

Innovation, Science and Technology

Have you ever used a ride-sharing app such as Uber, Pogo, TappCar, or Lyft? Uber launched in Edmonton in 2014. Did you know that ride-sharing has been common in many African countries for decades? In fact, the first ride-sharing app was inspired by public transport in Zimbabwe.

Many of the technologies that we use today originated in Africa. Just as people have migrated, so have these technologies. In this module, you will learn about ride-sharing, mobile money, and the Mpemba effect.

Here is a list of activities you will work on:

- KWL Chart
- Reading
- Listening / Video
- Activity
- Summary

KWL Chart

K	W	L
What I know about African technology and innovation	What I want to know about African technology and innovation	What I learned about African technology and innovation

Reading

1. Ride-sharing¹

In 2005, Logan Green took a trip to Zimbabwe and saw what he described as "ad-hoc carpools", where an entrepreneur would form a transit route using their personal vehicle and charge passengers he picked up along the road market rates for a ride.

What he observed are known in Zimbabwe as *combis* or *commuter omnibuses*. Based on this inspiration, in 2007 Logan Green and John Zimmer founded ZimRide. The first version of ZimRide was launched at Cornell University.

In 2012, the idea of ZimRide evolved, and the co-founders wanted to create a mobile version of ZimRide, called ZimRide Instant. They later changed the name to Lyft. According to Logan Green, the original vision for ZimRide and Lyft was that "you can go outside and find an empty seat in cars that are going the same direction as you, and just hop on".¹

In 2013, ZimRide was sold to Enterprise Holdings, and the founders decided to focus on Lyft. ZimRide allows you to log into your university or corporation's network and search for rides going the same direction you would like to go. It only operates in the USA.²

Lyft has been described as "the most disruptive, life changing, routine changing economic changing thing to come along in a long time" and one of the kings of the ridesharing industry.³ Following ZimRide, several ridesharing companies have emerged - the most popular being Uber. Pogo and TappCar are examples you might have seen in Edmonton.

Commuter omnibuses are commonly used throughout Africa. They are known as *taxis* in South Africa, *taxi-bus* in Cameroon, *shared taxis* or '100-100' in Congo, *matatus* in Kenya and Uganda, *aluguer* in Cape Verde and *minibuses* or *chapas* in Mozambique.

¹ <http://www.businessinsider.com/interview-lyft-cofounder-logan-green-2014-4>



Kombis at a terminus in Zimbabwe

(<https://www.newsday.co.zw/wp-content/uploads/2013/04/kombi-congegestion.jpg>)



TappCar in Edmonton (<http://www.tappcar.com/>)

2. Mpemba Effect

The Mpemba effect is the fact that in some circumstances, hot water may freeze faster than cold water. The effect is named after Tanzanian, Erasto Mpemba. He described it in 1963 when he was in Form 3, which is the same as grade 10, at Magamba Secondary School. During a cookery class, he was freezing ice cream mix when he noticed that the hot mix froze before the cold mix. He later became a student at Mkwawa Secondary (formerly High) School in Iringa.

The school's headmaster invited Dr. Denis G. Osborne from the University College in Dar es Salaam to give a lecture on physics. After the lecture, Erasto Mpemba asked him the question "If you take two similar containers with equal volumes of water, one at 35 °C (95 °F) and the other at 100 °C (212 °F), and put them into a freezer, the one that started at 100 °C (212 °F) freezes first.

Why?". He was ridiculed by his classmates and teacher for asking this question. Osborne experimented on the issue back at his workplace and confirmed Mpemba's finding. They published the results together years later in 1969, while Mpemba was studying at the College of African Wildlife Management.

Mpemba's observation and publication echoed a statement by Aristotle in 350 BC, but it was the first time this had been scientifically proven.

"The fact that the water has previously been warmed contributes to its freezing quickly: for so it cools sooner"

Aristotle (350 BC)

"If two systems are cooled, the water that starts hotter may freeze first".

Mpemba & Osborne (1969)



Mpemba Effect²

² <http://www.funaze.com/mpemba-effect-boiling-water-freezes-faster-than-ambient-temperature-water/>

3. Mobile Money³

Have you ever used Interac to make a payment or send money using your phone? Or have you ever used Apple Pay, Google Wallet or Android Pay? These are relatively new developments in e-commerce that allow people to complete transactions. Many countries in Africa have been using mobile money for over a decade. In the following paragraphs, you will learn about M-Pesa, a mobile phone-based payment and money transfer service.

In 2002, researchers documented that people in Uganda, Botswana and Ghana were using airtime (cellphone credit) as a proxy for money. They would send airtime to friends or relatives, who were then reselling it. Thereafter, several companies looked into linking mobile phones with bank accounts. In 2005, a student from Moi University in Kenya came up with a mobile software that could allow people to send, receive, and withdraw money using their mobile devices. The rights were bought by Safaricom, a communications company in Kenya. In April, 2007, following a student software development project from Kenya, Safaricom launched a new mobile phone-based payment and money transfer service known as M-Pesa. *M* stands for mobile, and *pesa* means money in Swahili, a language spoken in Kenya.

Since 2007, M-Pesa has grown both within Africa and internationally. Today there are 30 million users in 10 countries and a range of services including international transfers, loans, and health provision. The system processed around 6 billion transactions in 2016 at a peak rate of 529 per second.

M-Pesa allows users to complete the following transactions on their phone using an SMS-like platform.

- deposit and withdraw money
- transfer money to other users
- pay bills
- purchase airtime and
- transfer money between the service and, in some markets like Kenya, a bank account

M-Pesa around the world: Launch dates



Listening/Video

Watch these videos to learn more about the Mpemba effect:

<https://www.youtube.com/watch?v=djwPAfVrrks>

Mpemba talking about his discovery:

<https://www.youtube.com/watch?v=dOAUdJROSIo>

Experiment: Mpemba effect experiment to try at home

Make 2 trays of ice cubes. Use hot water for one and room temperature water for the other. Observe which tray freezes first.

Summary

Many scientific and technological advances that we take for granted today have been used for several years in Africa. As people have migrated and travelled between Africa and the rest of the world, these ideas have migrated with them. What other technologies can you think of that originated in Africa?

References

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5. https://en.wikipedia.org/wiki/Mpemba_effect
6. <https://www.brandsouthafrica.com/investments-immigration/africa-gateway/m-pesa-10-africa-become-leader-mobile-money>
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