

# TRENDS, NETWORKS, AND CRITICAL THINKING IN THE 21<sup>ST</sup> CENTURY CULTURE

Name of Learner: \_\_\_\_\_ Grade Level: \_\_\_\_\_  
Section: \_\_\_\_\_ Date: \_\_\_\_\_

## LEARNING ACTIVITY SHEET

### Differences of Networks, Connections, and Relationships

#### Background Information for Learners

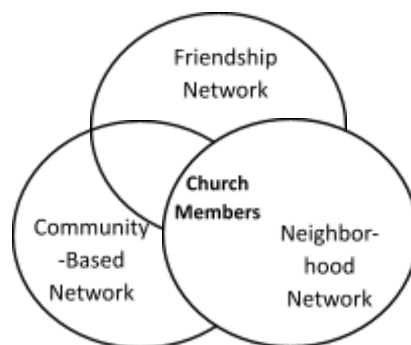
Each of us is connected in one way or another to different groups or contacts because of the significant developments in the fields of communication and transportation. Because of the links that technology has created into each of our lives, it is inevitable that our actions can now influence those around us. An action or activity of an individual can affect those in other parts of the globe. Hence, social relations link each of us to a particular group and these relations that connect us with others can produce diverse consequences.

Scientific evidence shows that involvement in social relationships and social ties benefits mental health, physical health and health behavior. These studies consistently show that individuals with the lowest level of involvement in social relationships are more likely to die than those with greater involvement (House, Landis, and Umberson 1988). Other studies would reveal that this brings significant difference in quality of life with different marital status, living state, frequency contact and social support from their families, social workers, neighbors, friends. The interviews reveal how the social relations affect the quality of life. The main effects are as follows: 1) Favorable family relationship is very important to improve the quality of life by the material and spiritual supports from families. 2) In the senior club the social workers can enrich their spiritual life. 3) The harmonious social relationships with neighbors and friends have a positive influence on the quality of life, because of the increased social contact and the sharing of knowledge. (Y.Gin et al, 2017)

#### What are the differences between networks, connections and relationships?

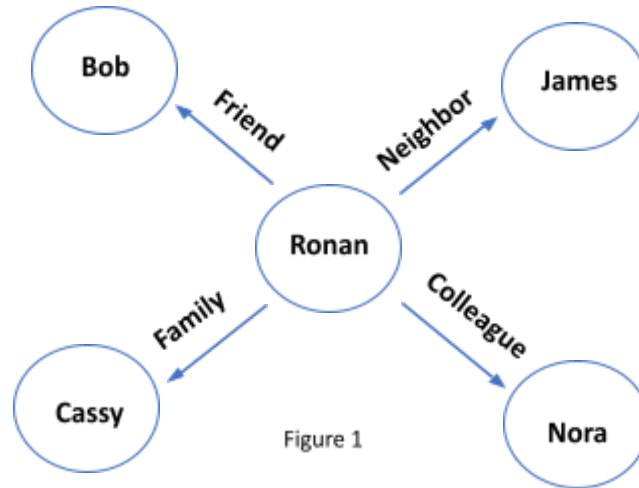
**A. Networks** – a set of units like nerves, species, individuals, institutions or states, and a rule that determines the “magnitude, and/or direction of ties” that exist between any two social entities or nodes. (Zeev Maoz, 2011, 38-39). It shows the relations that exist between nodes. In Social science, it refers to a group of interdependent actors and the relationship between them which might be people, families, organizations, states, or a mixture of individuals and groups.

*Example*, a group of persons in a church organization maybe a member of different networks like a friendship network, neighborhood network or community – based network (Maoz, 2011, 40).



## Two Types of Networks

- 1. Relational Networks.** One-mode networks that are characterized by rules that determine the presence, direction, and extent of a relationship between any two units. *Examples: family, neighborhood, friendship, alliance, or trade networks*



- 2. Affiliation Networks.** The rule determines an affiliation of a unit with an event, organization, or group. *Examples: membership in a professional organization, national membership in international organizations, or the distribution different provincial population based on their religion or ethnic affiliations.*

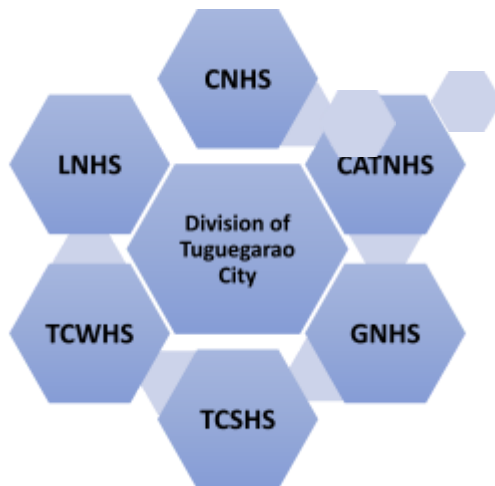


Figure 2

In understanding networks, it is imperative to understand the connections among social units including the effects or outcomes associated with these connections. The “social units” referred to in this context are called actors. Actors are defined as “discrete individual or collective social units.” The term connotes a social unit that is playing a role in a larger system. In Figure 2, it shows to whom the focal actor or ego. These social units to whom ego is directly connected or linked. This ego network shows the direct ties that exist between the *alters* (social units to whom the ego is connected) known as first-order ego net. Figure 3, shows the second – order egonet which contains a more complicated web of ties made up of both direct and indirect connections (Maoz, 2011).



Figure 3

Photo taken from <https://www.lyon.edu/networking>

- B. **Connections** – a relationship in which a person, thing, or idea is linked or associated with something else. It illustrates what links the actors or social units to one another. The range of connections or ties that link two actors are wide-ranging.

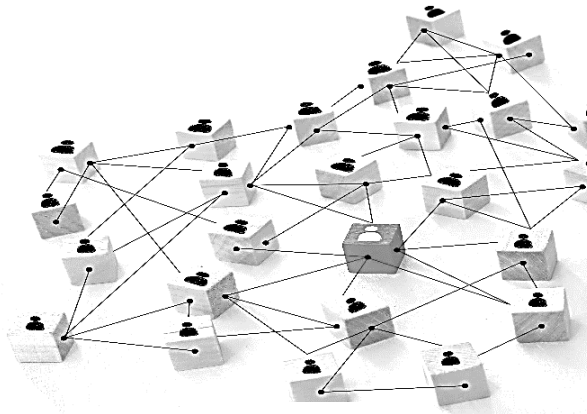
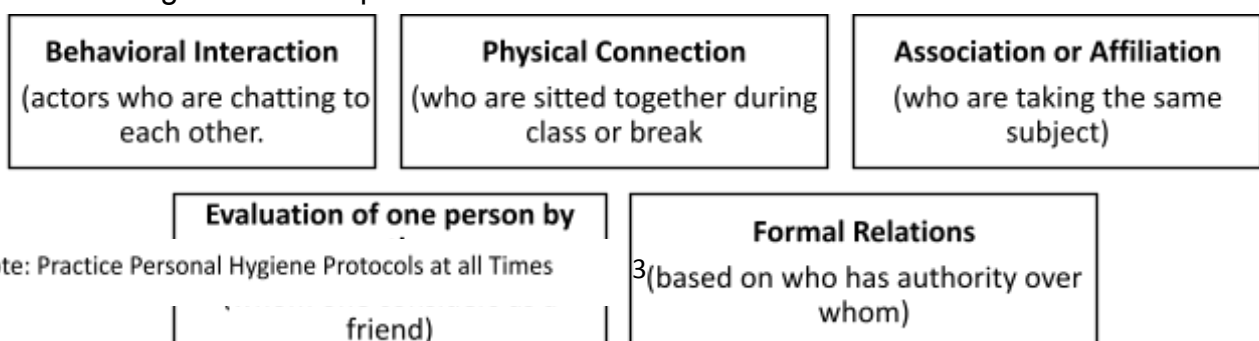


Figure 4

Photo taken from <https://www.dailymaverick.co.za/article/2019-07-31-relationships-the-meaning-of-connections/>

Whether we are dating, making friends, meeting someone for business or simply looking for a doctor, we often look for that connection – one that makes us feel safe and on which we hope to build a long-lasting relationship. When we want to connect with someone, we seek similarities and understandings of each other on many levels: physical, intellectual, sexual, cultural, spiritual and emotional.

Example of connections that can be used to show ties among actors using school set-up includes:



Note: Practice Personal Hygiene Protocols at all Times

- C. **Relationships** – refers to “a collection of ties of a specific kind measured on pairs of actors” from a particular group of social entities. (Carolan, 2014, 6). A single group of actors or social entity can have several different forms of relationships. *Example:* Studying the connection of teenage pregnancy to poor parenting and broken homes, relationship of Covid-19 pandemic to Philippine economy, environment, social relations and mental health.

**Networking** is about knowing more people. We connect with them to create social ties in which relationships between actors or social units can vary from close ties – such as those within a family – to occasional impersonal or mediated interactions. **Connecting** is about knowing people more. You may meet and know a lot of people socially and professionally but not deeply connected with them and have no part in their successes or failures in life. Connecting to people is somewhat associated with building a community that has a **relationship** built on mutual trust and respect. **Relationship** or close connection that is being developed because of the recurring interactions among individuals or social entities.

#### Learning Competency with Code:

Differentiate connections from relationship and networks.

**HUMSS\_MCT12-Ilg-i-1 (Quarter 2 – Week 6)**

#### Activity 1: CONNECT ME!

**Directions:** Match Column A to Column B and write your answer on the space before each item.

#### COLUMN A

- \_\_\_1. Philippine membership to ASEAN.
- \_\_\_2. Relations that exist between and among social entities.
- \_\_\_3. Benefits mental and physical health.
- \_\_\_4. Individual or collective social units.
- \_\_\_5. Indirect connections with the social units.
- \_\_\_6. Actors having a conversation with each other.
- \_\_\_7. One-mode networks characterized by rules.
- \_\_\_8. Direct connections with the social units.
- \_\_\_9. Close connection developed through recurring human interactions.
- \_\_\_10. Connections based usually on authority.

#### COLUMN B

- First-order ego net
- Formal relations
- Relationship
- Connection
- Second-order ego net
- Actors
- Relational Network
- Behavioral interaction
- Network
- Affiliational Network
- Social relations

**Activity 2: STOP, LOOK, EXPLORE**

**Directions:** Fill in the boxes with key ideas and examples of the following terminologies under the first column.

| TERMINOLOGIES | KEY IDEAS | EXAMPLES |
|---------------|-----------|----------|
| NETWORK       |           |          |
| CONNECTIONS   |           |          |
| RELATIONSHIPS |           |          |

**Activity 3: THINKING OUT LOUD!**

Question:

1. How important is network, relationship and connections in this time of COVID 19 pandemic? Cite a scenario or situation to show the interplay of the three terms. Explain briefly

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2. Is building connections better than networking? Explain your answer in three sentences only.

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### Activity 4: My Community Network!

Directions: Identify a particular network in your community (town, city or barangay) in which you are part of. Create a social map or matrix that traces your role and participation in the community network. The matrix must (1) identify the significant role you play in the community network; (2) show your relationship with the different members of the network.

Explain the social map or matrix by writing a short essay or reflection paper.

Rubric for Activity 4.

| Criteria                                   | Excellent  | Very Good  | Good   | Needs Improvement  | Poor  |
|--|--|--|--|--|---|
| Content & Clarity of the matrix            | With holistic and complete picture of the community network.<br><br>Shows the significant roles of the student and the relationship to the members of the network. | Shows clearly all the significant roles the student play within the community network. | Shows clearly some of the significant roles the student play within the community network. | Shows only one to two significant roles the student play within the community network. | Did not contain any information about the significant roles the student play. |
| Effort/ Perseverance                       | The effort exerted on output is beyond what is required.   | With effort but somewhat incomplete  | Choose an easy task and did it indifferently.  | Completed with minimum effort.   | Did not finish the work adequately and accurately.                            |
| Creativity and Visual Appeal of the matrix | Matrix is neatly and patiently done.<br>Creativity   | Matrix is neatly done but manifests  | The output shows average amount of creativity  | The output shows below average amount of   | The output shows no creativity  |

|  |                         |                     |                    |                               |                    |
|--|-------------------------|---------------------|--------------------|-------------------------------|--------------------|
|  | was perfectly observed. | limited creativity. | and visual appeal. | creativity and visual appeal. | and visual appeal. |
|--|-------------------------|---------------------|--------------------|-------------------------------|--------------------|

(Source: Dela Cruz et. al, 2017. *Trends, Networks, and Critical Thinking in the 21<sup>st</sup> Century Culture.*, Quezon City: Phoenix Publishing House, Inc.)

**Reflection**

1. *I learned that*

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2. *I enjoyed most on*

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3. *I want to learn more on*

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**References for Learners**

**Books**

Dela Cruz et. al, 2017. *Trends, Networks, and Critical Thinking in the 21<sup>st</sup> Century Culture.* 927 Quezon Ave., Quezon City: Phoenix Publishing House, Inc.

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<https://doi.org/10.1177/0022146510383501>

<https://www.dailymaverick.co.za/article/2019-07-31-relationships-the-meaning-of-connections/>

**Answer Key**

Activity 1

- |      |      |
|------|------|
| 1. J | 6. H |
| 2. I | 7. G |
| 3. K | 8. A |
| 4. F | 9. C |

Activity 2: Answers may vary

Activity 3: Answers may vary

5. E

10. B

  
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## TRENDS, NETWORKS, AND CRITICAL THINKING IN THE 21<sup>ST</sup> CENTURY CULTURE

Name of Learner: \_\_\_\_\_ Grade Level: \_\_\_\_\_  
Section: \_\_\_\_\_ Date: \_\_\_\_\_

### LEARNING ACTIVITY SHEET The Brain as a Neural Network

#### Background Information for Learners

Technology and the brain are closely related these days. Modern computer applications take into account the features of human brains and the human brains take into account the features of technologies. Neural network is a model inspired by how the brain works. It is widely used today in many applications: when your phone interprets and understand your voice commands, it is likely that a neural network is helping to understand your speech; when you cash a check, the machines that automatically read the digits also use neural networks.

In the last century, technology has been progressing exponentially and has brought us to a point where that dream of self-aware robots is no longer associated with magic. The creation of *Artificial Intelligence* has allowed us to create amazing programs that can far surpass the abilities of any human.

The key advancement in the field of artificial intelligence that allowed us to do amazing things like creating chat-bots and detect malignant tumors was the discovery of **neural networks**. Before this, programmers created relatively simple regression models to predict and classify data. However, these models had their limitations (Jain, 2019).

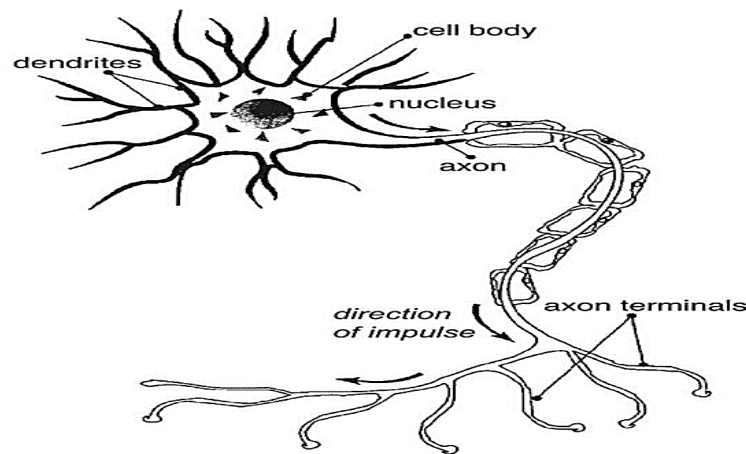
#### What is Neural Network?

**Neural Network** according to Simon Haykin (1999, 2) is “a massively parallel distributed processor made up of simple processing units, which has a natural propensity for storing experimental knowledge and making it available for use.” It can be likened to a learning process. Second, interneuron connection strengths, known as synaptic weights, store the acquired knowledge (Haykin 1999, 2).

Shiffman (2012) considers the human brain as biological neural network which is made up of an “interconnected web of neurons transmitting elaborate patterns of electrical signal”.

**Neuron.** The basic structural unit that makes up the entire nervous system is also called as *nerve cells*. Neurons are very sensitive which triggers them to easily respond to any form of pressure. The entire nervous system is made up of nerve cells averaging around one billion.

Figure 1. Parts of the Neuron



Source: <https://www.pinterest.ph/pin/742038476078773090/>

Neurons are made up of three major parts: a **cell body**, or **soma**, which *contains the nucleus of the cell and keeps the cell alive*; a branching treelike fiber known as the **dendrite**, which *collects information from other cells and sends the information to the soma*; and a long, segmented fiber known as the **axon**, which *transmits information away from the cell body toward other neurons or to the muscles and glands* (Walinga, 2010).

The dendrites receive the impulse from the terminal button or synapse of an adjoining neuron. Dendrites carry the impulse to the nucleus of the nerve cell which is also called as *soma*. Here, the electrical impulse is processed and then passed on to the axon. The *axon* is longer branch among the dendrites which carries the impulse from the soma to the synapse. The synapse then, passes the impulse to dendrites of the second neuron. Thus, a complex network of neurons is created in the human brain.

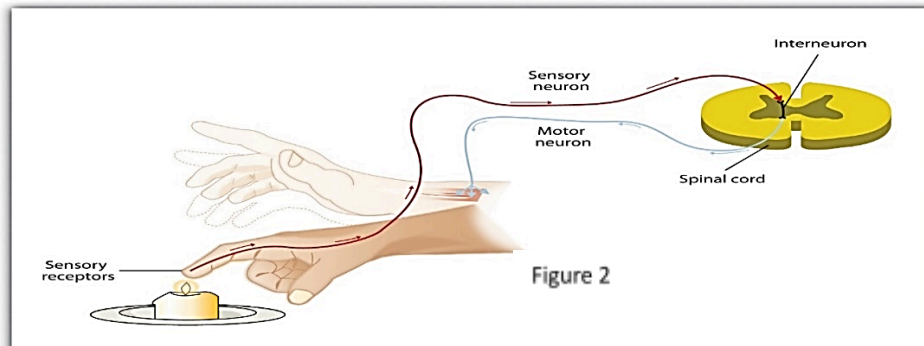
Our brains process information using networks of neurons. They receive an input, process it, and accordingly output electric signals to the neurons from which it is connected to.

### Three Kinds of Neurons

1. Sensory Neurons. Collect impulses from sense organs and direct these impulses to the spinal cord or to the brain (central nervous system).

2. Motor Neurons. Carry impulses from the central nervous system to the muscles and glands. These neurons cause muscles to contract and glands to secrete.

3. Connector Neurons. Connecting neurons between the sensory and motor neurons that are found in the brain and nervous system.



Source:

<https://opentextbc.ca/introductiontopsychology/chapter/3-4-putting-it-all-together-the-nervous-system-and-the-endocrine-system/>

When you touch a hot stove and immediately pull your hand away, or when you fumble your cell phone and instinctively reach to catch it before it falls, reflexes in your spinal cord order the appropriate responses before your brain even knows what is happening.

The central nervous system can interpret signals from sensory neurons and respond to them extremely quickly via the motor neurons without any need for the brain to be involved. These quick responses, known as reflexes, can reduce the damage that you might experience as a result of, for instance, touching a hot stove.

The human nervous system can be considered as a three-staged system. The human brain is the center of the system. It is represented by the neural or nerve net which acts as the receiver of information called *stimulus*. It also perceives the information gathered and makes appropriate decisions to the stimulus.

Figure 3. A representation of the nervous system



Source: Haykin (1999, 6)

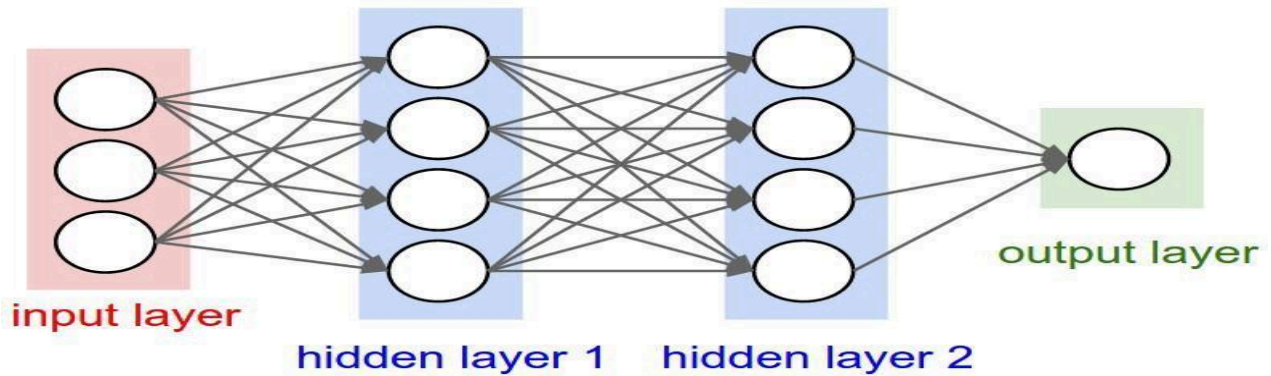
Figure 3 provides a representation of the nervous system. The two sets of arrows in the figure shows the transmission and feedback system within the process. The right pointing arrows illustrate the forward transmission of information-bearing signals through the system while the left pointing arrows show the feedback in the system. The receptors translate stimuli from the human body or any external environment into electric impulses that relay the information to the neural net or the brain. The effectors convert the electric impulses produced by the neural net into visible responses as system outputs.

### What is Artificial Neural Network?

**Artificial Neural Network (ANN)** is a computing system made up of simple, highly interconnected processing elements, which process information by their dynamic state response to external inputs (Shiffman, 2012). The goal is to mimic the behavior of the brain.

Artificial neural networks recreate the structure of human neurons to process information resulting in much more accurate results than previously used regression models.

*Figure 4. Parts of the Neural Network*



Source: <https://medium.datadriveninvestor.com/the-basics-of-neural-networks-304364b712dc>

### Three Main Parts of a Neural Network

#### Input layer

This is literally the layer that inputs information for the neural network to process. Each circle represents one feature (a piece of information). This can be anything. It could be the square footage of your house for a house price prediction program, or the value of a pixel on a screen for a computer vision program (Jain, 2019).

#### Hidden layers

These layers do all the processing for neural networks. You can have as many of these as you want. Generally speaking, the more hidden layers you have, the more accurate the neural network will be. Each layer consists of nodes that mimic your brains' neurons. These nodes receive information from the previous layer's nodes, multiply it by **weight** and then add a **bias** to it. Each line in the diagram represents a weight. That may sound confusing so here is an analogy:

Let us say you want to predict my SAT score and you have gathered two pieces of data: the number of hours you prepared, and the breakfast you had on the day of the test. These would go into the input layer. It's quite obvious that the hours you spend preparing will have a much greater impact on your mark than your breakfast (or everyone would ace the SAT). Because of this, the hours you spend studying receive a significantly larger **weight value** to be multiplied by. Now, granted, there's a chance that your breakfast may vary slightly impact your score, so it will receive a much lower weight value (Jain, 2019).

## Output Layer

This layer simply brings together the information from the last hidden layer of the network to output all the information you need from the program.

To sum up, neural networks take information from the input layer, process it in the hidden layers, and output the desired information in the output layer. This whole process of running a neural network is called **forward propagation (Jain, 2019)**.

## The Perceptron

The first artificial neural network was invented in 1958 by psychologist **Frank Rosenblatt** called *Perceptron* at the Aeronautical Laboratory in 1957. It was intended to model how the human brain processed visual data and learned to recognize objects. It is a computational model of a single neuron made up of one or more inputs, a processor, and a single output. A perceptron follows the “feed-forward” model. In this model, the inputs are sent into the neuron. Then they are processed and the result are shown in an output (Shiffman, 2012). The diagram below shows how the network or one neuron reads from left to right: inputs come in; output goes out.

*Figure 4. Parts of the Neural Network*



## Difference between Human and Neural Network

| Aspect            | Human Brain                                    | Neural Network   |
|-------------------|--|--|
| Size              | 86 billion neurons                             | 10 – 1000 neurons  |
| Learning          | can tolerate ambiguity                         | very precise & structured data is required to practice ambiguity |
| Topology          | complex topology with asynchronous connections | topology has three patterns with layers                          |
| Power Consumption | consumes 20% energy or less power              | consumes 250 watts or more power                                 |

Source: <https://blog.verzeo.com/blog-artificial-neural-network-vs-human-brain/>

## Learning Competency with Code:

Illustrate how the brain or neural network works.

**HUMSS\_MCT12-Ilg-i-2 (Quarter 2 – Week 5)**

## Activity 1. BRAIN ME TO LIFE!

Directions: Analyze the video and do what is asked of you to accomplish. If you cannot access the video, a copy of its content is provided.



Source: <https://www.youtube.com/watch?v=sm2d0w87wQE>

Watch a video clip about a robotic arm and a monkey. As you watch, think about how you can relate the monkey's actions to the possibilities of a human repeating those actions. This is a one-minute video clip that shows a monkey with a brain implant trained to use its brain to command a robot arm to feed itself marshmallows - just by thinking about it.

In this video, the monkey fed itself a banana without the use of his own arms. Instead, he thought about moving his arm, which sent signals to a computer. The computer interpreted these signals, and subsequently, moved the robotic arm. The monkey was able to move the robotic arm with his thoughts because of the activation of the neurons in his brain. Once this was discovered, many engineers thought about how the monkey could act as a model for humans.

In addition to using monkeys as models for humans, engineers also rely on rats as models to help them understand whether an LED light device could activate neurons inside the brain. Once engineers see that the device works with a rat, then they present what they learned and predict how the same technology might impact humans. Relying on various types of models, living and nonliving, leads to understand what is or what could be.

Processing Questions:

1. Why do engineers rely on models to show their thinking?

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2. What is a neuron and why is it important?

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3. Why is the human brain considered a neural network? How does the brain work as a neural network?



| Category                     | 4  | 3   | 2   | 1  |
|------------------------------|--|---|---|--|
| Stays on Topic               | Stays on topic all (100%) of the time  | Stays on topic (99-90%) most of the time.                                       | Stay on topic (89-80%) some of the time.  | Topic is not related or ambiguous  |
| Accuracy of facts            | All supporting facts are reported accurately.  | Almost all supporting facts are reported accurately.                            | Most supporting facts are reported accurately.                                      | No facts are reported or most are inaccurately reported.                       |
| Sequencing of Information    | Information is organized in a clear, logical way.  | Most information is organized in a clear, logical way.                          | Some information is logically sequenced. An item of information seems out of place. | There is no clear plan for the organization of information.                    |
| Grammar, Usage and Mechanics | Consistently contains accurate and proper grammatical conventions, spelling and punctuation. | Contains accurate and proper grammatical conventions, spelling and punctuation. | Contains frequent errors in grammatical conventions, spelling and punctuation.      | Contains numerous errors in grammatical conventions, spelling and punctuation. |

### Reflection

1. *I learned that*

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2. *I enjoyed most on*

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3. *I want to learn more on*

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### References for Learners

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Dela Cruz et. al, 2017. Trends, Networks, and Critical Thinking in the 21<sup>st</sup> Century Culture., Quezon City: Phoenix Publishing House, Inc.

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## Answer Key

Activity 1 (Answers may vary)

Activity 2 (Answers may vary)



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