Journal of Education and Practice www.iiste.org
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.9, No.3, 2018

Impact of Visual Graphic Organizer in the Study of Information Action Research

Hamdan Al Maziadi
Chemistry Teacher at Saif bin Sultan Secondary School, Oman

Abstract
Grade 11 students participated in a study that looks to answer the question" does use of Visual Graphic Organizer as teaching technique improve student to study of information and achievement and their attitudes in grade 11 chemistry in our schools? Attitudes were measured with a Likert Scale survey "*Questionnaire"*; while achievement was measured with pre-post test. The unit included in this study is "Periodic Table" which is one of the most difficult subjects for the students. The main sources of information were teachers and grade 11 student's book. Students took both a unit test and Likert scale following the instructional period. The results show that using visual graphic organizer enhanced test scores. The Likert scale survey shows that students in the first group like the way of using visual graphic organizer and enjoy it. In contrast, the second group which subjected to the old way did not like it.
Keywords: Visual Graphic Organizer, information, achievement, schools.

1. Introduction

Teaching methods are the ways that give the information very fast and clear to the students or participants. This is very important for science students to increase their achievements and attitudes toward science especially in chemistry. Visual graphic organizer is one of these ways or strategies that teacher can use it with her\his students to improve their achievement and attitudes to make them enjoy the class. This new techniques talk to both sides (left & right) of the brain.

Graphic organizers are conscious, flexible plans that readers apply and adapt when they are reading a variety of texts. Graphic organizers add a visual aid to the thinking process involved in the comprehension of text. They may be used before, during, and after the reading and/or writing process. (Frederick county, 1999).

The graphic organizers techniques depend in brain sides in thinking. It also depend on the way that person use and sense that he\she use to collect and organize information. The shape of most of graphic organizers takes the shapes of periodic table. Most of teachers use the old traditional way in teaching with their students. This make students poor and have difficulties in studying science especially chemistry science. The main goals that fill up my thinking are to find a new teaching method that can improve student's achievement and their attitudes toward chemistry science. This method as mentioned above is using of graphics organizer in chemistry class. I am going to measure the improvement of this method in grade 11 chemistry students.

2. Review of Literature

Graphic organizers have been used in education, policy studies, and the philosophy of science to provide a visual representation of knowledge structures and argument forms. They provide a complementary alternative to natural language as a means of communicating knowledge. In many disciplines various forms of graphic organizers are already used as formal knowledge representation systems, for example: semantic networks in artificial intelligence, bond graphs in mechanical and electrical engineering, CPM and PERT charts in operations research, Petri nets in communications, and category graphs in mathematics. Gaines & Shaw (1999) describe the design and application of an open architecture graphic-organizing tool and show how it may be used to support a wide range of applications and disciplines.

In explaining the notion of graphic organizers based on the examples in the literature, one finds a need for three levels of analysis. From an abstract perspective graphic organizers may be seen as representations of graphs, using the term as defined in mathematics (Berge, 1958). From a visual perspective graphic organizers may be seen as diagrams, using the term to mean a drawing with reasonably well understood semiotics for some community (Bertin, 1983). From a discourse respective graphic organizers may seen as a way of representing and communicating knowledge through visual languages (Chang, Ichikawa, & Ligomenides, 1986; Saint-Martin, 1990). Each perspective draws out different representations of the term, graphic organizer in the literature.

From an abstract perspective, the basic graphic organizer data structure is a sorted hyper graph consisting of typed nodes, some of which are linked. Each node has a type, a unique identifier, and a content (which may be structured, for example, as a label plus other data). A node may enclose other nodes, giving the graph a hyper graph structure (Berge, 1973) in which a single link may connect sets of nodes. Links may be directed or undirected, represented visually by lines between nodes with or without arrowheads. In some applications the links may themselves be typed.

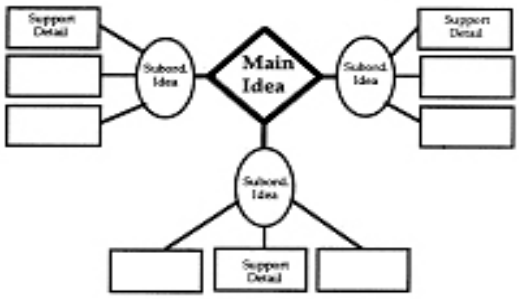
From a visual perspective, to provide a consistent relation between the visual features as signs and their semiotic infrastructure, the visual attributes of nodes and links need to be in one-to-one unique correspondence with their types. The node type may determine, and itself be determined by, the physical attributes of the node; that is, the shape, color, and font. Link types may determine and be determined by line thickness, color, cross-hatching, and other forms of decoration (Gaines & Shaw, 1999).

From a discourse perspective, the abstract structure represented as a diagram in visual terms consistent with it has meaning as knowledge representation and communication because it is subject to interpretation by some reference community. In this there is an exact parallel between natural language visual languages: the abstract grammatical structures and their expressions in a medium take on meaning only through the practices of a community of discourse. Some communities may find it appropriate to use language in a loose, associative fashion, whereas others may wish to use it with technical precision, and usage may be mixed with informal and formal sublanguages combined in actual discourse (Gaines & Shaw, 1999) Graphic Organizers, Mind Maps and Concept Maps are pectoral or graphical ways to organize information and thoughts for understanding, remembering, or writing about. Graphic organizers, mind maps and concept maps are powerful tools that can be used to enhance learning and create a foundation for learning.

Is a picture worth a thousand words? A graphic organizer forms a powerful visual picture of information and allows the mind 'to see' undiscovered patterns and relationships. We use them every day in our lives. The most common example is the calendar. How can graphic organizers help you and your students? www.**graphic**.org/**organizers**/1.html - 11-k

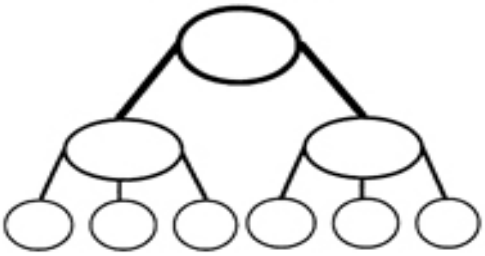
organizers come in many different forms, each one best suited to organizing a particular type of information. The following examples are merely a sampling of the different types and uses of graphic organizers Alvermann, D. E., & Boo

Descriptive or Thematic Map



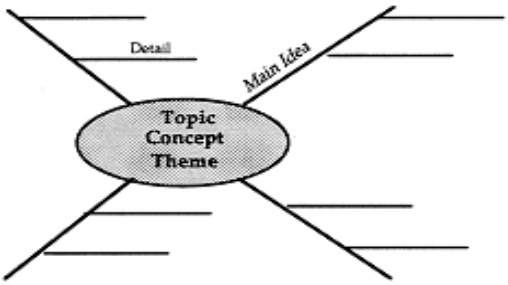
d

Network Tree



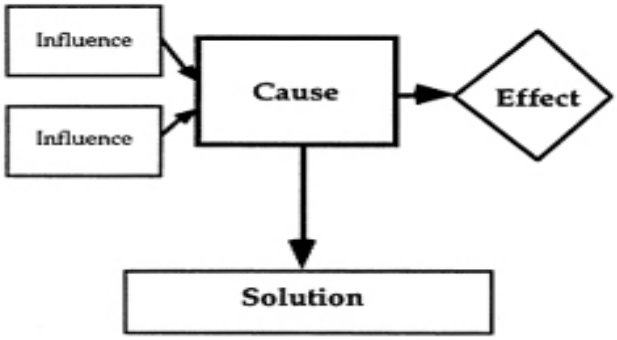
d

Spider Map



d

Problem and Solution Map



Graphic organizers can be used as a lecture notes, yearly planning of teacher program, term
Planning daily planning, lessons, presentations and examinations. There are some benefits of aching
Using Graphic organizers techniques. These benefits are:

1. Make students interesting and more cooperative in the classroom.
2. It makes the curriculum very easy to teacher to summarize it easily and adapted with any change vastly.
3. Lesson becomes more spontaneous, creative and enjoyable for both teacher and student.
4. The celerity of concepts and unit of Periodic Table and make it very easy.
5. Showing of the relationships between the content and concepts of the unit.
6. Reducing the volume of lectures notes.
7. Students with learning difficulties, find this method inspire them to learn fast and better.
8. It save time for doing more exercises about the unit.

These benefits and researches led me to put my research question: "does use of Visual Graphic
Organizer as teaching technique improve student achievement and their attitudes in grade 11 chemistry in my school?". Student's marks will be measured by pre/post unit test for both groups (controlled and experimental) while student's attitudes will be measured using pre/post liker scale questionnaire. The teaching method used in this study is Graphic Organizer techniques with the experimental group only while the controlled one will be taught by the traditional way.

3. Method

In order to answer my research question and to measure the attitude and the achievement of the students, I designed a pre/post unit test and pre/post likert scale questionnaire. Unit test used for measure student's marks while the likert scale questionnaire used for measure student's attitudes toward periodic table. Students were divided into two groups,

Experimental (Group A) and controlled (Group B). Group A will be taught using Visual Graphic Organizer. Group B will be taught using the traditional way in classroom. At the end of the unit, both groups will take pre/post unit test and pre/post likert scale questionnaire. To conclude the results I'll compare between the test results within the same group and between the two groups. Also I'll compare between the pre/post questionnaires for both groups.

3.1 Sample

The subject I have chosen is the periodic table from Chemistry book of my 11 grade students.

The study applied for two groups, experimental and controlled. The sample size consists of 32 from 11 grade male students at Saif bin Sultan Secondary school. The location of the school is at Al-Murtafa;a village on Wilayat of Ibri on Al Dhaherah region. The students are divided in to two groups of 16 students in group A and 16 in group B. The age range varied from 16 to 18 and those students are from different villages in my Wilayat.

Arabic is the first language of all students, whereas English is their second language. I think my school is one of the best schools where I can apply my research project since students from different parts of the Wilayat of Ibri and also it is the most famous school in the Wilayat.

3.2 Data Collection

Data collected through the study. At first, two groups took the pre unit test of 16 multiple choice questions and pre likert scale questionnaire of 10 statements. The unit test for measure student's marks and the likert scale is for measuring their attitudes toward periodic Table. Then the experimental group (Group A) taught using the Visual Graphic Organizer for 3 weeks and the controlled one (Group B) taught using the old (traditional) method. Then on the 4^{th} week each group took the post unit test which is the same pre test. They also took the post likert scale questionnaire. Finally, I have to compare between the pre and post test for each group and between pre and post likert scale for each one.

3.3 Threats to Validity

There are some of threats to validity facing me during my study. At first, some students didn't understand the pre/post test and likert scale in English, so I have to translate them to Arabic and give each student 2 copies one in English and the other in Arabic. The student has to answer in the English copy of the pre/post test and likert scale. During the post unit test some of experimental group students (Group A) absent, so I repeat the test for them on week 5. I started my study on 14/02/2009. Some of experimental students absents during some lessons, so I taught them again separately. Sometimes I got problems with the media instruments like the multi-media projector and the Overhead projector in which they don't work, so I have fix them and repeat the lesson. All of these threats to validity are not very difficult and didn't make obstacles on my face or stopped my study. I overcome them and I finished my study with positive results and outcomes

4. Results

4.1 Results: Attitudes

The results of our study show that there is a significant change in the mean of the gain scores of the Experimental group compared to the control group as shown below.

Data Summary

	A	B	Total
n	16	16	32
- ΣX	277	-11	266
- ΣX^2	4957	147	5104
SS	161.4375	139.4375	2892.875
mean	17.3125	-0.6875	8.3125

Results$_Q$

P	one-tailed	<.0001
	two-tailed	<.0001

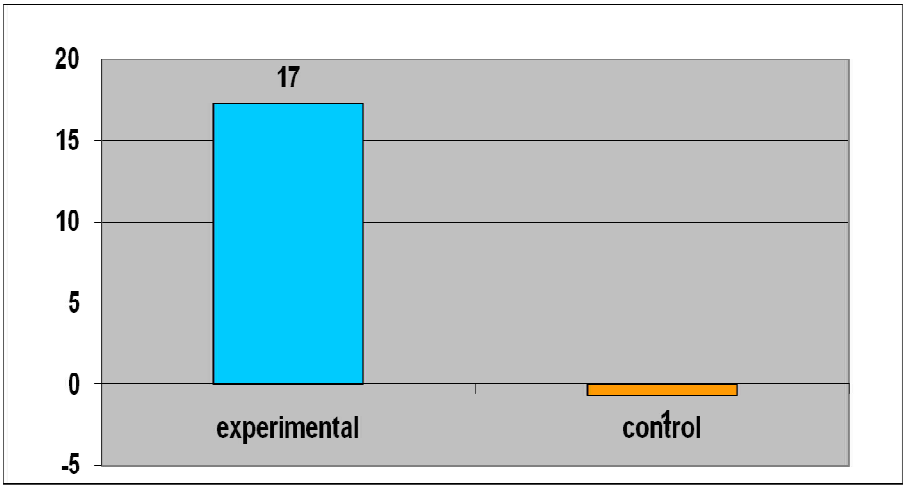
$Mean_a$—$Mean_b$	t	df
18	+16.08	30

df_1	df_2	F	P
	15	15	1.16

$Mean_a$—$Mean_b$	t	df
18	16.6	29.84

P	one-tailed	2.5
	two-tailed	<.0001

(t= +16.08 df= 30 p<0.001)



4.2 Results: Unit Test

The results of our study show that there was a significant gain in the achievement scores of the experimental group compared to the control group as shown below

Data Summary

	A	B	Total
n	16	16	32
ΣX	128	47	175
ΣX^2	1720	373	2093
SS	696	234.9375	1135.9688
mean	8	2.9375	5.4688

df_1	df_2	F	P
	15	15	2.96

P	one-tailed	0.0076895
	two-tailed	0.015379

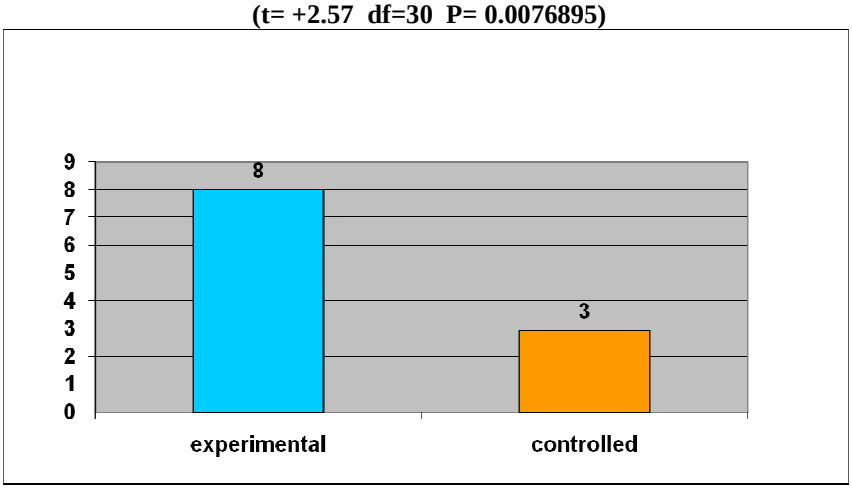
$Mean_a$—$Mean_b$	t	df
5.0625	+2.57	30

4.3 $Results_Q$

P	one-tailed	0.007014
	two-tailed	0.014028

$Mean_a$—$Mean_b$	t	df
5.0625	2.65	24.09

(t= +2.57 df=30 P= 0.0076895)



5. Discussion and Action Plan

Graphic organizer provides an ideal tool for teaching and learning since studies with all types of students and at all grade levels. They allow teachers and students to summarize and evaluate information. See relationships, use appropriate language, and comprehend concepts. Teachers can use graphic organizers to prepare lessons and guide student achievement. Graphic organizers make learning manageable and fun.

Through this research, we learned that the students in our study showed a better understanding of chemistry when using a graphics organizer method instead of lecturing. The mean was higher when implementing the graphics organizer method. In addition student attitudes showed that they preferred graphics organizer method in the teaching of chemistry.

So, in accordance with the results, I have decided to use more graphics and science demonstrations while teaching chemistry. I will also share the research and the results with the other science teachers in my school and district.

Finally, I believe that students need a new style of learning, the manner in which we have

Used instead of the traditional method of obtaining a better understanding.

References

Alvermann, D. E., & Boothby, P. R. (1986). Children's transfer of graphic organizer instruction. Reading Psychology, 7(2), 87-100.

PATRICK J. GREENE, August 2001, What are Graphic Organizers and How Will their Use, Tampa, Florida,

Bell & Howell Information and Learning Company 300
Thilla Sivakumaran, Interactive Graphic Organizers, Tennessee, USA
Taylor, B., Graves, M., & Van Den Broek, P. (2000). Reading for meaning: fostering comprehension in the middle grades. New York, NY. Teachers College Press
Vacca, R. (2002). From efficient decoders to strategic readers. Educational Leadership, 60, 6-11.
http://en.wikipedia.org/wiki/graphic-organizer
www.graphic.org/organizers/1.htmlk

Appendices

Appendix A: Unit test

Dear Student:

The specific goal of this test is to measure the capacity of your understanding of science concepts, data and information that are included in the chapter of Periodic Table.

Read carefully the following instructions before you answer the test:

-The test consist of (16) questions, each one have (4) multiple choice, one of them is correct only.
- Please answer all of the questions in the test.
- Test time period is about (30 minutes).

Choose the correct answer and put (/) on answer sheet:

This question may require the use of the *Chemistry Reference Tables* or the *Periodic Table of Elements*

1-Which three groups of the Periodic Table contain the most elements classified as metalloids (semimetals)?

1. 1, 2, and 13
2. 2, 13, and 14
3. 14, 15, and 16
4. 16, 17, and 18

2-Which element has the highest first ionization energy?

1. sodium
2. aluminum
3. calcium
4. phosphorus

3-Which compound forms a colored aqueous solution?

1. $CaCl_{22}$
2. $CrCl_3$
3. NaOH
4. KBr

4-When a metal atom combines with a nonmetal atom, the nonmetal atom will

1. lose electrons and decrease in size
2. lose electrons and increase in size
3. gain electrons and decrease in size
4. gain electrons and increase in size

5- According to Reference Table S, which of the following elements has the smallest atomic radius?

1. nickel
2. cobalt
3. calcium
4. potassium

6-Which element in Group 15 has the strongest metallic character?

1. Bi
2. As
3. P
4. N

7-Which halogens are gases at STP?

1. chlorine and fluorine
2. chlorine and bromine
3. iodine and fluorine
4. iodine and bromine

8-When combining with nonmetallic atoms, metallic atoms generally will

1. lose electrons and form negative ions

2. lose electrons and form positive ions
3. gain electrons and from negative ions
4. gain electrons and form positive ions

9-Which set of elements contains a metalloid?

1. K, Mn, As, Ar
2. Li, Mg, Ca, Kr
3. Ba, Ag, Sn, Xe
4. Fr, F, O, Rn

10-Atoms of elements in a group on the Periodic Table have similar chemical properties. This similarity is most closely related to the atoms'

1. number of principal energy levels
2. number of valence electrons
3. atomic numbers
4. atomic masses

11-As atoms of elements in Group 16 are considered in order from top to bottom, the electro negativity of each successive element

1. decreases
2. increases
3. remains the same
4. decreases and increases

12-The first ionization energy of an element is 736 kJ per mole of atoms. An atom of this element in the ground state has a total of how many valence electrons?

1. 1
2. 2
3. 3
4. 4

13-An atom of which of the following elements has the greatest ability to attract electrons?

1. silicon
2. sulfur
3. nitrogen
4. chlorine

14-At STP, which substance is the best conductor of electricity?

1. nitrogen
2. neon
3. sulfur
4. silver

15-Which metal is obtained commercially by the electrolysis of salt?

1. Zn
2. K
3. Fe
4. Ag

16-Which element can be found in nature in the free (uncombined) state?

1. Ca
2. Ba
3. Au
4. Al

Appendix B: Likert Scale (Questionnaire)

Dear Student:

The specific goal of this questionnaire is to measure your attitudes toward studying Biology by different types of teaching techniques.

Read carefully the following instructions before you fill the Likert Scale:

-The Questionnaire consist of (10) statements, each one have (5) agreements, from Strongly Disagree (1) to Strongly Agree (5).

- Please choose one agreement for each statement.
- Time period required is about (10 minutes)
- It's up to you if you want to write your name or not on the questionnaire paper.

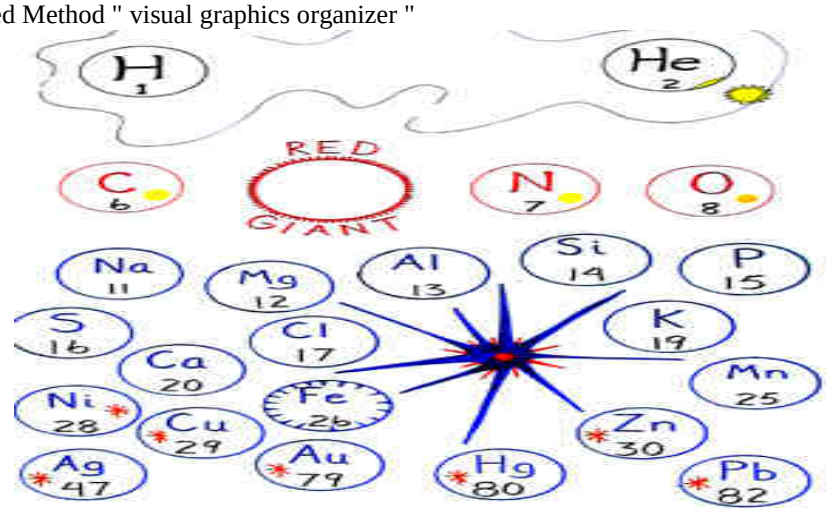
Dear Student:
Please rate your agreement with the statement:
Circle the agreement you chose.
Pre-Likert Scale Attitude Questionnaire
Name: (write your name if you want only)

Grade: 11

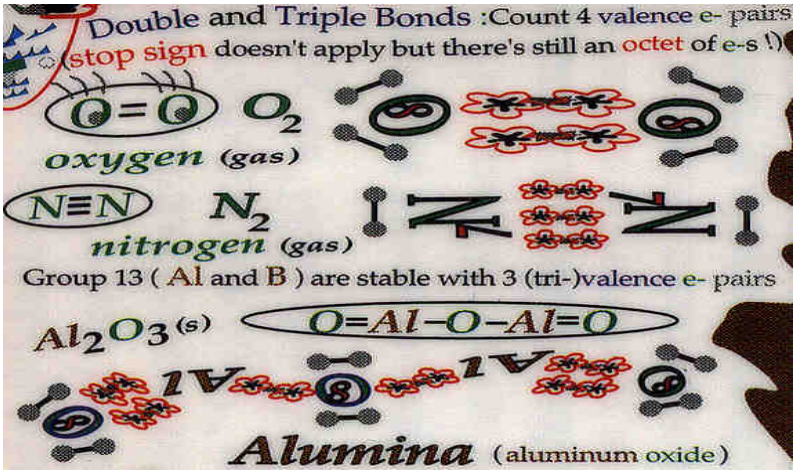
Section:

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	Statement
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	1. Chemistry is simple for me.
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	2. I can understand relation ship.
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	3. I remember the sequence of event in chemistry problem
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	4. I can use an organizer to help complete assignments
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	5. I use cloud diagrams to help me organize my essays
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	6. flow charts help me remember the
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	7. I can choice a graphic organizer to help me learn the content
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	8. Using graphic organizers help me understand the reading assigned.
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	9. I like studying the theory of chemistry.
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	10. I enjoy studying chemistry at home.

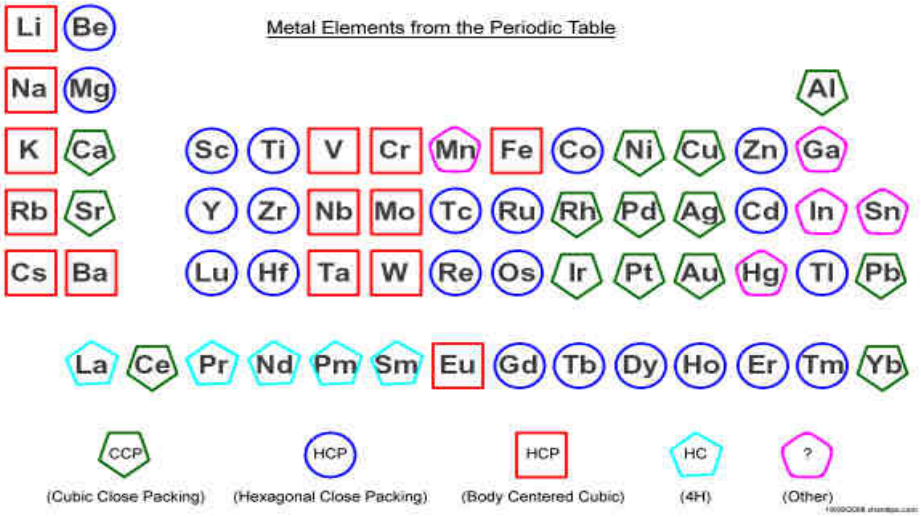
Appendix C: Used Method " visual graphics organizer "



1-


Double and Triple Bonds :Count 4 valence e- pairs
stop sign doesn't apply but there's still an octet of e-s !)
O=O
O2
oxygen (gas)
N≡N
N2
nitrogen (gas)
Group 13 (Al and B) are stable with 3 (tri-)valence e- pairs
Al2O3 (s)
O=Al–O–Al=O
Alumina (aluminum oxide)

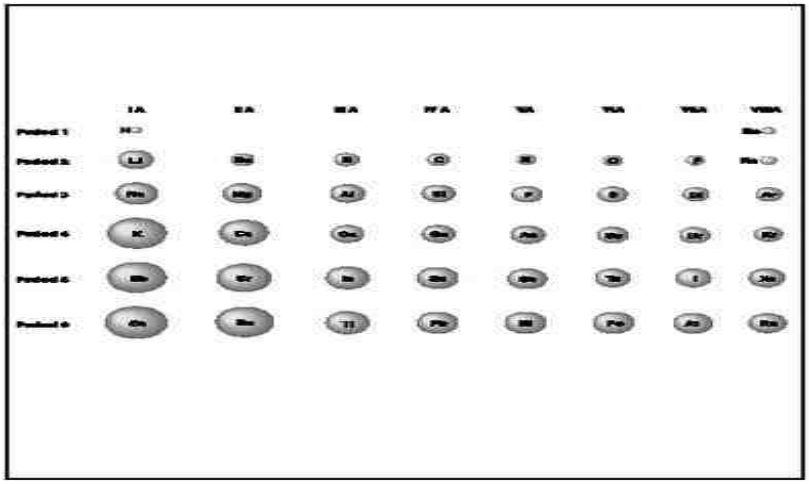
2-


Metal Elements from the Periodic Table
Li Be
Na Mg
Al
K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga
Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn
Cs Ba Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb
La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb
CCP
(Cubic Close Packing)
HCP
(Hexagonal Close Packing)
HCP
(Body Centered Cubic)
HC
(4H)
?
(Other)

3-


PERIODIC TABLE of the ELEMENTS

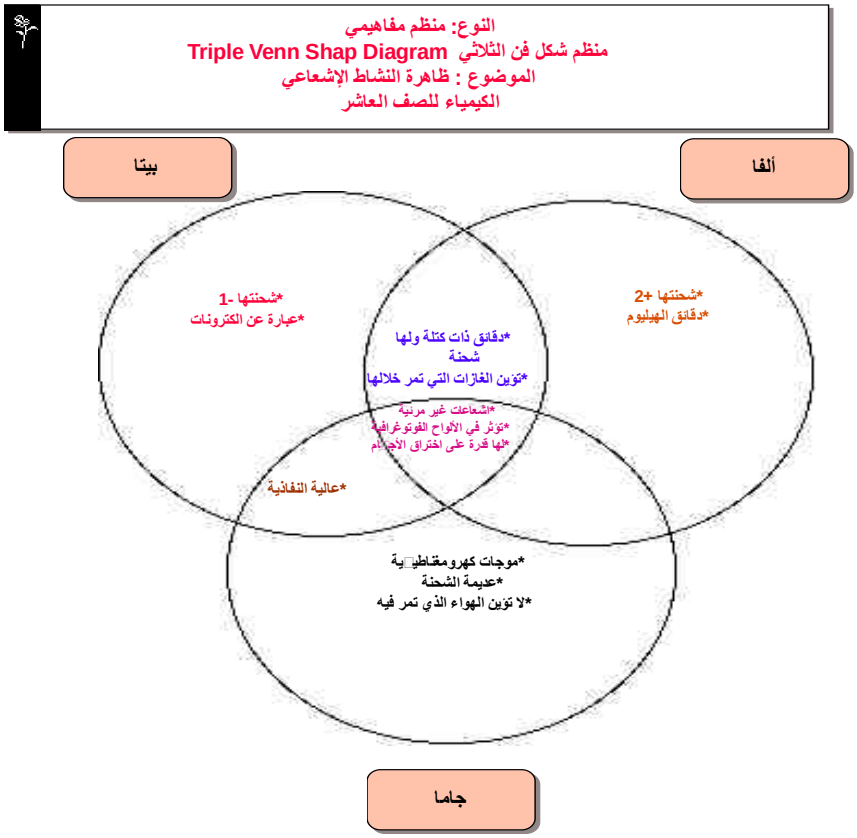
4-



5-


Gd
64
Gadolinium
Atomic Weight
Density
Melting Point
Boiling Point
He
Ne
Ar
Kr
Xe

6-


النوع: منظم مفاهيمي
منظم شكل فن الثلاثي Triple Venn Shap Diagram
الموضوع : ظاهرة النشاط الإشعاعي
الكيمياء للصف العاشر
بيتا
ألفا
*شحنتها -1
*عبارة عن الكترونات
*شحنتها +2
*دقائق الهيليوم
*دقائق ذات كتلة ولها شحنة
*تؤين الغازات التي تمر خلالها
*اشعاعات غير مرئية
*تؤثر في الالواح الفوتوغرافية
*لها قدرة على اختراق الاجسام
*عالية النفاذية
*موجات كهرومغناطيسية
*عديمة الشحنة
*لا تؤين الهواء الذي تمر فيه
جاما

7-