Outline:

Use selected on-line articles to explore current issues related to crypto currencies such as BitCoin. A focus for learning is: the underlying technologies, impacts on society, and impacts on the environment.

Objectives:

* C1.4 describe how electronic access to information influences our everyday lives.
* C2.1 describe the negative effects of computers and computer use on the environment.
* C3.1 describe legal and ethical issues related to the use of computers.

**Level 1: Cryptocurrencies & Blockchains**

Read the following resources before answering the questions below:

* <https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/>
* <https://www.investopedia.com/terms/b/blockchain.asp>
* <https://www.cryptoandgamers.com/>

1. What is a  “cryptocurrency” and how are “cryptocurrencies” different from traditional currencies (money)?

A crypto currency is virtual or digital money in the forms of tokens or “coins”. Unlike traditional currencies, cryptocurrenices are almost always designed to be free from government manipulation and control.

2. BitCoin is the leading cryptocurrency that most people know. What are some other cryptocurrencies and what are their unique features?

Litecoin- launched in 2011, not controlled by any central authority, is based on an open source global payment network

Ethereum- launched in 2015, enables Smart Contracts and Apps to be built and run without any downtime, fraud, control, or interference from a third party.

Zcash- open source of cryptocurrency, offers privacy and selective transparency of transactions, claims to provide extra privacy

Dash-  launched in 2014, a more secretive version of bitcoin, offers anonymity and makes transactions almost untraceable

3. “Blockchains” are the basic technology behind cryptocurrencies and other emerging technologies. Explain blockchains work with respect to:

* 1. What they store
* Blocks store information about transactions like the data, time, and dollar amount of your most recent purchase.
* Information about who is participating in transactions (using digital signatures kind of like a username)
* Information that distinguishes them from other blocks (unique codes)
  1. How they work

A transaction must occur. Then, that transaction must be verified. What this means is, networks of computers check your transaction to see if it happened the way you said it did. This includes the time, participants, and dollar amount of the purchase. Next, all the information to do with the transaction is stored in a block. There, the transaction joins others like it. Then, the block is given a unique code called a hash which identifies the transaction. Once hashed, the block is added to the blockchain. Then, it becomes publicly available for anyone to view.

* 1. How they are secure and private

You would not have access to identifying information about the users making transactions. Although transactions on a blockchain are not completely anonymous, personal information about users is limited to their digital signature or username. Additionally, since any user can connect their computers to the blockchain network, there are hundreds and thousands of copies. Even though each copy is identical, spreading that information across a network of computers makes it hard to manipulate for hackers.

* 1. How they use public and private encryption keys

There is no central database that keeps track of a blockchain network’s private keys. If a user misplaces their private key, they will lose access.

4. How does BitCoin use blockchains?

When it comes to printed money, the use is regulated and verified by a central

authority but Bitcoin is not controlled by anyone. Instead, transactions

made in Bitcoin are verified by a network of computers:

“When one person pays another for goods using Bitcoin, computers on the Bitcoin network race to verify the transaction. In order to do so, users run a program on their computers and try to solve a complex mathematical problem, called a “hash.” When a computer solves the problem by “hashing” a block, its algorithmic work will have also verified the block’s transactions. The completed transaction is publicly recorded and stored as a block on the blockchain, at which point it becomes unalterable. In the case of Bitcoin, and most other blockchains, computers that successfully verify blocks are rewarded for their labor with cryptocurrency.”(Blockchain, Explained)

5. What are some other real-world applications of blockchains?

Blockchain is a reliable way of storing data about many types of transactions. Blockchain

technology can be used to store data about property exchanges, stops in a supply chain, and

votes for a candidate. That being said, blockchains would be beneficial if applied in banks as its

users would be able to make transactions in a quicker, possibly more efficient way. Additionally,

healthcare professionals could use blockchains to secure patient data. Another example could

be the use of blockchains for property records or voting.

6. What are some advantages and disadvantages of blockchains?

Advantages:

* Accuracy; info approved by network not humans, thus less error.
* Cost; no transactions fee for third party like a bank
* Decentralization; info is spread on network of computers not one central location
* Efficiency; blockchain is available at all times whereas business close at certain days and times
* Privacy; not completely anonymous but still confidential
* Security; authenticity of transactions are verified by the blockchain

Disadvantages

* Cost; vast amounts of computational power needed
* Inefficiency; some blockchains like Bitcoin take ten minutes to upload a new block, which gives the estimate that the network can only manage 7 transactions per second
* Confidentiality may allow for illegal trading
* Several banks have launched investigations into digital currencies
* Hacker attacks are likely to increase based on NYU study

7. Blockchain based games are the latest development in the gaming industry. Research the topic “Crypto Games” (google) to answer the following questions.

* 1. What are some interesting Crypto Games available for Android or iPhone?
* Alien run(Apple and Android)
* Blockchain Game( Apple and Android)
* Abundance (Apple and Android)
* The Crypto Games; Bitcoin (Apple)
  1. How are they different from conventional games?

These games are played to earn bitcoins.

**Level 2: Bitcoin & Society**

Read the following resources before answering the questions below:

* <https://www.cnet.com/how-to/what-is-bitcoin/>
* <https://www.independent.co.uk/life-style/gadgets-and-tech/news/bitcoin-price-fall-criminals-blockchain-anonymous-cryptocurrency-zcash-monero-dash-a8174716.html>
* <https://coincenter.org/link/why-ransomware-criminals-use-bitcoin-and-why-that-could-be-their-undoing>

1. Who created BitCoin and who owns BitCoin now?

Bitcoin was invented by a person who called himself Satoshi Nakamoto in 2009. He turend it over to others in the bitcoin community and vanished in 2011.

1. How is BitCoin created and what is "BitCoin Mining"?

Bitcoin is a digital currency, there is no authority that controls it. It isn’t issued from the top down, it is “mined” by powerful computers connected to the internet. A person mines bitcoin by doing advanced math and record keeping. When someone sends a bitcoin to someone else, the network records that transaction using blockchain.

1. Can you buy BitCoin and what does it cost?

Yes, the value of bitcoin is determined by what people are willing to pay for it. There are 21 million bitcoins that can possibly be mined, and 12 million have already been mined so far. Since there is no central authority the value is open to interpretation. Currently, it is worth $5131.59 Canadian Dollars.

1. Why would you want to buy BitCoin and what can you use it for?

You can use it to buy things from more than 100,000 merchants, sell it, or hang on to it.

1. What are the risks of using BitCoin?

The main risk is that the financial value of a bitcoin can swing wildly from day-to-day. Also, bitcoin transactions cannot be traced back to individuals, which comes with the drawbacks of never being certain who you are buying from or selling to. Finally, theft is also a risk. There are no refunds, a transaction is final once it is in the blockchain.

1. How much of BitCoin business is related to criminal activity?

Almost half (44%) of all bitcoin transactions are associated with illegal activity and 25% users are associated with illegal activity.

1. What are some of the reasons why criminals use BitCoin?

Hacks, money laundering (altering), trading drugs, and illegal pornography.

1. What are some of the disadvantages of BitCoin when used for criminal activity?

It isn’t completely anonymous as every transaction is recorded on the blockchain. Researchers claim that it is possible to use this information to identify specific individuals. The same study claims that techniques have been developed that can be used in surveillance and monitoring trends in illegal activity.

1. Many people dislike BitCoin because they think it is only good for criminal activity. Is this true? Write a supported opinion paragraph (SOP) to explain your position.

Although it is possible for there to be users on Bitcoin with no intention of committing crime, it is very unlikely. The reality is that Bitcoin is mainly useful to those with intention of committing crime. First of all, nearly half of all bitcoin transactions are found to be associated with illegal activity. Evidently, many users are taking advantage of the anonymity feature that is provided through Bitcoin. Researchers have linked a quarter of bitcoin users with crime, such as hacks, money laundering and the trading of drugs and illegal pornography. Thus, such features are much more useful to those who want to hide their transactions rather than the general public. Secondly, researchers also believe that the popularity of the cryptocurrency amongst criminals is a major contributor to its value. If criminals did not use Bitcoin, it would not be of any use at all to regular users. Criminals are the foundation of Bitcoin’s purpose and use. In conclusion, Bitcoin is only good for criminal activity as it it less of an investment, and more useful to those wanting to keep anonymity during illegal transactions.  
Guidelines for writing a supported opinion paragraph (SOP)

* <http://schools.peelschools.org/sec/fletchersmeadow/studentlife/OSSLTprep/Documents/Sample_%20Writing%20a%20Supported%20opinion%20paragraph.pdf>

**Level 3: Bitcoin & The Environment**

Read the following resources before answering the questions below:

· <https://www.cbc.ca/news/business/bitcoin-electricity-1.4668768>

· <https://www.cbc.ca/news/business/hut8-medicine-hat-bitcoin-mining-1.4834027>

1. What is a BitCoin “miner” and why are people concerned about BitCoin mining?

Computers hashing for bitcoins are known as miners. People are concerned about bitcoin mining because it uses a lot of electricity

2. Why does BitCoin mining use so much energy?

“In the early days, it was comparatively easy to find a bitcoin, as there were fewer miners competing for the work. Mining could be done by hobbyists using personal computers. But as the digital currency's popularity — and value — has skyrocketed, the increased complexity of the blockchain requires more energy and computing power to solve equations, and now there are specialized computing farms mining for bitcoin.” (Evans 2018)

3. Why has Hut-8 decided to locate its facility in Alberta when its head office is in Toronto? What does the city of Medicine Hat provide that is required for mining BitCoin?

Medicine Hat offers low cost energy that Hut-8 needs to run their bitcoin mining facility as Hut-8 needs reliable, large amounts of non renewable energy.

4. What benefits does the city of Medicine Hat expect to see from this BitCoin facility?

“Medicine Hat owns its own natural gas and electricity generation and distribution businesses. The city leases the land to Hut 8 and the facility employs 40 full-time workers. Add up the economic benefits and the city of Medicine Hat will receive a significant financial boost from the new project, says Ted Clugston, the city's mayor.”

5. What concern does the city of Medicine Hat have about from this Bitcoin facility?

The city is mainly concerned for environmental impacts as well as long-term purpose. Some argue that the facility will lead to blackouts for residents and others argue that Alberta does not need bitcoins at all as the environmental impacts are too harmful.

6. What concern do environmentalists have about the Medicine Hat facility and about BitCoin mining in general? E.g. how does BitCoin mining harm the environment?

Environmental groups are concerned for the amount of energy consumed by

bitcoin mining in places like Medicine Hat where most of the electricity is

produced by fossil fuels.

7. If Hut-8 wanted to build a facility in Brampton, would be in favor of this proposal. Write a SOP to justify your position.

Although it is arguable that such a facility would be beneficial in terms of job openings as well as economic benefits, the environmental impacts are too large to ignore. Along with the massive amounts of electricity needed, such a facility would require energy that is can only be provided by fossil fuels as they are more reliable than renewable energy. Gas emissions from such fossil fuels are obviously quite harmful to the environment. In addition, such harmful effects would only increase with time. This is because over time, as more miners compete for a decreasing number of available bitcoins, facilities will have to use more electricity. Evidently, this is a facility that would be more harmful than useful as time would progress. Therefore, I would not be in favour of this proposal due to the given environmental effects, as well as the increasing use of electricity required over time.