SATL BASED LESSON FOR TEACHING METABOLISM IN BIOCHEMISTRY

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ABSTRACT

The implementation of teaching through SATL method is being suggested to be preferred to discuss the content of metabolism in an effective and meaningful way. It provides a better understanding of the metabolic reactions, their importance in the regulation of body's function and in understanding the associated diseases of improper metabolic reaction. This teaching technique will open new thinking approach and develop interest in students rather being getting confused and wary of learning. Teaching through connectivity will present the basic concepts in a cognitive way and students will be able to correlate it to the issues and clarify them at a glance. *[African Journal of Chemical Education—AJCE 7(3), Special Issue, October 2017]*

INTRODUCTION

Traditional method of teaching is prone to inefficient delivery. It is practiced by teaching the context without any meaningful learning outcome. The learner would not be able to relate the existing knowledge with the previous information on the subject and thus would be unable to apply the knowledge in a purposeful way. It is therefore desired to deliver the context through connectivity in a meaningful, easier and thoughtful way. Concept mapping is a methodology for the delivery of facts, concepts and skills in one package. It makes teaching and learning; easier and purposeful. SATL is a basic idea of teaching by an arrangement of concepts or issues through interacting systems in which all relationships between concepts and issues are made clear, up front, to the leaner using a concept map-like representation. It involves establishing a hierarchy of concepts striving for underscoring a more or less closed system of concepts to clarify the interrelationships among these concepts. Lesson modeled on the basis of SATL diagrams help to overcome the traditional snags.

To Ausubel, meaningful learning is a process in which new information is related to an existing relevant aspect of an individual's knowledge structure and which, correspondingly, must be the result of an overt action by the learner. Teachers can encourage this choice by using tools such as concept maps. Some theories postulate that continued learning of new information relevant to the previous information produces constructive changes. Meaningful learning presupposes that the learner has a disposition to relate the new materials to his or her cognitive structure and that new material will be potentially helpful for the learner. SATL is a method that can be used to communicate to the learner as well as providing a vehicle to help the learner with meaningful learning tasks. It provides the basis of relating new knowledge to previously assimilated knowledge in a systemic way. Concept mapping also incorporate a strong element of

constructivism; in the sense that a student can build his/her understanding of newer inputs over and above that which he/she is already having a deep familiarity.

A number of issues pertaining to chemistry have been thus addressed in our previous discourses [1-7].

A lesson model for teaching biochemistry has been developed for the first time and presented herein. This may lead to teach various other topics of biochemistry via SATLC approach.

Step-1: Linear connections of different metabolic terms

"Metabolism" is one of the most difficult and conceptually hard contexts of biochemistry which often causes the students to get confused or withdraws them. It involves different terms which themselves have to have a detailed mapping of their own like organs, enzymes, biomolecules, energy, nutrition or diet and nutritional states (fed/starvation) etc. It is understandably hard to relate the concept of metabolism to these various terms. Let us first indulge into a linear connection to start mapping these ideas. In the linear connection these terms can be defined and explained through a liner diagram as shown in figure 1.

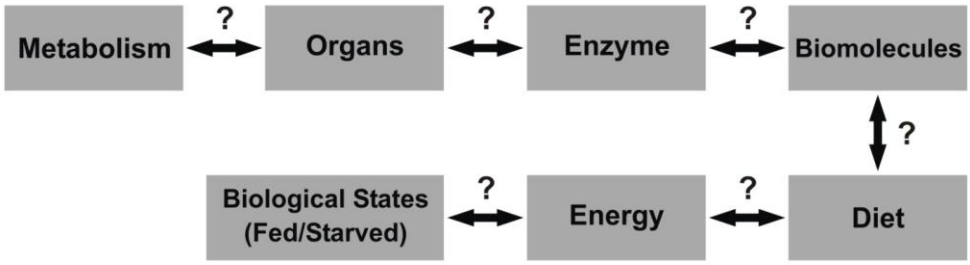

Figure 1: **Linear Connections**

Display of Linear Connection

Step-2: Systemic relations related to the various terms of metabolism

Step-2-1: Build SDo

Teaching metabolism through SATL method makes it easier for the students and it will provide them meaningful and purposeful outlays. Figure 2 illustrates the connectivity of metabolism with the each of the stake holders. Students usually have previous knowledge regarding organs, diet, and energy through linear connections. However they may or may not have concepts developed enough to approach enzymes and their functions in the body, formation of biomolecules and the wholesome response of body. Enzymes are the substances that are regarded as a biocatalyst. An enzyme will determine which metabolic pathway a cell will undergo. Enzymnes act on biomolecules ,basic components of a cell,known as substrate and after the biochemical reaction they form products thus a connection to enzyme with metabolism and other metabolic terms like biomolecules gets established. As a consequence of enzymatic action in different biological states (fed/starved) also grasped in same manner. In figure 2, the initial systemic diagram, SD0, these vital contributors towards the life process are indicated and highlighted for an ensuring classroom discussion. Through this connectivity diagram the students understand metabolism better and let him/her delve into the beneficial effects. As from the diagram it is apparent that metabolic processes that energizes the human body has many inputs, one of these being the enzyme action. Mode of action of enzymes that is based upon lock and key concept can also be built upon at this stage. Each enzyme works on a specific site i.e. its substrate molecules to induce a specific function just like a key works for its specific lock. Hence an interest is developed which helps a student to relate the other terms with this enzymes function in further details.

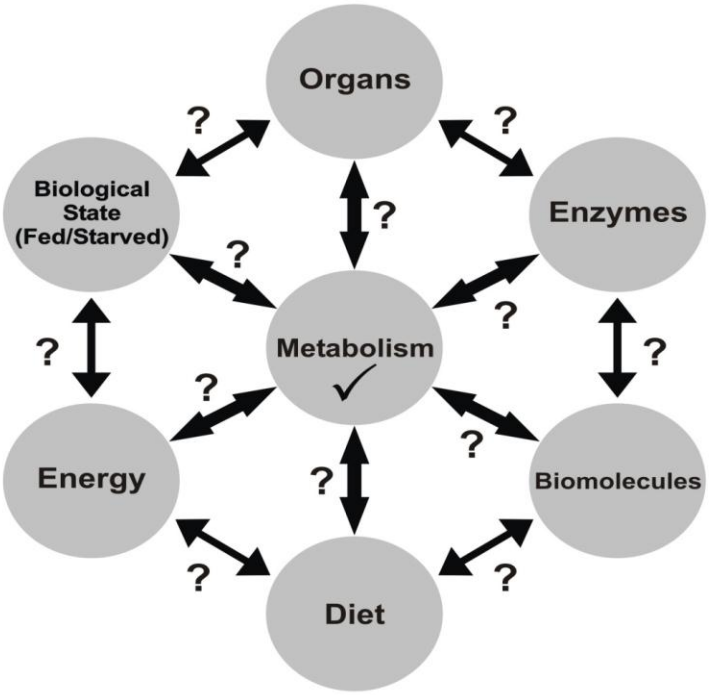

Figure **2: SDo**

Pictorial representation of possible interlinkage between various metabolic connection

Step-3: advanced pictorial diagram to connect the advance topics of metabolism with the previous knowledge.

Step-3-1: Build SD1

Students will be able to appreciate the role of each of the identified components related to metabolism. He/she will be able to understand how our body organs work, where different enzymes are located and how they perform their actions, what are biomolecules and what are their nutritional importance in the diet, how much energy the body can get when taking particular amount of biomolecules in the diet, also student will be able to understand effects of nutritional status (fed/starvation) on our body organs. Through the discussion involving interconnectivity of the individual unfamiliar contents, students will be able to grasp metabolism. All the discussed and clarified contents are tick marked in figure 3. Figure 3 illustrates the correlation of salient

variables that relate to the metabolism and with each other. Clarifying all the individual contents by teacher will let the students to correlate each of these with the other and now they will be able to understand and value each of the individual parameters that are important for the regulation of metabolic processes in the body. When a person takes in diet or in the fed state; organs will respond by activating particular enzymes which act on different biomolecules present in the diet and provide energy. It will be anabolic category of metabolism. Whereas in starvation condition the organs of our body respond differently by activating different enzymes which will start the catabolic processes of biomolecules to provide energy to the body.

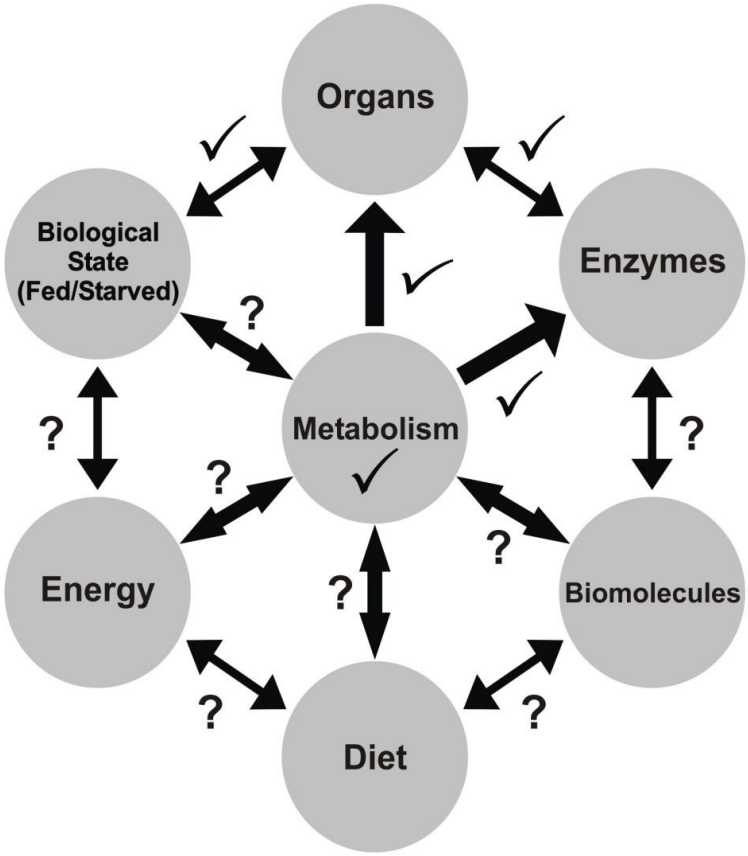

Figure 3: **SD-1**

Systemic diagram showing the linear connection of various aspects of metabolism.

Step-4: advanced pictorial diagram to connect the advance topics of metabolism with the previous knowledge.

Step-4-1: Build SD2

Now when all the previous knowledge of metabolism is summarized through connectivity, at this stage advanced level thinking can be built in students' minds through systemic learning in the form of SD3 as shown in figure 04. In this figure the idea that how diet that is utilized in the form of biomolecules is important in playing a vital role in the energizing sequences of the body that are related to various biological states fed or starved condition and ultimately towards affecting organs and over all metabolism of the body. Now this idea is represented in the figure 04.

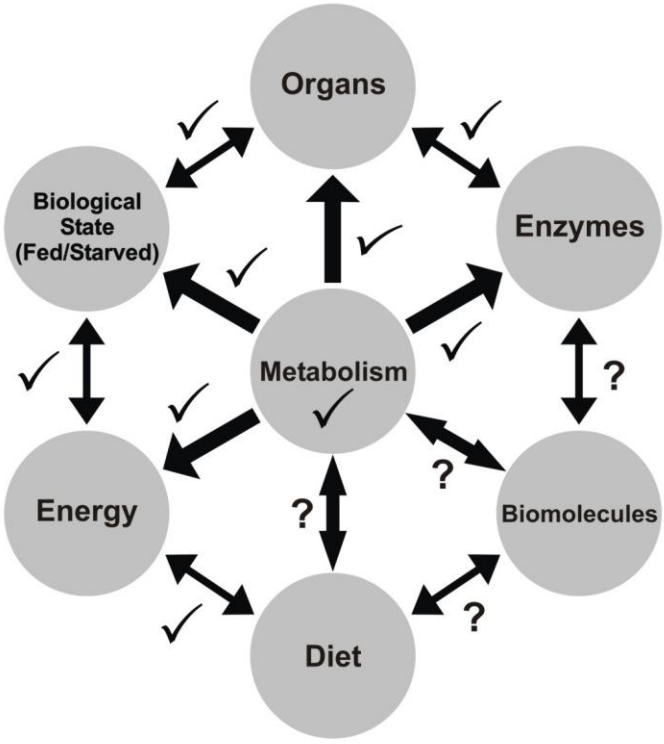

Figure 4: **SD-2**

Advanced pictorial diagram showing all connections building concepts of metabolism

Step-5: final pictorial diagram to show all the aspects of metabolism.

Step-5-1: Build SD final.

At this stage all concepts of metabolism are now revealed. And a final map of metabolism is thus established through SATL diagram.

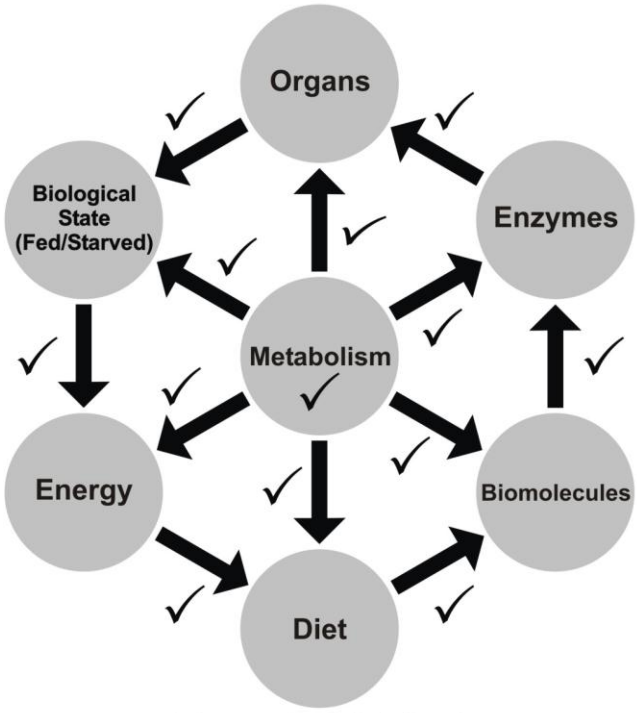

Figure 5: **SD-Final**

Systemic diagram with complete mapping of metabolic systems and process involved in Biochemistry

CONCLUSIONS

A model lesson for teaching and learning the concepts underlying metabolism has been developed on the basis of systemic building strategy. We feel that a lecture delivered through this SATL Scenario is going to be more useful for the undergrads students. This mode of teaching and learning is likely to open new avenues for appreciating the knowledge of biochemistry. As this is the first ever SATL designed lecture of biochemistry.

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