

“Facts are needed to establish theories but theories are needed to make sense of facts.”

Discuss this statement with reference to two areas of knowledge.

Facts and theories have an interdependent relationship with one another, which assists an individual in their acquisition of knowledge. The establishment of a theory is reliant on known facts, and these facts are necessary in contributing to an individual's understanding of the theory; therefore, facts and theories work in a cycle to enhance the understanding of knowledge. Facts and theories may carry a certain degree of uncertainty, as new knowledge may disprove the accepted knowledge; however, it does play a significant role in contributing to the understanding of one another. The relationship between the two concepts differs based on the area of knowledge it pertains to. In chemistry, theories are propositions that provide an explanation for observations, the facts, collected through experimentations and established through these observations. Similarly, within sociology, theories are explanations of phenomena made through observations of societal behaviours, and observations provide the basis for the formation of such theories. As seen in these two areas of natural and human sciences, facts and theories are both necessary and play an essential role in the contribution to knowledge.

The necessary role facts play in the establishment of theories and theories' role in the understanding of facts is evident in chemistry - the science that studies various aspects of matter, including its properties and its behaviour with different substances (Helmenstine). Facts and theories play a vital role in chemistry because knowledge acquired from this area relies on concrete evidence and generalizations. Within chemistry, observations are accepted empirical facts, made through repeated experimentation, and theories are the explanations chemists use to justify facts. The kinetic molecular theory of gases highlights the essential role of theories and facts in chemistry; this theory provides an explanation for observations made on the behaviours of gas

molecules under the assumption of gases being in ideal conditions (Kinetic Molecular Theory). These assumptions may cause limitations to the proposed knowledge of the nature of gases; however, this theory was established through the understanding of ideal gases, and it does parallel the behaviour of real gases (Shahbaz, Cooley). This theory helps the understanding of gas laws, which were established from similar facts; however, laws are statements describing observations that do not explain how and why something happens, while theories provide explanations for such phenomena, indicating their necessary role in the understanding of facts (Bradford). The kinetic molecular theory accurately represents the interdependent relationship between facts and theories in contributing to an individual's understanding of chemistry.

Some may argue that the establishment and acceptance of theories based on facts are dependent on their accuracy at the specified time period, suggesting that, although theories may be believable at a specific time period, it does not guarantee its certainty. Unlike the kinetic molecular theory, the disposal of the phlogiston theory, with the replacement by the oxygen theory of combustion, suggests that theories may be made based on facts at the time, but new knowledge may cause changes to such theories. Once new facts are discovered, the theories established previously that do not parallel the discovered new facts cannot be used to explain them. The phlogiston theory was based on observations of oxidation. At the time, the theory was proposed to explain the burning of combustible materials through the releasing of phlogiston, a flammable substance, upon combustion (The Editors of Encyclopaedia Britannica, Phlogiston). However, upon the discovery of oxygen, a new theory of combustion arose. Through observations made in several experimentations of combustion, it was concluded that burning resulted from its reaction with oxygen (Antoine Laurent Lavoisier). The changes in the theories of combustion suggest that although some theories were established as an explanation for observations, they may be subject

to changes when new observations are made. Although facts are necessary in establishing theories and making sense of facts, its time of formation may contribute to its inaccuracy and uncertainty as new knowledge is continuously discovered.

However, others may believe that the inaccuracy of such theories may result in a future advancement to enhance the accuracy of the theories, thus suggesting that throughout history, the improvement in theories and facts is advantageous to understanding and accepting knowledge. In many ways, all theories are subjected to a level of uncertainty because a theory does not have to be fully tested with absolute certainty to become a theory, though it requires the support of evidence for its claims. The advantages of changes in theories and facts are evident in the ligand field theory. This theory was formed through the incorporation of the pre-established theories of the molecular orbital theory and crystal field theory (Ligand Field Theory & Frontier Molecular Orbital Theory). The combination of the two theories resulted in a theory that provided a better explanation of the structure of compounds such as the transition metals (Evans). By broadening the concepts provided by the theories, which were initially based on the observations of the two theories, it resulted in the formation of a better theory. Yet, all three of the theories are still used in the explanation of such knowledge. As new observations are made, theories are modified to present better explanations of the phenomena. Therefore, facts are essential for the creation of theories, and theories are necessary in providing support for the observations made; however, as new discoveries are made, theories and facts undergo revisions or rejections to advance scientific knowledge.

Likewise, within sociology, facts and theories contribute significantly to the interpretation of knowledge; theories and facts work in a continuous cycle to increase our understanding of the world. Sociological theories play a major role in sociology; these theories contribute to

understanding many aspects of societies, relationships and social behaviours (Crossman). Many of these theories were formed from observations made regarding the behaviours of individuals under different circumstances, and are used to justify the predictions of individual actions, therefore suggesting the important role observations - the facts - play in the establishment of knowledge in sociology. These theories aid the understanding of society. For example, the social exchange theory was formed through conclusions made from social experiments and theoretical studies (Social Exchange Theory). The theory analyzes patterns in human interaction based on the concept of punishments and rewards: when the reward of an action outweighs the punishment, it can be predicted that the individual would follow through with their actions (Crossman). By analyzing the nature of human actions through conclusions from experiments, sociologists proposed the theory to explain such behaviours. Theories play a fundamental role in assisting individuals in understanding societal behaviours, and their corresponding facts are responsible for the development of such theories.

However, some may argue that the extent of error in theories results in limited understanding of facts. In some cases, like the labelling theory, errors lead to theories that lead to inaccurate understandings of facts. However, modifications are made to propose a more accurate theory. Although the theory was formed through the experimentation of several sociologists, a modified labelling theory was formed years after the development of the initial theory. This may be due to the changes of ideologies throughout time; as time progresses, new beliefs formed and new experiments provided support for the theories. The labelling theory is used to understand the influences of labels and stereotypes on the behaviours of individuals, as individuals tend to identify with traits reflecting their labels (Crossman, Labelling Theory). However, the proposal of a modified labelling theory to mental disorders was formed because aspects of the original theory

were limited. The modified theory suggests that the negative connotations society has for individuals labelled as mentally ill cause these individuals to fear society and reject social interactions (Kroska). Although the labelling theory is typically related to criminology, the modified theory proposes an alternate aspect to the theory that many were not aware of through the original theory. Therefore, some theories are limited because they ineffectively suggest broader explanations for various factors and inadequately incorporate facts in their development.

Despite some limitations to the role of theories and facts within sociology, theories formed through continuous experimentations generally provide accepted explanations of individual behaviours. One of the most widely accepted societal theories is the functionalist theory, established from observations made on the behaviour of individuals within society. The theory explores society as an organism since the stability of society relies on the various parts and their contribution (Crossman, Functionalist Theory). It suggests the vital role social institutions play in ensuring the survival of the society by meeting societal and individual needs (Functionalist Perspective). From the knowledge obtained through this theory, it can be suggested that many of the theories that stem from societal observations are essential to understanding complicated concepts. Henceforth, many theories are reliant on facts in contributing to the understanding of such theories and vice versa.

Many theories are dependent on factual evidence to support their generalizations, for, without facts, theories would not be accepted. Theories aid the understanding of facts since they provide justifications for the observations. Therefore, facts are essential in the establishment of theories, while theories provide explanations for the phenomena expressed through facts. The analysis of facts and theories within chemistry and sociology demonstrate the essential contribution of each concept to the production of knowledge. Without one or the other, difficulties

to the understanding of ideas arise. Despite its limitations as insufficient knowledge leads to uncertainty, they generally contribute to accepted ideas. Thus, the relationship between the two concepts follow a continuous cycle - facts are needed to establish theories, and theories are needed to make sense of facts.

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