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Students' Attitude towards Science after Taking Chemistry

AMEL L. MAGALLANES
http://orcid.org 0000-0001-7455-5250
amelmagallanes@gmail.com
Capiz State University
Centro Escolar University
Capiz, Philippines

ABSTRACT

Regardless of one's major or field of specialization, science or Chemistry specifically, plays an enormous role in life. Chemistry has become an indispensable feature in creating innovative tools in teaching the fact that Chemistry informs, many thoughts and behaviors, students have not valued science in general and Chemistry in particular. Thus, this study utilized the quantitative research with the use of a questionnaire to collect necessary data for the study and the Sloven formula to determine students' attitudes and level of confidence after taking introductory Chemistry subjects taught in tertiary level science courses at Centro Escolar University, Makati Branch. The findings confirmed that the CEU Makati students have high-level of confidence after taking up Chemistry. Male or female, whether a graduate from private or public high school shows the same confidence level after taking Chemistry in performing exploring and applying what they have learned in their everyday activities and to other science subjects. Furthermore, there is a significant relationship between students who take up a science-related course as to their attitude level and level of confidence after taking up Chemistry. Teachers should encourage and motivate students to develop a high positive attitude towards Chemistry through skills and their ability.

Keywords **–** Science and Technology, Science Attitudes, Chemistry, Quantitative Research, CEU, Makati Philippines

INTRODUCTION

Every ASEAN country adopts highly standardized educational systems to deliver quality education and quality graduates. In the Philippines, the academicians find ways in which Chemistry and all other Science and Technology related subjects can be enhanced and be learned by proper appreciation among students.

Chemistry has always been a part of everything in the world. In the same way, Zuru (2009) remarked during his address "what [else] on earth is not Chemistry". Chemistry is undoubtedly present in the areas of agriculture, health, environment and a lot more. Hence, we can say that Chemistry acts as a stimulant in promoting the national growth and development.

According to Oskamp and Schultz (2005), attitude is defined as a predisposition to respond in a favorable or unfavorable manner with respect to a given attitude object. Attitudes, like academic achievement, are important outcomes of science education. However, the development of students' positive attitudes to Chemistry after taking the subject is one of the major responsibilities of every Chemistry teacher.

Herein, attitude means the interests or feelings of students towards studying Chemistry. The expected students' attitude towards Chemistry is considered to be a scientific approach showed by an individual in solving problems, assessing ideas and making decisions towards the subject. Such also are the beliefs and attitudes of students they promote.

The study focuses on the students' attitudes towards Chemistry subjects taught at tertiary level. The term 'subjects' refers to both theory and laboratory classes at the tertiary level. Thus, the scope of the present study was limited to Chemistry as experienced by students in tertiary school rather than out-of-school experiences obtained from external sources such as the media, museums, field trips and friends.

The results of the study are beneficial to Chemistry teachers to develop new learning experiences for the students and reconstruct these learning experiences in some ways enough to arouse the interest of the students. The results of the study can also help develop various methodologies and strategies that will help further motivate students to learn the science-related courses that could be applied in everyday life.

It is necessary for teachers to make a habit of acquiring new learning styles where they could improve their old and obsolete teaching methods, as well as,

use adequate, modern and relevant instructional materials and textbooks as they teach in their classrooms.

This study may also assist the students to improve their attitude towards the study of the Chemistry subject and understand how it can be applied in their daily activities.

FRAMEWORK

Evaluations of the different attitude of various students after taking Chemistry in teaching and learning have led to the development of various frameworks.

This framework is characterized by the inclusion of authentic, real-world learning experiences which can be enumerated in the following pedagogies: problem-oriented and case-oriented, inquiry-oriented, design, modelling, and construction-oriented, knowledge-building and immersive learning.

Demographic profile such as gender, age, and the school from where they graduated have a crucial role in the attitude of students towards Chemistry. In the same way, it can be leverage on how they perceived Chemistry as one of their major subjects and how confident they are after passing the Chemistry subject.

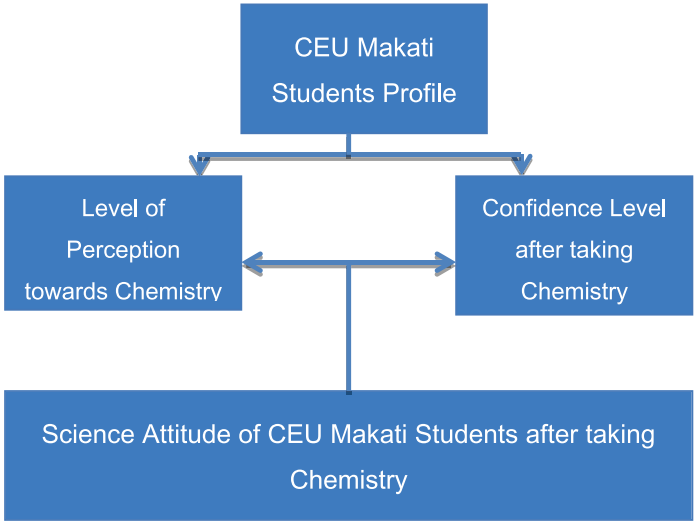

Figure 1. The Conceptual Framework of the Study

OBJECTIVE OF THE STUDY

The study aimed to investigate the attitude of students to teaching and learning of Chemistry at the tertiary level of education. The study also determined the students' attitudes towards Chemistry and the students' level of confidence after taking up the Chemistry subject.

METHODOLOGY

The study was conducted at Centro Escolar University, Makati Campus. The respondents of this study consist of the sophomore students in the tertiary level from the different programs offered by Centro Escolar University, Makati Campus. A total of 226 numbers of students were randomly selected from every program at Centro Escolar University, Makati.

A probability sampling technique used by Sloven was used to determine the sample size at 0.05 margin of error. Stratified random sampling was used to distribute the number of samples.

In carrying out the study, the research used a questionnaire to collect necessary data. The attitude level is classified as "Highly Positive", "Positive", "Moderately Positive", "Negative", and "Highly Negative" while to determine the level of confidence of the students, the terms "Very Confident", "Confident", "Unconfident", and "Very Unconfident" were used in the study.

The questionnaire used for this study was a modified standard questionnaire on the attitudes of students towards the study of Chemistry; the instrument is divided into two sections. Section A consists of the demographic profile of the students while section B consists of questions on their attitudes and level of confidence after taking up the Chemistry subject.

Data Analysis Procedure

The data gathered from the profile were analyzed using frequency count, percentage and mean. The data on the study of the level perceptions (attitude) and the level of confidence towards Chemistry were analyzed using the weighted mean using the Likert scale with verbal interpretations. The mean ranges were interpreted as follows:

	Level of Perception			Level of Confidence	
	Mean	Verbal Interpretation		Mean	Verbal Interpretation
5	4.21 - 5.00	Highly Positive	4	3.21 - 4.00	Very Confident
4	3.41 - 4.20	Positive	3	2.41 - 3.20	Confident
3	2.61 - 3.40	Moderately Positive	2	1.61 - 2.40	Unconfident
2	1.81 - 2.60	Negative	1	1.00 - 1.60	Very unconfident
1	1.00 - 1.80	Highly Negative			

RESULTS AND DISCUSSION

Demographic Profile

Gender of the Respondents. The descriptive result shows that as regards gender, out of the 226 respondents, 166 or 73.50 percent were female, and only 60 or 26.50 percent were males. (Table 1).

Table1. Frequency and percentage distribution of respondents by gender

Gender	Frequency (F)	Percentage (%)
Male	60	26.50
Female	166	73.50
Total	226	100.00

The majority of the students taking up science-related courses at Centro Escolar University, Makati were dominated by female students. It signifies that female students prefer to take up any science-related course as their profession. Furthermore, it also implies female students are mostly interested in science-related courses compared to male students enrolling in science-related courses.

This finding affirms the study of Barnes, Mclnerney, and Marsh (2005), which in exploring the sex differences on science enrolment intentions, most of the females were engaged to enroll in science and other science-related courses because female students perceive work opportunities after graduation and the application of science.

Furthermore, Cousins (2007) revealed in his study that female students secondary level show interest to science subjects as compared with male students. It is an indication that most female students will end up pursuing an education in science and other science-related courses in their tertiary level.

Schools from where the Respondents Graduated

Table 2 shows that out of the 226 respondents, 167 or 73.90 percent come from the private schools and only 59 or 26.10 percent of the respondents were from the public school.

Table 2. Frequency and percentage distribution of respondents by high school they graduated from

High School Graduated From	Frequency (F)	Percentage (%)
Private	167	73.90
Public	59	26.10
Total	226	100.00

The result shows that majority of the students at Centro Escolar University, Makati taking up any science-related course come from private high school. This indicates that most of the students who graduated from private high school also pursue their tertiary education in private institutions. Furthermore, since most of the private tertiary institutions have comparatively higher tuition fees, only those who can afford to study are those who come from private high school as well.

Olatoye (2002) made a casual model of school factors as determinants of science achievement in Lagos State Secondary School. His study confirms that majority of the students taking up science-related courses come from private high schools and only few come from public secondary high school. His study further explains that one of the factor of this is due to economic status of the family.

Level of Perception of the Respondents towards Chemistry

The mean responses of respondents on the level of perception as their attitudes towards Chemistry as a subject such as environmentally aware, care about the effect of their result, imaginative, patience, help people, improve quality of life, solve problem, advances in society, and challenging were perceived by the respondents as *highly positive* as their attitudes.

However, much (12 out of 22) of the specified perceptions towards Chemistry is positive. Specifically, the perceptions on Chemistry with positive attitudes were socially aware, flexible in their ideas, friendly, inquisitive, enjoyable, interesting, varied, satisfying, exciting, and fascinating.

Furthermore, perception as athletic has a moderately positive attitude towards Chemistry as their subject (Refer to Table 3).

Table 3. Level of perceptions of the respondents towards Chemistry

	Level of Perception	Mean	V.I.
1	Athletic	3.11	Moderately Positive
2	Socially Aware	3.96	Positive
3	Environmentally Aware	4.33	Highly Positive
4	Flexible in their ideas	4.19	Positive
5	Care about the effect of their result	4.36	Highly Positive
6	Imaginative	4.34	Highly Positive
7	Friendly	3.85	Positive
8	Inquisitive	3.88	Positive
9	Patience	4.21	Highly Positive
10	Helps people	4.57	Highly Positive
11	Improve Quality of life	4.52	Highly Positive
12	Solve problem	4.34	Highly Positive
13	Advances in Society	4.54	Highly Positive
14	Enjoyable	3.84	Positive
15	Interesting	3.80	Positive
16	Challenging	4.45	Highly Positive
17	Varied	4.01	Positive
18	Interesting	4.08	Positive
19	Satisfying	3.83	Positive
20	Exciting	4.13	Positive
21	Fascinating	3.36	Positive
22	Exciting	4.20	Positive
	Grand Mean	**4.09**	**Positive**

The result shows that students taking science-related courses at Centro Escolar University Makati show a positive attitude. A grand mean of 4.09 established that they concentrate more, think about the topic, associate positive feelings and consequently achieve more towards Chemistry as a subject.

Respondents who come from private high schools and public high schools show no significant difference. Even though respondents finished from private high school who take up science-related courses, they were more exposed to better teaching methodologies and technology, they are also comparable to students who take up science course who come from public high school.

It conforms to the study of Thompson and Soyibo (2002), as the effect of lecture, teachers demonstration, discussion and practical works on Chemistry, that school factors do not affect their performances, private and public students exhibit the same perceptions as their attitudes towards Chemistry.

Level of Confidence of the Respondents after Taking Chemistry

The mean responses of respondents on the confidence level after taking Chemistry as a subject revealed that all of the specified items measuring its confidence level after taking Chemistry were perceived by the respondents as confident in their ability to: explain Chemistry, perform and analyzing, ask meaningful questions, and understand and apply what they have learned in after taking Chemistry as a subject with a grand mean of 2.90. (Refer to Table 4)

Table 4. Level of confidence of the respondents after taking Chemistry

	Level of Confidence	Mean	V.I.
1	Achieving a passing grade in a Chemistry class	3.13	Confident
2	Reading the Procedure for an experiment and conducting the experiment without the supervision	2.80	Confident
3	Designing and conducting the Chemistry experiment	2.92	Confident
4	tutoring another student in a Chemistry course	2.49	Confident
5	Determining what answer is required from a written description of a Chemistry problem	2.75	Confident
6	Ensuring that data obtained from an experiment is accurate	2.94	Confident
7	Proposing meaningful questions that could be answered experimentally	2.81	Confident
8	Explaining something that you learned in this Chemistry course	3.00	Confident
9	Choosing an appropriate formula to solve a Chemistry problem	2.92	Confident
10	Knowing how to convert the data obtained in a Chemistry experiment into a result	2.93	Confident
11	After reading an article about a Chemistry experiment, writing a summary on the main point	2.90	Confident
12	Learning a Chemistry theory	2.92	Confident
13	Determining the appropriate units for a result determined using a formula	2.87	Confident

14	Writing up the experimental procedure in a laboratory report	3.03	Confident
15	Writing a summary of the main point after watching a documentary dealing with some aspect of Chemistry.	2.86	Confident
16	Applying the theory learned in a lecture for a laboratory experiment	2.92	Confident
17	Writing up the result section in a laboratory report	3.14	Confident
	Grand Mean	**2.90**	**Confident**

The result suggests that students were confident after taking their Chemistry subject and confident in their ability to: explain Chemistry, perform and analyzing data, ask meaningful questions, understand and apply what new information they have learned in their Chemistry class in doing their everyday work and activities in other subjects.

Data further revealed that the level of confidence of the respondents could be described when respondents were grouped by gender and their high school graduated from. Data show that female respondents have high confidence level to perform, explore, and apply things they have learned after they have taken up Chemistry as a subject to their other activities and science subject. The data also show the same results to male respondents. Furthermore, when respondents were grouped as to their high school graduated from, the private and public high school respondents show the same confidence level.

Correlation between Students Confidence Level and their Level of Perception towards Chemistry

The relationship of students' level of perceptions to their confidence level towards Chemistry revealed that an r-value of .497 with a t value of 8.6 is higher than a tabular value at .01 level of significance, the null hypothesis is rejected (See Table 5).

Table 5. Correlation between the level of confidence and the level of perception of the respondents towards Chemistry

		Perception	confidence
perception	Pearson Correlation	1	.497(**)
	Sig. (2-tailed)		.000
	N	226	226
confidence	Pearson Correlation	.497(**)	1
	Sig. (2-tailed)	.000	
	N	226	226

This implies that students of Centro Escolar University, Makati who are taking up science-related courses have a positive attitude towards Chemistry. This has greatly influenced their performance in Chemistry.

The students' capability in performing different Chemistry activities and better performance in Chemistry is also associated with their level of confidence. This is shown in their ability to explain Chemistry, data analysis, raising meaningful questions, and apply what they have learned in their Chemistry class in doing their everyday work and activities in other subjects. Data further implies that when the attitude level of respondents towards Chemistry is positive, they also show a confidence level after taking Chemistry as a subject.

The result of this study conforms to the study of Lang, Wong, and Fraser (2005), the student's perceptions of Chemistry and attitudes in secondary school class in Singapore. Results show that if students show a positive attitude towards Chemistry they also exhibit a high level of confidence showing and applying what they have learned in their Chemistry class.

This study covered 226 sophomore students taking up science-related courses at Centro Escolar University, Makati.

The variables were limited to the demographic profile of the respondents on gender, course, and high school graduated from, and their perceived attitudes and confidence level after taking up introductory Chemistry as a subject. This did not include the identification of attitudes the student developed after taking up general Chemistry.

CONCLUSIONS

The attitude of the respondents towards Chemistry as a subject when grouped according to gender and schools they graduated is positive; they show interest and motivation in their Chemistry subject. CEU Makati students taking up a science-related course perceived high level of confidence after taking up the Chemistry subject. Whether male or female, and whether they were graduates from private or public high schools, they show the same confidence level after taking Chemistry in performing, exploring and applying what they have learned in their everyday activities and to other science subjects. There is a significant relationship between CEU Makati students who take up science related course as to their attitude level and confidence level after taking up Chemistry. When the respondents show a positive attitude, they also have a high confidence after taking Chemistry as a subject.

TRANSLATIONAL RESEARCH

The findings of the study may be best translated to various media of communication for information dissemination, if not, for further awareness campaign. Brochures and manuals may be produced for information dissemination. Indigenous materials such as wall newspaper, one-act play, among others may be designed for stakeholders from the remote areas, and social media, mass media (TV, newspaper, and radio) may be used in the information dissemination.

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