Building Your Data & Analytical Skill Set

Data and analytics are important skills to have in any industry because they enable you to support decisions with data, learn more about customers, and predict future trends. Here are seven skills for success and ways to develop them.

7 Data & Analytics Skills You Need

1. Critical Thinking

If you're interested in using data to solve business problems, you need to be adept at thinking critically about challenges and solutions. While data can provide many answers, it's nothing without a human's discerning eye.

"From the first steps of determining the quality of a data source to determining the success of an algorithm, critical thinking is at the heart of every decision data scientists—and those who work with them—make," Tingley says in the Harvard Online course Data Science Principles. "Data science is a discipline that's built on a foundation of critical thinking."

2. Hypothesis Formation and Testing

At the heart of data and analytics is the desire to answer questions. The proposed explanations for these leading questions are called **hypotheses**, which must be formed before analysis takes place.

An example of a hypothesis is, "I predict that a person's likelihood of recommending our product is directly proportional to their reported satisfaction with the product." You predict the data will show this trend and must prove or disprove the hypothesis through analysis. Without a hypothesis, your analysis has no clear direction.

3. Data Wrangling

Data wrangling is the process of cleaning raw data in preparation for analysis. It involves identifying and resolving mistakes, filling in missing data, and organizing and transferring it into an easily understandable format.

This is an important skill for anyone dealing with data to acquire because it leads to a more efficient and organized data analysis process. You can extract valuable insights from data more quickly when it's cleaned and in its optimal viewing format.

4. Mathematical Ability

You don't have to be a mathematician to become data literate, but strong math skills become increasingly important as you deal with more complex analyses.

A seasoned data professional needs a solid understanding of statistics, probability, linear algebra, and multivariable calculus. Data scientists often call on statistical methods to find structure in data and make predictions, and linear algebra and calculus can make machine-learning algorithms easier to comprehend.

If you're not a data scientist or analyst, your work may not require you to understand the more complex mathematical concepts, but having a basic understanding of statistics can go a long way.

5. Data Visualization

It's crucial to know how to transform raw data into compelling visuals that tell a story.
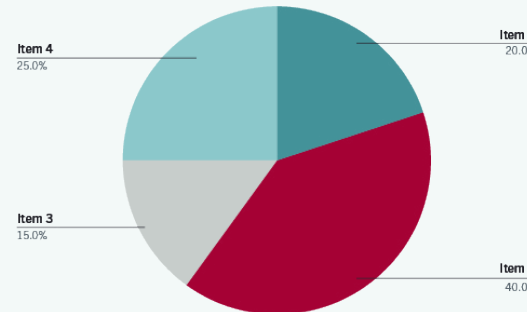
Rather than simply presenting a list of values to your stakeholders, it's more effective to visually communicate data in a way that's easily digestible. Some popular data visualization techniques that all business professionals should know include pie charts, bar charts, and histograms.

To create these visualizations, use a **data visualization tool**, a form of software designed to present data. Each tool's capabilities vary but, at their most basic, allow you to input a dataset and visually manipulate it. Most, but not all, come with built-in templates you can use to generate basic visualizations. Examples include Microsoft Excel and Power BI, Google Charts, Tableau, Zoho Analytics, Data Wrapper, and Infogram.
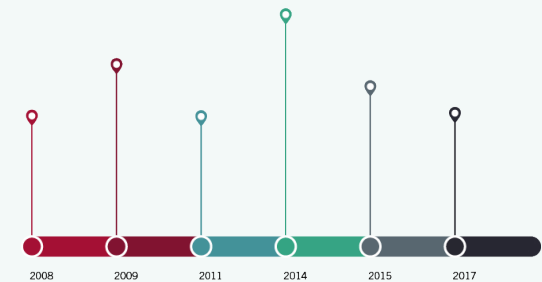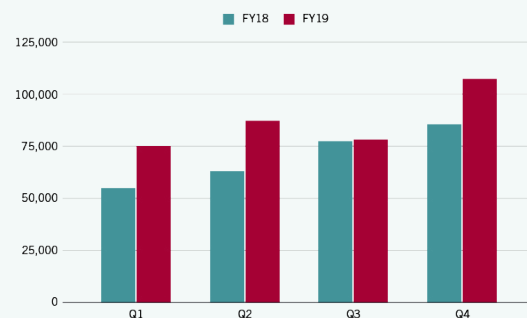
DATA VISUALIZATION TECHNIQUES

Pie Chart

Item 1
20.0%

Item 2
40.0%

Item 3
15.0%

Item 4
25.0%

Timeline

2008   2009   2011   2014   2015   2017

Bar Graph

FY18   FY19

125,000
100,000
75,000
50,000
25,000
0
Q1   Q2   Q3   Q4

Area Graph

2017   2018   2019

50,000
40,000
30,000
20,000
10,000
0
January   February   March   April   May   June   July
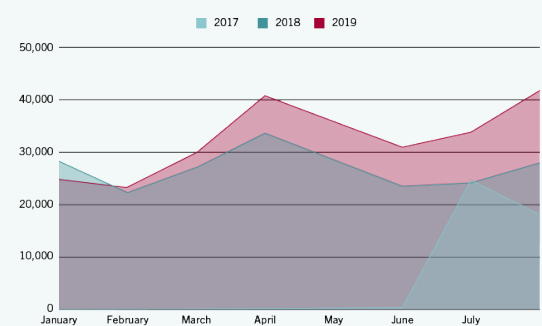
6. Programming

Programming languages, like Python and R, are commonly used to solve complex statistical problems with data. Proficiency in a database querying language, like SQL, can also help you more easily extract and change data in a database.

While programming skills are immensely valuable, they're not necessary for beginners dabbling in data. It's more important to focus on effectively analyzing and visualizing data to draw conclusions.

7. Machine Learning

As artificial intelligence grows in popularity, machine learning is a highly valuable skill for professionals working with big data.

Machine learning refers to the use of computer algorithms that automatically learn from and adapt in response to data. Some business applications of machine learning include risk management, performance analysis, trading, and automation.

Even if you're not responsible for writing code, knowing the basics of machine learning can help you gain a deeper understanding of your organization and boost efficiency through automation.

How to Improve Your Skills

1. Embrace the Challenge

The first step is to confront any mental barriers surrounding your ability to learn and develop data skills.

"Data science isn't scary, and it shouldn't be intimidating," says Professor Yael Grushka-Cockayne in the Harvard Online course Data Science for Business. "Combining your business know-how and intuition with data science can set you and your company up for success."

Although data science has a reputation for being code-based and complex, its concepts are accessible if you have the desire and drive to learn and put in the work.

"Some folks are under the impression that unless they were trained as a data scientist and have been coding for years, they don't stand a chance," Grushka-Cockayne says in a recorded webinar. "But that's not accurate. It's never too late."

2. Consider Opposing Viewpoints

While engaging with opposing viewpoints can help you expand your perspective, combat bias, and show your fellow employees their opinions are valued, it can also be a useful way to practice analytical skills.

When analyzing data, it's crucial to consider all possible interpretations and avoid getting stuck in one way of thinking.

For instance, imagine you track users who click a button on your site to download an e-book. The data shows that the user's age is positively correlated with their likelihood to click the button; as age increases, downloads increase. At first glance, you may interpret this trend to mean that a user downloads the e-book because of their age.

This conclusion doesn't take into consideration the variables that change with age. For instance, perhaps the real reason older users are more likely to download the e-book is their higher level of responsibility at work, average income, or likelihood of being parents.

This example illustrates the need to consider multiple interpretations of data, and it specifically shows the difference between **correlation** (the trending of two or more variables in the same direction) and **causation** (when a trend in one variable causes a trend to occur in one or more other variables).

To practice this skill, question your assumptions and ask others for their opinions. The more you actively engage with different viewpoints, the less likely you are to get stuck in a one-track mindset when analyzing data.

3. Play Games or Brain Teasers

If you're looking to sharpen your skills on a daily basis, there are many simple, enjoyable ways to do so.

Games, puzzles, and stories that require visualizing relationships between variables, examining situations from multiple angles, and drawing conclusions from known data points can help build the skills needed to analyze data. Some fun ways to practice analytical thinking include crossword puzzles, riddles, mystery novels, Sudoku, and logic puzzles.

These options can supplement your analytics coursework and on-the-job experience. Some also allow you to spend time with friends or family. Try engaging with one each day to hone your analytical mindset.

4. Learn From Real-World Examples

By exploring how other business professionals use data to solve problems, you can imagine what you'd do in their scenarios, evaluate the impact of their actions, and put that knowledge into practice.

Case-based learning is one of the foundations of HBS Online courses. Each offers several examples of business leaders at well-known organizations who used data to solve problems.

"You need to make it real," Grushka-Cockayne says in a recorded webinar. "You need to make it relevant and ask, 'Why do I care about this?' or 'Why do I want to look at a summary statistic?' or 'How is this going to be meaningful for a specific decision?' By exposing yourself to cases from various industries, the richness of the variety allows you to put yourself in a decision-maker's position and understand how actual decisions get made."

"I enjoyed how the principles in the course were grounded in concrete applications to the real world. I majored in engineering and minored in economics as an undergraduate, but the content showed me new ways for using the theoretical foundations I already had."

Carolina Ragolta
HBS Online Business Analytics Participant

5. Find a Community

On your path to learning data and analytics, a community of fellow professionals with the same goal can be a motivating, supportive force. You can turn to online forums, social media, affinity groups within your organization or geographic area, or a cohort of learners in an online class.

For instance, the <u>HBS Online Community</u> is a global network of learners dedicated to furthering their business education. Having this kind of community allows you to ask for feedback and advice, and engage with others on new concepts as you work toward goals.

6. Engage with and Ask Big Questions of Your Data

To engage with data further, ask questions. With each question comes an opportunity to uncover more insight and gain skills. These questions can lead you to learn a new coding language, analysis method, regression, or visualization tool to help solve a specific business problem. Here are examples of questions to ask yourself when handling data:

- *What am I hoping to understand?*
- *What do I need to know to make a certain business decision?*
- *What story is this data telling?*
- *What do the relationships between variables mean for _____ at my company?*
- *What if _____ changed? Which variables, trends, or forecasts would be impacted?*
- *What needs to change in the data to get the desired outcome?*
- *Why does the data trend in this direction, and what does it mean for the future?*
- *How can I further analyze the data to get the answers needed to make important decisions?*

Make the data work for you by determining what you need to know and the best way to answer questions using available data. Improving your data and analytical skills is an ongoing process, and each experience offers a chance to learn more.