



Lesson 4: Big Data Unlocked - What Every Youth Should Know

Target group: 15–17-year-old secondary students in Africa

Key Learning Outcomes

By the end of this lesson, you should be able to:

1. Explain what big data is.
2. List the main characteristics of big data.
3. Identify career opportunities in big data.

1. Introduction

Back to Lesson 1, you came out of class for a lunch break and noticed security cameras, erected all over the school area, variously recording students as they run, walk, laugh, fight, etc. The recordings are taking place continuously, capturing when students walk into class, when they go out for breaks, when they go for sports, and when they walk home after lessons. The cameras record not only students but also staff, school suppliers, and parents, as well as changes in the environment like sunny, cloudy, or rainy weather, and even birds flying into the compound.

To your surprise, your school integrates these recordings with other information: students' enrolment data, exam performance, and participation in extracurricular activities. By the end of the term, the cameras and other sources have captured an enormous amount of data.

Why would your school bother with all this data? Behind this enormous data are patterns that can provide valuable information. This information can help improve students' performance, enhance school security, protect property, boost enrolment, or create new training programs. But to achieve this, the data must be stored, processed and analyzed. Traditional computers cannot handle such massive amounts of data, and this challenge has led to the concept of 'big data.'

2. Big Data

By definition, big data refers to extremely large and diverse collections of data that continue to grow exponentially over time. These data sets are so huge and complex that traditional data management systems cannot store, process, or analyze them effectively.

3. Main Characteristics of Big Data

a) Volume

Volume describes the enormous amount of data available for collection, produced continuously from a variety of sources. In our example, it refers to recordings of students in different activities and emotions, at different times, enrolments into the school, as well as students' marks from various classes and exams.

b) Velocity

Velocity refers to the speed at which data is generated. For instance, cameras capture recordings every second, and exam data or enrolment data is continuously added.

c) Variety

Variety refers to the many forms of data collected. In our example: recordings from cameras are unstructured data, students' marks from classes are structured data, and enrolment records with names, passport photos, and registration numbers are semi-structured data.

4. Benefits of Big Data

- Improved decision-making
- Increased chances for innovation
- Better customer (or student) experiences
- Improved risk management

5. Career Opportunities in Big Data

Big data has created some of the most highly sought-after jobs in the world. Below are the core careers, additional careers and emerging careers in big data.

a) Core Careers

1. Data Scientist

- Designs experiments and models to analyze data.
- Uses programming, statistics, and machine learning.
- Helps businesses/government/ predict trends and make smarter decisions.

2. Data Analyst

- Collects, organizes, and interprets data.
- Prepares reports, charts, and summaries.
- Often the "translator" of data into everyday language for managers.

3. Data Engineer

- Builds and maintains systems that store and move data.
- Works with large databases, cloud storage, and pipelines.
- Ensures data is available, clean, and ready for analysis.

b) Additional Career opportunities in big data

1. Database Administrator

- Manages databases to make sure they are secure and efficient.
- Handles backups and prevents data loss.

2. Business Intelligence Analyst

- Uses data to help businesses improve operations and profits.
- Creates dashboards and reports for decision-makers.

3. Machine Learning Engineer

- Develops AI systems that learn from big data.
- Builds algorithms that can predict or automate tasks (like chatbots).

4. Cloud Data Architect

- Designs systems that store and process data in the cloud (e.g. Google Cloud).

- Helps organizations scale data usage without huge costs.

c) Emerging Careers in big data

1. 'Internet of all Things' Data Specialist

- Works with data from devices like sensors, cameras, and smart machines.
- Common in agriculture, health, and transport in Africa.

2. Cyber-security Data Analyst

- Uses big data to detect and stop fraud, hacking, and cybercrime.
- Critical for banks, telecoms, and governments.

3. Big Data Consultant/Entrepreneur

- Advises schools, hospitals, or businesses on how to use data effectively.
- Can start small firms that offer data services locally.

These professionals play a key role in analyzing, managing, and applying big data.

6. Conclusion

In this lesson, you have learned that:

1. Big data refers to extremely large and complex data sets that grow continuously.
2. The main characteristics of big data are volume, velocity, and variety.
3. Careers in big data such as data scientists, analysts, and engineers provide great opportunities for the future.

Big data is shaping the way schools, organizations, businesses, industry and governments make decisions, and it is opening new paths for young people like you.