

## Interactive Ties of Metabolic Pathways in a Systemic Module

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### Abstract

One form of the organization of the teaching process is the teaching unit which constitutes the essential unit. Changes in the way of organizing the teaching unit intend to increase the yield and the quality of the teaching process. The construction of the teaching unit, according to the linear method of teaching, is based on the transfer of the information step by step to the students, who can afterwards relate it to their previous knowledge. The teaching unit encourages memorizing, however, in some way, it prohibits the creativity which is very important for their future. Recently, the systematic unit for teaching and learning is gaining ground. Basically, the construction of this unit includes the creation of the concept map where the relationships between the concepts are established through the system interactions. These relationships between the concepts are explained during the lesson. The technique of the systematic unit is a very helpful instrument to make the teacher's job easier and to ensure that the students receive good information. Also, it ensures the essence of systematic thinking and the continuous increase of knowledge which is in it a sign of qualitative education.

**Keywords:** systematic unit, concepts, systematic diagram, objectives.

### 1. Introduction

The teaching unit is one way of the organization of the teaching process. The important changes in the way of its organization intend to increase the yield and quality of the teaching process, strengthen the role of the teacher as the organizer of this process, and enhance the role of the student as a party in this process. The teaching process becomes pleasant if the communicative skills of the teacher prevail over the natural inertia of the students as they concentrate on a difficult topic (Eilks, I., & Byers, B. 2009).

The organization of the lesson by employing the systemic approach in teaching and learning is unique in itself. The systemic approach in teaching and learning is a new approach contrasted to the common approach of the concept map which involves the creation of a hierarchy of concepts. The systemic approach creates somewhat closed system of concepts, a cluster concept, that highlights interrelations. This method contradicts the linear method which is currently used in our educational system. The founders of this method are Prof.Dr.A.F.M Fahmy dhe Prof.Dr.J.J.Lagovski. In their opinion, systematic is an orienting, restructuring means which asks for the explanation of the subject matter by both the student and the teacher through the creation of a diagram about the strategy of the map of concepts. The systemic approach in teaching and learning promotes higher levels of thinking, that are, evaluation, analysis and synthesis.

Teaching all over the world is adopting this method. This way of teaching is increasingly being highly appraised by the world academy.

### 2. Methodology

Methodology provides students and lecturers with a global image of the teaching of science. As is known, teaching is carried out through communication. The technique of the systemic approach in teaching and learning is a good instrument to increase the communicative skills of the teacher.

The methodology of the systemic approach in teaching and learning is holistic (Fahmy, A. F., & Lagowski, J. J. 1999). In essence, the systemic approach includes offering of facts, concepts and skills, all in one unit. In this age, in the

21 century, it is indispensable for us to shift from the linear educational system to the systemic educational system. A fundamental structural element of the systemic approach is the systemic diagram which has the attributes of the closed map of concepts. The construction of this systemic diagram, as an essential element of the systemic teaching unit goes through many stages detailed below (Fahmy, A. F., Hamza, M. A, & Lagowski, J.J. 2002).

### 2.1 Aim and objectives

The study of the interactive ties of metabolic pathways.

### 2.2 Identification of students knowledge on the topic.

Students will get informed about different aspects of metabolic pathways of studying liaison mechanisms and regulation of metabolic pathways. Liaison mechanisms and regulation of metabolic pathways constitute a dialectical unity of processes and phenomena, which is based on the presence and development of several rings of common mechanisms (Fahmy, A. F., & El-Hashash, M. 1999).

Most essential liaisons to be treated are:

- The formation of common substances for various metabolisms which constitute the end of a catabolic string and the start of an anabolic string. These substances, the most important are: acetyl-CoA, pyruvate, oxaloacetate, glucose-6-phosphate, etc. Role can be called universal, because it is exercised in all metabolic pathways of carbohydrates, lipids and proteins (Garret, R. H., & Grishan, C. 1995).
- The action of energetic liaisons through ATP, ADF, AMP, GTP, CTP, UDP, NAD and NADH+ H+. ATP has been at the same time the main source of energy, ensuring the development of anabolic routes. ATP is a secondary product that is synthesized by the phosphorylation of ATP through giving the macroenergetic phosphoryl group by different substances of different metabolic strings (Kuchel, W.F., & Gregory, B. R. 1988).
- The action of final products of a series of metabolic string on the allosteric enzymes of the first reaction of metabolic string (Collen, S., Allan, D. Marks., & Michael. L. 2005).
- The action of hormones as effectors allosteric on allosteric molecules in general. The allosteric mechanism constitutes the main factor of regulating sequences and local intracellular biochemical cycles, intercellular, at the level of a whole organism and suburb-body interaction (Lygre, D. 1995). This mechanism has universal biological value because not only represents the main link to the regulation of genuine metabolic processes, but also the processes of absorption in the intestine, the kidney reabsorption, the transport of substances through the plasma proteins and intercellular fluids and intracellular (among which the O<sub>2</sub> and CO<sub>2</sub>) the penetration of substances through cell chips and cell organelles (active transport), the realization of repression and induction of protein and enzymes synthesis, the conduction of nerve electricity through chemical mediators and immune processes.

### 2.3 Drawing of a diagram to show linear connections between concepts.

Based on students' knowledge about the most essential liaisons concepts described above, we draw a diagram. The diagram that shows the linear relationship between the essential liaisons, previously described about is displayed in figure 1.

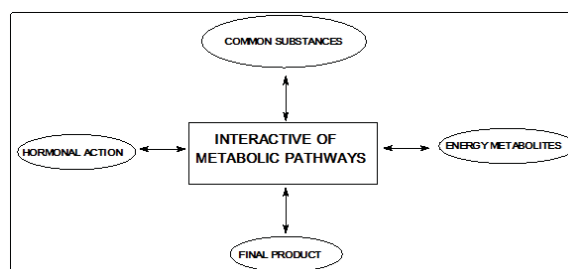


Figure 1: Display of the linear relationship between liaison mechanisms and regulation of metabolic pathways

This diagram describes the concepts of the lesson in relation to the respective information. As noticed in the diagram, the above relationships are linear and independent from each other.

2.4 Identifying the till then known and unknown linear connections between concepts.

In the diagram, the till then known and unknown linear connections between metabolic pathways should be identified. The sign [√] and a number is put on the known linear connections between the metabolic pathways. The sign [?] and a number was put on the unknown linear connections between the metabolic pathways. The modified diagram is shown in Figure 2.

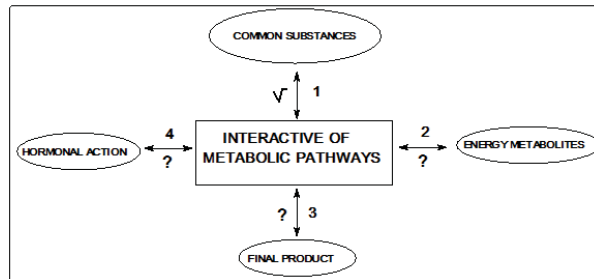


Figure 2: Display of the known and unknown linear main issues.

2.5 Identification of arrow direction of the known and unknown linear connections between main issues.

In the diagram we draw, the direction of the arrows of the known and unknown linear connections between liaisons is identified. Arrows can have either one direction or two directions. Based on the direction of the arrows, the order of the study is indicated. In this way, the diagram drawn based on the suggestions of the previous stage undergoes changes. These changes transform the linear diagram into a systematic one as are presented in figure 3.

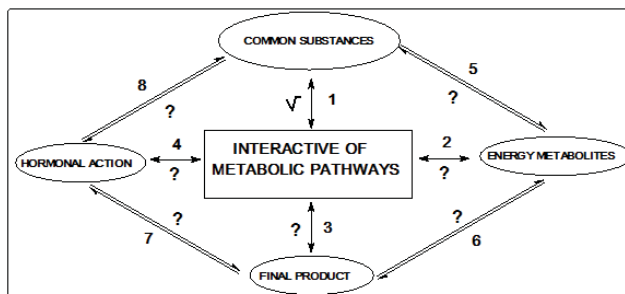


Figure 3: A display of the systematic connection between liaison mechanisms and regulation of metabolic pathways. Systematic diagram(SD-0).

This is the first diagram of the kind in the series of diagrams to be constructed in the process of teaching. We mark(see figure 4) this diagram with SD-0 (systemic diagrams) and the final diagram with SD-3. In the systematic SD-0, diagram it can be noted:

- a. The links 1 and 2 in the diagram (SD-0) are known. For this reason, the arrow heads go in one direction and have the (√) sign.
- b. The unknown relations in the SD-0 diagram have the question mark (?) and arrow heads have two-way reversible directions.

2.6 Replacement of some (?) signs in the SD-0 diagram with the (✓) sign.

Now, there comes another stage of learning, when some of the unknown relationships between liaisons in SD-0 have been explained by the lecturer. In the SD -0 diagram, some of the (?) signs are replaced with the (✓) signs. Changes in the unknown connections between liaisons in SD-0 are made only after they have been taught by the lecturer. Hence, we come to the SD-1 diagram.

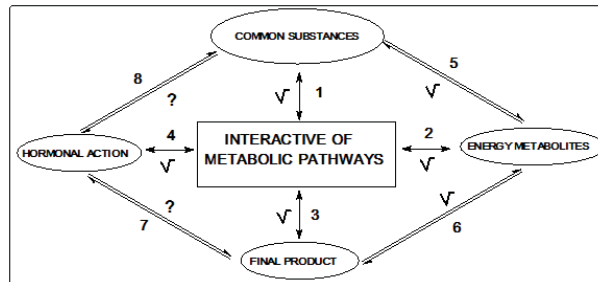


Figure 4: Systematic diagram (SD-1).

The SD-1 diagram is composed of two types of links. The first link is already known, as is explained by the lecturer. In the SD-1 diagram, we put the (✓) sign in the learned systematic links. The second component consists of not yet known connections between liaisons, which will be discussion topic in class. So in the SD-1 diagram (?) signs are placed on unknown systematic links. Class discussion between the lecturer and students helps to unfold "learning secrets" of several unknown liaisons. After these discussions, the class draws some conclusions.

- In the diagrams, the (?) signs are replaced by (✓) signs
- The discussion topic in the classroom about the connections between unknown metabolic pathways and known ones results in knowing new connections systematically.
- The discussion topic that continues helps students to identify new connections. Changes made in the SD-1 diagram convert it to the SD-2 diagram.

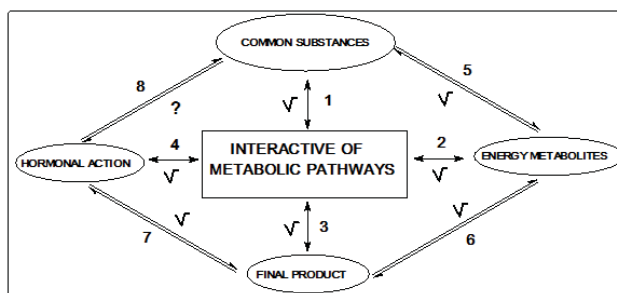


Figure 5: The systematic diagram (DS-2).

In the SD-2 diagram, it can be noticed:

- All links between the liaison mechanisms and regulation of metabolic pathways have been identified, except the connection 8, which would be taught at a later stage of learning (see figure 5).
- At this stage of the study, students clarify the connections analyzed during the debate and try to analyze the remaining unknown links.

2.7 Drawing of the final systematic diagram

At this stage of the study we have already reached our goal. In the SD-2 diagram, the unknown links are now known.

These changes are placed in the diagram SD-2 to obtain the SD-3 diagram. The SD-3 diagram does not have unknown connections between concepts which means that the systematic teaching unit has been completed. The SD-3 diagram is called the final systematic diagram that is shown at figure below 6.

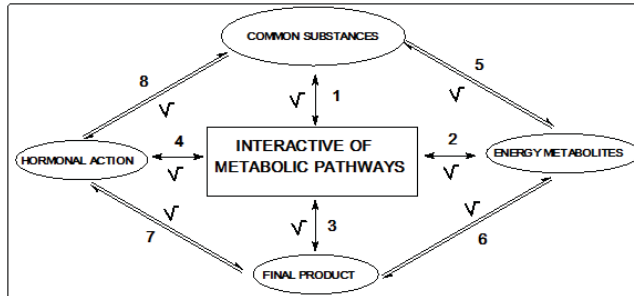


Figure 6: The final systematic diagram (SD-3).

### 3. Results

- A systematic teaching and learning unit involves drawing systematic diagrams (SD-0, SD-1, SD-2 and SD-3). These diagrams have SD-0 diagram as a starting point, SD-3 diagram as a terminal points and SD-1 and SD-2 diagram as intermediate point.
- Lectures of the systematic method are marked SD-0, SD-1, SD-2 and SD-3. All diagrams are essentially similar, however, they differ from each other in placing the (✓) sign on known systematic links and (?) signs on unknown systematic links.

The strategy of this approach is displayed in the following figure 7.

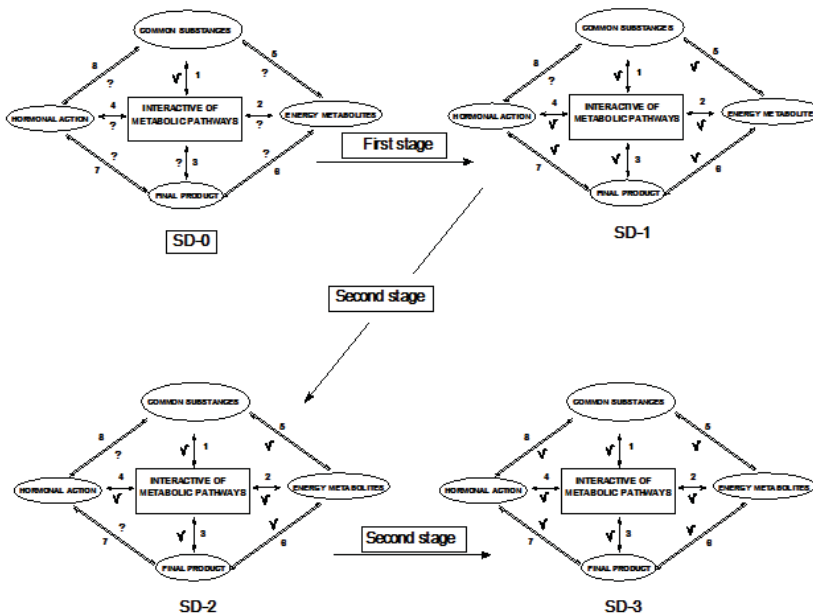


Figure 7: The strategy of structuring the systematic teaching unit.

#### 4. Discussion and conclusions

- The systematic teaching unit carries a range of innovations and demonstrates the possibilities of overcoming the traditional model which is still currently practiced in our schools.
- This unit helps students develop their skills and provides them with a collection of knowledge through learning by giving up knowledge provision through available sources.
- The systematic teaching unit offers new sources of information. It motivates students to acquire new information, rely on prior knowledge and deepen it through the various stages of systematic learning.
- Organization of this systematic lesson makes students capable of finding new sources of knowledge, and building up an accurate cognitive structure.
- Students participate in the organization of this tutorial (teaching unit).
- Employment of the systematic approach in organizing learning/teaching units establishes new relationships between teachers, teachers and students and among students.

#### References

- Collen, S., Allan, D. Marks., & Michael L. (2005). Marks' Basic Medical Biochemistry. A clinical approach. Philadelphia: Lippincott Williams & Wilkins
- Lygre, D. (1995). General, Organic, and Biological Chemistry (pp. 575-600). California: Brooks/ Cole Publishing Company.
- Eilks, I., & Byers, B. (2009). Innovative Methods in Teaching and Learning Chemistry In Higher Education Cambridge: Royal Society of Chemistry Publishing.
- Fahmy, A. F., & El-Hashash, M. (1999). Systemic Approach in Teaching and Learning Heterocyclic Chemistry. Chemical Education International, 3(1), 56-78.
- Fahmy, A. F., Hamza, M. A., & Lagowski, J.J. (2002). From systemic approach in teaching and learning chemistry (SATLC) to benign analysis. Chinese Journal Chemical Education, 23(12), 12-16.
- Fahmy, A. F., & Lagowski, J. J. (1999). The use of systemic approach in teaching and learning for 21st century. Pure and Applied Chemistry, 71(5), 859-863.
- Kuchel, W.F., & Gregory, B. R. (1988). Theory and problems of Biochemistry (2ed ed., pp. 213-215). New York: The McGraw-Hill Companies.
- Howard, B. L. (1991). Test scores & What they mean 5ed ed., pp. 56-73). New York: Allyn and Bacon.