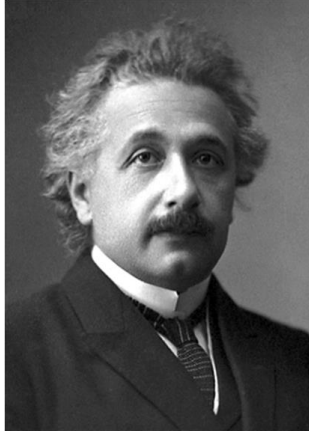


Plato was a philosopher, as well as mathematician, in Classical Greece. He is considered an essential figure in the development of philosophy, especially the Western tradition, and he founded the Academy in Athens, the first institution of higher learning in the Western world. Along with his teacher Socrates and his most famous student, Aristotle

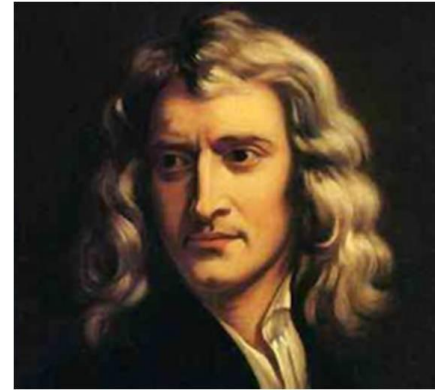


Aristotle was an ancient Greek philosopher and scientist, one of the greatest intellectual figures of Western history. He was the author of a philosophical and scientific system that became the framework. Ethics, logic, philosophy of science, etc.

Inventors and Scientists

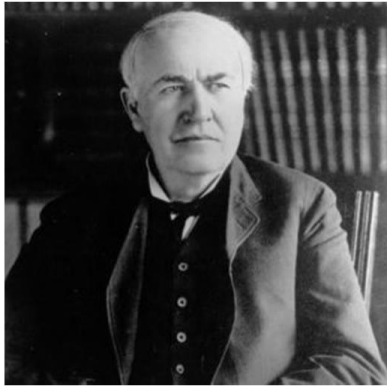


Albert Einstein was a German-born theoretical physicist. He developed the general theory of relativity, one of the two pillars of modern physics. Einstein's work is also known for its influence on the philosophy of science.

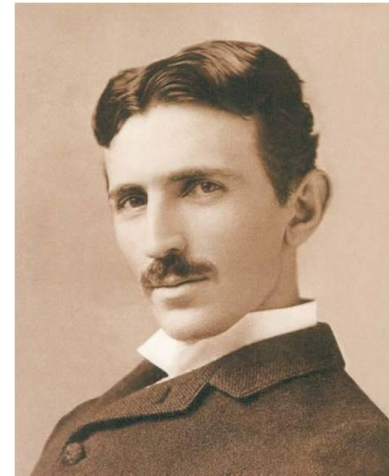


Sir Isaac Newton PRS MP was an English physicist and mathematician who is widely recognized as one of the most influential scientists of all time and as a key figure in the scientific revolution

Inventors and Scientists



Thomas Alva Edison was an American inventor and businessman. He developed many devices that greatly influenced life around the world, including the phonograph, the motion picture camera, and a long-lasting, practical electric light bulb.

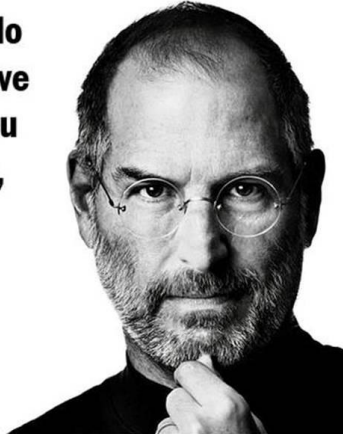


Nikola Tesla was a Serbian American inventor, electrical engineer, mechanical engineer, physicist, and futurist best known for his contributions to the design of the modern alternating current electricity supply system

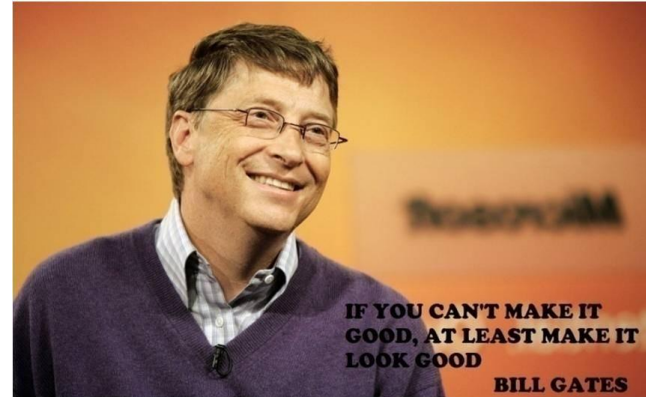
Innovators

“The only way to do great work is to love what you do. If you haven't found it, keep looking. Don't settle.”

- Steve Jobs

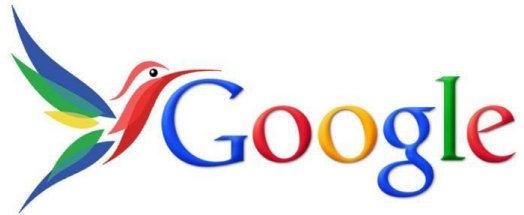


Steven Paul "Steve" Jobs was an American pioneer of the personal computer revolution of the 1970s . Shortly after his death, Jobs's official biographer, Walter Isaacson described him as the "creative entrepreneur whose passion for perfection and ferocious drive revolutionized six industries: personal computers, animated movies, music, phones, tablet computing, and digital publishing.



William Henry "Bill" Gates III is an American business magnate, philanthropist, investor, computer programmer, and inventor. In 1975, Gates co-founded Microsoft, the world's largest PC software company, with Paul Allen

Innovations

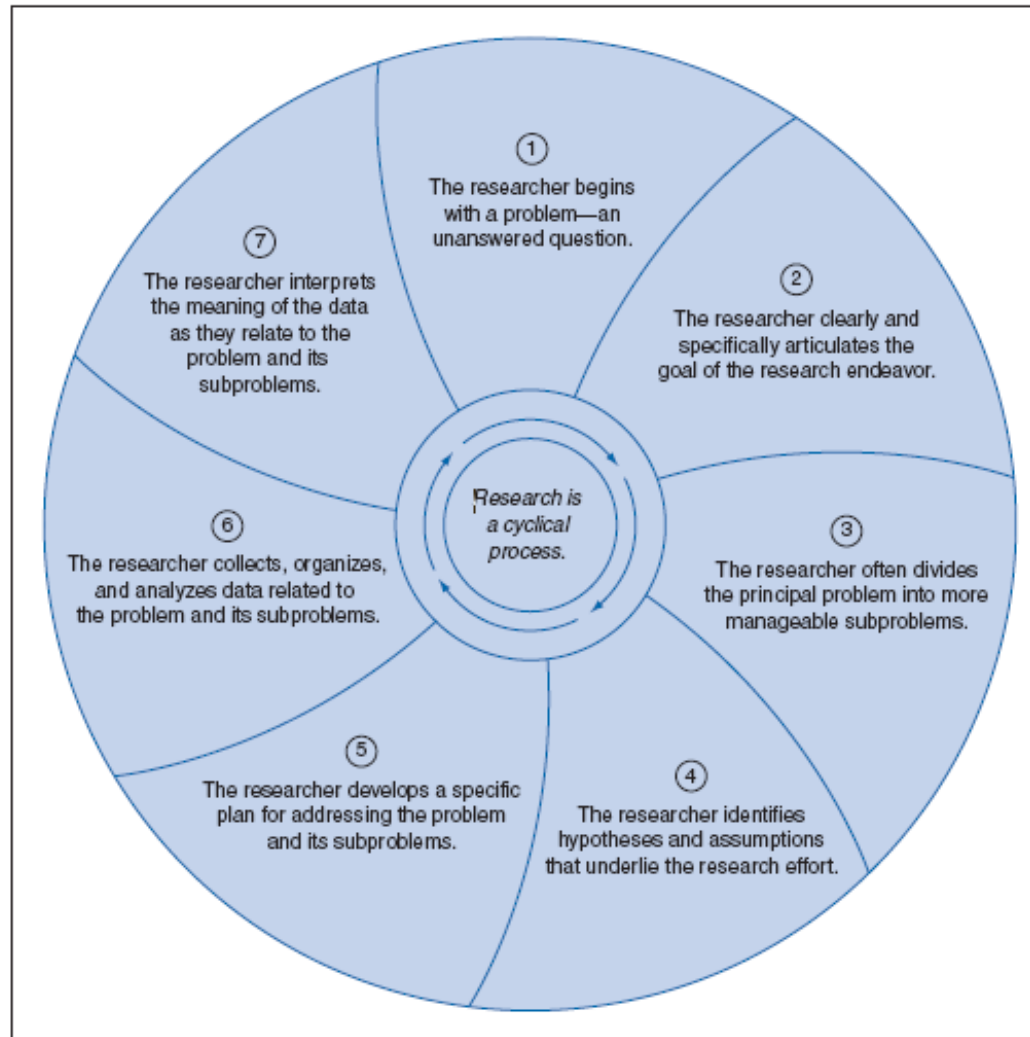


Google is an American multinational technology company specializing in Internet-related services and products. These include online advertising technologies, search, cloud computing, and software. Most of its profits are derived from Ad Words, an online advertising service that places advertising near the list of search results. Google was founded by Larry Page and Sergey Brin while they were Ph.D. students at Stanford University. Together they own about 14 percent of its shares but control 56 percent of the stockholder voting power through super voting stock.



Facebook is an online social networking service headquartered in Menlo Park, California. Its website was launched on February 4, 2004, by Mark Zuckerberg with his Harvard College roommates and fellow students Eduardo Saverin, Andrew McCollum, Dustin Moskovitz and Chris Hughes. The founders had initially limited the website's membership to Harvard students, but later expanded it to colleges in the Boston area, the Ivy League, and Stanford University

Research is a cyclical process



Iterative Steps

- Identify a question or problem
- Articulate a goal
- Divide the principal problem into more manageable subproblems
- Identify hypotheses and assumptions
- Develop a plan
- Collect, organize, and analyze data
- Interpret the data as they relate to the problem

Hypothesis

- A hypothesis is:
 - A logical supposition
 - A reasonable guess
 - An educated conjecture
- Provides a tentative explanation for a phenomenon under investigation
- May direct thinking to possible sources of information necessary to resolve the research problem and its subproblems

Assumption

- An assumption is: Condition that is taken for granted
- Two general assumptions that underlie most research projects:
 - The phenomenon under investigation is somewhat lawful and predictable.
 - Cause-and-effect relationships can account for certain patterns observed in the phenomenon.

Philosophical Orientations Toward Research

- Positivism
 - with appropriate measurement tools, scientists can objectively uncover absolute, undeniable truths about cause-and-effect relationships within the physical world and human experience.
- Postpositivism
 - true objectivity in seeking absolute truths can be an elusive goal
 - Rejection of the idea that **empiricist** observation of the natural sciences can be applied to the social sciences
 - **Tons of data, availability of tools and their knowledge and a aching desire of finding valuable outcomes is not enough.....**

Philosophical Orientations Toward Research

- Constructivism
 - no absolute truth — the “realities” researchers identify are simply perceptions and interpretations.
- Pragmatism/realism
 - absolute truths may actually exist—even if they are exceedingly difficult to discover.
 - human beings’ self-constructed beliefs about phenomena are legitimate objects of study in their own right.

Tools of Research

- Specific mechanisms or strategies used to collect, manipulate, or interpret data
 - The library and its resources
 - Computer technology
 - Measurement
 - Statistics
 - Language
 - The human mind
- Methodology dictates the tools the researcher selects

Library and Its Resources

- Access to books, microforms, CDs, DVDs, online databases
- Fast and efficient means of locating and accessing information
- Access to library holdings around the world

Computer Technology is Used for:

- Generating and organizing ideas
- Scheduling, structuring, and coordinating projects
- Finding literature
- Networking with others
- Storing and analyzing data
- Writing, editing, formatting
- Producing graphics
- Presenting results

Measurement

- Usually used in quantitative research
- More difficult for qualitative research
- Common instruments
 - Scales
 - Rulers
 - Stopwatches
- Specialized instruments
 - Telescope
 - MRI

Main Functions of Statistics

- Describe the data
 - Descriptive statistics summarize the general nature of the data obtained
- Draw inferences from the data
 - Inferential statistics help the researcher make decisions about the data

Language as a Tool

- Allows us to communicate and think more effectively
 - reduces complexity of the world
 - allows abstraction of the environment
 - enhances the power of thought
 - facilitates generalizations and drawing inferences

Communicating Effectively Through Writing

- Be specific and precise: Say exactly what you mean
- Keep your primary objective in mind at all times
- Provide an overview of what you will be discussing
- Organize ideas into categories by using headings and subheadings
- Use concrete examples to make abstract ideas more understandable

Communicating Effectively Through Writing

- Use figures and tables
- Regularly summarize what you've said
- Anticipate having to write multiple drafts
- Check your final draft
 - Grammar
 - Punctuation
 - Spelling

The Human Mind

- The most important tool in the researcher's toolbox
- Used for critical thinking
- Evaluates
 - Accuracy
 - credibility
 - worth of information
 - lines of reasoning

The Human Mind

- Evaluation may take a variety of forms:
 - verbal reasoning
 - argument analysis
 - probabilistic reasoning
 - decision making
 - hypothesis testing

The Human Mind

- Deductive logic
 - Begins with one or more premises, statements or assumptions that the researcher initially takes to be true
 - Valuable for generating research hypotheses and testing theories

The Human Mind

- Inductive reasoning
 - Begins with an observation (sample)
 - Observation then used to draw conclusions about entire classes of objects or events (population)

The Human Mind

- Scientific method
 - Process of collecting & analyzing data systematically
 - Involves thinking actively and intentionally
 - Yields hypotheses

The Human Mind

- Theory Building
 - An organized body of concepts and principles
 - Intended to explain a particular phenomenon

The Human Mind

- Collaboration with other minds
 - Increases variety of
 - Perspectives
 - Backgrounds
 - Areas of expertise
 - May reduce bias

Exploring Research in Your Field

- Juried (or *refereed*) research report
 - Judged by experts in the field and deemed to be of sufficient quality and importance to warrant publication.
- Nonjuried (or *nonrefereed*) report
 - Appears in a journal or on the Internet without having been reviewed or selected by experts.
 - Some nonjuried reports are excellent, but others may not be.