

A Survey on the influence of Mathematical knowledge in Chemical Science

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Abstract - Knowledge has become a way of developing life as the world is now a global village. The ability to create knowledge is main source of development for today and future and this ability is the main source of development for today and the future which can be achieved through the knowledge of mathematics. Society and mathematics are both better off because of the application of mathematical theories to societal development. Mathematics has its influence in chemistry. There are some tools produced in mathematics useful for chemistry. This study investigated the indistinguishable companion of mathematics and chemistry in fostering science and technology education through the perceived influence of mathematics knowledge on students' performance in chemistry. The internal consistency of the instrument was 0.67 respectively using Cronbach alpha. The study is a descriptive research of the cross sectional survey type. A researcher designed questionnaire was used for collecting data for the study. It was discovered that chemistry student's perceived knowledge of mathematics influence their performance in chemistry. The results of this research work suggest that students who are very sound in mathematics perform better in chemistry.

Key words: knowledge, perception, performance, science
INTRODUCTION

Mathematics is regarded as a useful tool by chemists, all chemistry students need to pay attention to the study of mathematics in order to access and make the most of their science. There are various levels of mathematics used in chemistry, ranging from proportional reasoning to heavy-weight differential equations and Fourier analysis, study of any of the underlying mathematics reduce mathematical activity to a series of clean, dry routines and procedures. According to Hewson (2011), many students then struggle with applying the quantitative knowledge in the complicated chemical contexts encounter. According to Flapan, Hemkin, Robinson, Schrier, Seeman and Simion, mathematical confidence and

problem solving ability are probably the most important factors in predicting the success of students in chemistry. However, knowledge and skills in the areas of basic mathematics, calculus, and 3 dimensional geometry as described below, can be useful as a prerequisite to general chemistry. It was also emphasized that, It is unlikely that a student will excel in general chemistry without a solid understanding of and facility with the following basic mathematics topics: unit conversions, significant figures, proportions and concentrations, expressions involving exponents and logarithms, basic trigonometry and algebra including graphing, summation notation, probability and statistics and applications of all of the above to word problems.

Chemistry involves the creation of molecules from the atoms that occur naturally. According to Malkervitch (2017) there are 92 naturally occurrence elements in chemistry with complex properties, some are gases, some are liquid and some are solid at room temperature. From the beginnings of chemistry, mathematics was used to create quantitative and qualitative models to comprehend the world of chemistry by understanding the elements that make up molecules. An atom is made up of particles known as protons, neutrons and electrons.

Chemistry is concerns with measurement issues concerning these particles protons, neutrons and electrons have mass and electrical charge that can be measured. Numbers have been used to understand the structure of the 92 naturally occurring elements and to classify them into families with similar kinds of chemical properties, which lead to the formation of periodic table. This helps in organizing the elements into cheaters which have similar properties and then was the information to understand the properties of these elements.

The following table consists of the on how some contents in mathematics relate with chemistry.

Table 1: Contents in Mathematics and How Related to Chemistry

Mathematics	Chemistry Context
Ratios	Mixing solutions with certain molarities, making dilutions
Proportional reasoning Algebra and graphs	Analysis of molecular structure; moles Analysis of experimental plots of reaction rates; gas laws
Calculus	Predicting and measuring rates of reaction in measurable experiments
Units of measurements	Making sense of real, complicated measurement
Vectors	Understanding crystal structure
Logarithms	Understanding pH
Probability	Drawing general conclusions from trials

Measurement is another aspect of mathematics that is very useful in chemistry. Different units in measure are being used in chemistry such as centimeter(cm), inch(in), foot(ft), meter(m), kilometer(km) for length; gram(g), kilogram (kg) for mass. Second(sec), minute (min), hour (hr), for time; sq (unit of length) for area; density kg/m³. The natural sciences involve observation and numerical measurements of quantities such as length, volume, temperature, density and the concentration of chemical solutions. The measurement referred to is tool in mathematics and its application can be made use in chemistry and other natural sciences. Most of the above quantities mentioned have units associated with them which must be retained when use in calculation. Akinoso, O.F., A.R. Taiwo (2016) tried to find out a relation between various aspects of chemistry and mathematics through a survey.

OBJECTIVE OF THE STUDY

The objectives of this study is to find out whether mathematical knowledge influences student's performance in Chemistry (IMKC).

Research Question

The followings questions were answered:

- How do student's perceived knowledge of mathematics as it influence the performance in chemistry?

METHODOLOGY

The study is a descriptive research of the cross sectional survey type. 152 science students were randomly selected from 10 different Schools and Colleges in Haryana State. A researcher designed questionnaire on influence of mathematical knowledge on chemistry (IMKC) was used to collect data. It consists of 2 sections. Section A was on bio-data information of the respondents. Section B consists of five (5) questions. The instrument was validated. The internal consistency of the instrument was 0.67 using Cronbach alpha.

RESULTS

- How do student's perceived knowledge of mathematics as it influence their performance in chemistry?

Table 2: Students' Perceived Knowledge of Mathematics as it Influence their Performance in Chemistry

Sr. No.	Influence	Mean (X)	Decision
1.	I perform better in chemistry based on the knowledge of mathematics	3.94	Accepted
2.	Having knowledge of mathematics affects performance in chemistry	3.82	Accepted
3.	Students do perform well in chemistry with the knowledge of mathematics	3.84	Accepted
4.	Mathematics concepts are pre-requisites to some topics in chemistry	3.77	Accepted
5.	Creativity in mathematics influence students' performance in Chemistry	3.86	Accepted
	Grand Mean	3.85	Accepted

The result on table 2 revealed that the respondent admits that they perform better in chemistry based on the knowledge of mathematics, knowledge of mathematics affects performance in chemistry and perform well in chemistry with the knowledge of mathematics had mean scores of 3.94, 3.82, and 3.84 respectively. More so, respondents Mathematics concepts are pre-requisites to some topics in chemistry

and also Creativity in mathematics influence student's performance in chemistry on table 2 was 3.77 and 3.86 respectively were accepted. The average mean score of student's perceived knowledge of mathematics influence their performance in chemistry on table 2 was 3.85 and this was also accepted. With this result, it is postulated that students' perceived knowledge of mathematics influence their performance in chemistry.

CONCLUSION

According to the information gathered from the study on how chemistry students perceived their knowledge of mathematics, it was concluded that chemistry students perceived that they have adequate knowledge of mathematics to apply to related fields of study, that knowledge of mathematics relates with chemistry and knowledge of mathematics influence the students' performance in chemistry.

RECOMMENDATION

Since the knowledge of mathematics is very important in studying chemistry, the students of chemistry must find a way of attending more mathematics classes. Students are encouraged to attend tutorial classes in mathematics to improve their knowledge in the subject. The use of ICT is very important especially in the learning of mathematics, in this case, the students of mathematics and chemistry should be encouraged in using this medium in learning.

REFERENCES

- [1] Malkevitch, J. (2017). Mathematics and chemistry partners in understanding our world.
- [2] Hewson S. (2011). Mathematical Issues for Chemistry.
- [3] Ogunlade,O.O. and Olafare,F.O.(2012). Advantages of Internet and Intranet for knowledge creation among lecturers and students in University of Ilorin.
- [4] Soleymani B.and Rekabdar G. (2016). Relation between Mathematics Self-Efficacy and Mathematics Achievement with Control of Mathematics Attitude.
- [5] SO Akinoso, O.F., A.R. Taiwo (2016). Mathematics and Chemistry an Inseparable Companion