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**EDUCATIONAL TELEVISION PROGRAM EXPOSURE AND CHEMISTRY
PERFORMANCE OF THE THIRD YEAR LABORATORY HIGH SCHOOL STUDENTS
OF NAVAL STATE UNIVERSITY**

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ABSTRACT

The study was conducted to determine the effects of educational television program exposure on Chemistry performance of the third year laboratory high school students of Naval State University. Employing the one shot survey design, 111 respondents in Chemistry were involved as subjects of this study. Almost two-thirds (58.4%) of the respondents were female. Their family's mean income posted at P11, 103.30. Generally, they obtained an average grade in General Science and average grade in Biology. They spent a mean of 1.97 hours in studying Chemistry subject. In terms of access to educational television facilities, a big proportion (94.6%) of the respondents owned television set. But only 43.2% had cable subscription. Only 45% watched educational TV shows through the cable channels. Five types of television shows were watched by the students. Most of them watched educational TV shows, but only one-half (52%) had watched Chemistry concepts in the ETV shows. The students revealed the following Chemistry topics as they watched ETV shows: atoms, matter, kinetic energy, chemical change, chemical reactions, elements and compounds, gas laws, solutions and mixtures, phases of matter, colloids, scientific notation, molecules, physical change, molarity and molality, laboratory apparatus, and electrolytes. During the first performance evaluation (pre-test), the student's overall total mean score posted at 14.49. Their performance was generally at average level. During the second performance evaluation (post-test), their overall total mean score posted at 17.26. Their performance was at highly average level. A highly significant difference was noted between the first and second evaluation performance of the students, except in the topics of Le Chatelier's principle of chemical equilibrium and the 2nd law of thermodynamics. Their performance ratings during the 2nd evaluation were significantly higher than the different topics in chemical change, chemical reaction and reaction kinetics. Among the profile variables tested, only the grade in General Science and grade in Biology found to be significantly related to Chemistry performance. Exposure to ETV programs was not significantly related to the students' Chemistry performance.

KEYWORDS: Chemistry Performance; Educational Television Program; Exposure.

INTRODUCTION

In response to the urgent need to improve the quality of education as well as to improve the performance of the students in Chemistry subject which the students considered it as the most difficult to understand, educational television programs related to Chemistry are aired and presented in television networks. Knowledge Channel is one of the television networks to use TV show as an appropriate tool in presenting the lesson that could eliminate the boredom and helps to have better understanding of the lesson.

Knowledge Channel aims to improve the quality of education by providing universal access to quality and relevant education through the creative use of audio-visual production and transmission technology. It is committed to bringing quality education closer to the Filipinos. Knowledge Channel is the only all educational TV Channel on cable. It believes in the effectiveness and efficiency of television as teaching tool and as an instructional medium. Knowledge Channel foundation through educational television hopes to equalize the learning field by making quality educational video materials available to poor students in the Philippine Public Schools.

Based on the foregoing information, Knowledge Channel is one of the potential contemporary technologies used by many teachers and students in other universities to attain thorough understanding and enhance learning. It is more advantageous to utilize such medium for it can predict the optimum performance in a relatively short time and minimal expense.

In actual setting, our learners are incapacitated to comprehend, use their critical thinking skills, compute or do problem solving (Collado, 2000). Some lack the comprehension skills and some has no retention as observed by the researcher since she is teaching Chemistry for ten years at the venue of this study. Currently, there are some students who could not follow the basic rules in problem solving. Majority of the students lack the comprehension skills. Students do not review their past lessons, master the subject matter or do their assignment. Since the Institute is already a university, high school students should develop their higher thinking skills. They should be updated and exposed with the different multi-sensory aids of teaching so that when they go to college they will not become ignorant with this advent of technology.

Along this vein of thought, the teacher should therefore consider how she motivates her students. Teacher's creativity is constantly challenged to make her lesson presentation not only interesting but also unique, perhaps in a way, the student would enjoy and even remember after they get out of school (Guiral, 2003).

Since educational television program (ETV) on Chemistry are readily available to students it is interesting to find whether the ETV program carry or present concepts in Chemistry that could enhance students' performance in the subjects. Moreover, it is worth finding out whether student's exposure to these ETV programs has bearing on the chemistry performance of the students of Naval State University Laboratory High School.

OBJECTIVES OF THE STUDY

This study aimed to determine the effects of exposure to Chemistry concepts in educational television on the Chemistry performance of the Third Year Laboratory High School of Naval State University. Specifically, this study was conducted to:

1. Determine the profile of the third year student of Naval State University Laboratory High School in terms of: sex, family income, grade in previous science subject taken, hours spent in studying Chemistry, access to educational television facilities, and time spent in watching educational program.
2. Ascertain the students' exposure to Chemistry concepts in educational television programs;
3. Find out the Chemistry lessons learned by students through watching educational television program;
4. Determine the students' performance in Chemistry during: the first performance evaluation, and the second performance evaluation
5. Find out the significant difference of students' Chemistry performance between the second and first evaluation
6. Find out the significant relationship of variables in terms of; students' profile and performance in Chemistry, students' profile and the exposure to Chemistry concepts in the educational television program, students' exposure to Chemistry concepts to educational television programs and performance in Chemistry.

FRAMEWORK OF THE STUDY

This study determined the effects of exposure to educational television program to the Chemistry performance of the 3rd year Laboratory High School students of Naval State University. This utilized the one group pre-test post-test design with considered exposure to ETV programs carrying Chemistry concepts as an intervention. It also utilized the students' profile such as sex, family income, grade in previous science subjects taken, the number of hours spent in studying Chemistry and the respondents' access to educational television facilities as independent variables. The dependent variable of this study was the students' performance in Chemistry. The administration of pre-test and post-test, also called first and second evaluations respectively, was done with an interval of about one and a half months. Within that span of time, the students were advised to seek information about the Chemistry concepts by watching television in addition to what they have learned in the classroom, Figure 1 presents the conceptual framework of the study.

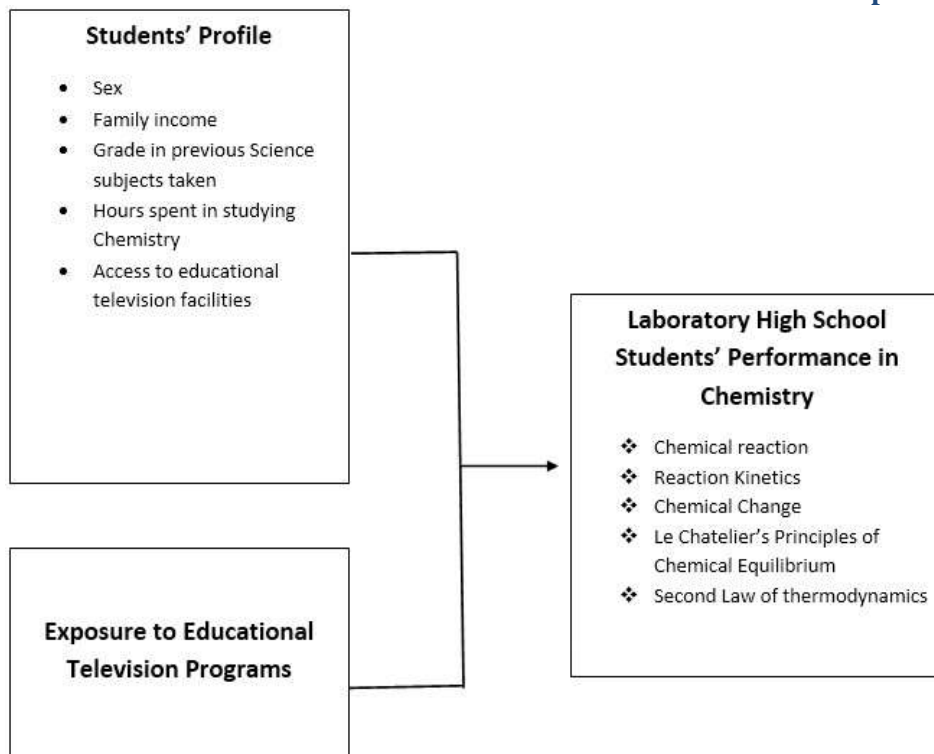


Figure1. Conceptual framework of the study.

Scope and Delimitation of the Study

This study focused on finding out the effects of exposure to educational television program on Chemistry Performance of the Laboratory High School students of Naval State University, Naval, Biliran. Respondents of this study were limited to the third year Laboratory High School students of Naval State University. The exposure of the students to the educational television program was not controlled since the participant-students were just encouraged to watch television programs to enhance their knowledge of the Chemistry concepts taught in the classroom. The performance of the Chemistry was also limited to five topics in Chemistry. The study was conducted for one and a half months only.

METHODOLOGY

This study utilized the present design which focused on finding out the effects of Educational Television Program exposure to the Chemistry performance of the students it also utilized the descriptive correlational design wherein the students' profile such as sex, family income, grade in previous science subjects taken, the number of hours spent in studying chemistry, and the respondents access to educational television facilities were tested for correlation to the Chemistry performance. The pretest and posttest, also called first and second evaluations in this study, was measured after one and a half months interval. The venue of this study was the laboratory high school of Naval State University located at the Municipality of Naval, the capital town of Biliran Province. There were 111 third year Laboratory High School students of Naval State University who served as the respondents of the study. This study utilized a 40-item multiple choice teacher-made test that was adapted from national and international sources, as well as from the episodes of Knowledge Channel. The 40-item test were representatives for the contents of Chemistry topics presented in the Knowledge Channel. The test, which served as the pretest and posttest was also referred to as the first and second evaluations. To obtain the profile of the students, an interview questionnaire was used. The interview questionnaire contained eleven items which represented the students' profile such as sex, family income, grade in previous science subject taken, hours spent in studying Chemistry, and access to the Educational Television program. Data in this study were analyzed with the aid of Statistical Package for social Sciences (SPSS) Version 11.5. Descriptive statistics such as mean, percentage and frequency counts were utilized to describe the respondent's scores

in the pretest, posttest, and incremental scores and some profile variables. T-test was applied to determine significant differences of variables. Chi-square and Pearson correlation were used to ascertain the significant relationships of variables.

RESULTS AND DISCUSSION

Results of this study were presented according to the objectives such as the Effects of Education Television Program Exposure on Chemistry Performance of the third year laboratory high school students during the pretest and posttest incremental scores, significant differences in learner's performance and highlights of Knowledge Channel Exposure experience of the learners.

Profile of the Third Year Laboratory High School Students of Naval State University. The respondents' profile considered in the study included sex, family, income, grade in previous science subjects taken, hours spent in studying chemistry, and access to educational facilities. Table 1 portrays the profile of the third year laboratory high school students of Naval State University.

Sex. As presented in Table 1, there were 65 or 58.6% female students and 46 or 41.6% males. Results showed that most of the respondents in the third year laboratory high school of NSU are female. This implies that the female respondents were dominant in terms of quantity or distribution among the third year students.

Family Monthly Income. As portrayed in Table 1, one (1) or 0.9 percent out of the total 111 respondents had a family income of P30,000 above; nine (9) or 8.1 percent had P21,000 - P29,999 bracket; 29 or 26.1 percent had an income of P11,000 - 20,999 bracket; 39 or 35.1% of the respondents had a family income of P6000 - 10,999 bracket; and 33 or 29.7% of the respondents posted at P11,103.30. The data indicates that the family monthly income of the respondents is from P6000 - 10,999 which implies that ownership of a family television set is possible and affordable for their families.

Grades in previous Science subjects taken (General Science and Biology). As gleaned in Table 1, it can be seen that out of 111 respondents, not among of them got the grade of 93 and above described as outstanding performers in General Science. A little less than one fourth (24.3%) were able to get a grade range of 89 - 92 described as above average performers; less than one half (44.1%) of their grades ranged from 85-88 considered as average performers; more than one fourth (27.9%) obtained a grade of 81-84 described as below average performer; and four (4) or 3.6% of the respondents were able to get a grade of 80 below described as poor performers. In Biology, a little less than a percent (0.9%) was able to get a grade of 93 described as outstanding performer. A little more than one fourth (27.9%) were able to get a grade of 89-92 described as above average performers; almost one half (49.5%) obtained a grade of 85-88 considered as average performers; 18 or 16.2 percent with a grade of 81-84 described as below average performers; and six (6) or 5.4% were poor performers with a grade of 80 below. The data implies that nobody of the respondents was considered as outstanding performer in the previous science subjects taken. Another profile of the respondents considered in the study was the number of hours spent in studying Chemistry. There were only four (4) or 3.6% of the respondents who spent one (1) hour in studying Chemistry daily, five (5) or 4.5% studied Chemistry for one hour and thirty minutes; 97 or 87.5% studied Chemistry for two (2) hours; two (2) or 1.8% of the respondents spent two (2) hours and 30 minutes; two (2) or 1.8% spent three (3) hours; and only one (1) or 0.9% spent four (4) hours in studying Chemistry on a daily basis. The student's mean duration of studying Chemistry was 1.97 hours. Results would imply that students allot a considerable time for studying their Chemistry lessons.

Access to educational television facilities. Students' access to educational TV facilities was ascertained by asking them about TV set ownership, connectivity to cable TV, and place and exposure to educational TV shows. As shown in the table, out of 111 respondents, 105 or 94.6 percent owned a TV set and only six (6) or 5.4% have no television set at home. This implies that majority of the respondents have potential access to educational television. When asked if their TV sets are cable connected, 63 or 56.8 percent of them revealed to have no cable connections and 48 or 43.2% were connected to cable. It was revealed in the survey that a lone (1) or 0.9 percent respondent watch educational TV shows in school because they do not have cable connection; a little more than one fourth (26.1%) watched ETV shows in their relatives' and friends' house; less than one fifth (18%) watched ETV shows in their neighbors. There were 61 or 55% who did not care to watch ETV shows because they do not have a cable connection. This implies that notable

proportion of the students have access to educational television programs since most of the educational TV shows are aired accessible through the cable connection.

Table 1. Profile of the third year laboratory high school students of NSU.

Profile of the Respondents	<i>f</i>	%
Sex		
Female	65	58.6
Male	46	41.1
Total	111	100
Family Monthly Income		
30,000 above	1	0.9
21,000 - 29,999	9	8.1
11,000 - 20,999	29	26.1
6,000 - 10,999	39	35.1
5,000 below	33	29.7
Total	111	100
Grade in previous science subject taken		
General Science Grade		
93 above - outstanding	0	0
89 - 92 - above average	27	24.3
85 - 88 - average	49	44.1
81 - 84 - below average	31	27.9
80 below - poor	4	5.6
Total	111	100
Biology Grade		
93 above - outstanding	1	0.9
89 - 92 - above average	31	27.9
85 - 88 - average	55	49.5
81 - 84 - below average	18	16.2
80 below - poor	6	5.4
Total	111	100

Hours spent in studying Chemistry

1.0	4	3.6
1.5	5	4.5
2.0	97	87.4
2.5	2	1.8
3.0	2	1.8
4.0	1	0.9
Total	111	100

Access to educational facilities

Own TV?

Yes	105	94.6
No	6	5.4
Total	111	100

Cable connectivity

No	63	56.8
Yes	48	43.2
Total	111	100

Place of watching ETV shows

School	1	0.9
Relatives	29	26.1
Neighbors	20	18.0
Don't watch ETV	61	55.0
Total	111	100

Students' Exposure to Chemistry Concepts in Educational Television Programs. To find out if the students were exposed to Chemistry concepts by watching educational TV shows, they were asked about the different TV programs they watched. From the TV programs that they were watching, they were asked to ascertain if Chemistry concepts were embedded in the TV shows. Table 2 presents the different television programs watched by the students.

Table 2. TV Programs watched by the students.

TV Programs watched by students	<i>f</i>	%
Variety Show	52	46.8
News	52	46.8
Educational TV shows	82	73.9
TV shows with Chemistry topics	58	52.3
Politics	29	26.1
Games	39	35.1

*Multiple response

The survey revealed that the third year high school students of NSU were watching five types of TV programs, namely variety shows, news, educational TV shows, politics and games shows. Less than one half (46.8%) of them watched variety show. Similarly less than one half (46.8%) of them watched news in television. Out of 111 respondents, a little more than one fourth (26.1%) of them watched politics in a television show. Almost three fourths (73.9%) of them watched educational television shows. Interestingly, the students disclosed that they have watched Chemistry topics or concepts while watching educational TV shows. This was revealed by more than one half (52.3%) of the respondents. The students have not encountered Chemistry concepts from the other TV programs watched. Results imply that the only TV program that carry messages or concepts on Chemistry is the educational television shows, and about one-half of the students were exposed to the Chemistry topic

Chemistry Lessons captured by the Students through Watching Educational Television Programs. One of the objectives of the study was to find out if students learned or encountered Chemistry lessons through the educational television programs. Positive result was achieved during the survey. Some lessons in Chemistry were portrayed in the educational TV programs. The Chemistry lessons learned by the students through watching educational television programs are presented in Table 3. The chemistry lessons watched by the students are as follows: atoms with frequency of 20; matter (18); kinetic energy (9); chemical change reaction/ properly (9); elements / compounds (8); gas laws (8); solutions and mixtures (7); phases of matter (6); colloids (6); scientific notation (4); molecules (4); physical change (4); molarity and molality (3); laboratory apparatus (3); and electrolytes (2). This implies that the respondents were able to capture chemistry lessons through watching educational television programs and that the educational television programs carry messages related to Chemistry concepts.

Table 3. Chemistry lessons captured by the students through watching educational television programs.

Chemistry Topics*	Frequency (<i>f</i>) (n=58)	Percentage (%)
Atoms	20	34.4
Matter	18	31.0
Kinetic Energy	9	15.5
Chemical Change / Reaction Property	9	15.5
Elements / Compounds	8	13.7
Gas Laws	8	13.7
Solutions / Mixtures	7	12.1
Phases of Matter	6	10.3
Colloids	6	10.3
Scientific Notation	4	6.9
Molecules	4	6.9
Physical Change	4	6.9
Molarity and Molality	3	5.2
Laboratory Apparatus	3	5.2

*Multiple response

Students' Performance in Chemistry. To determine the students' performance in Chemistry, they were allowed to take an achievement test (Appendix A) which consisted of 40- item multiple choice teacher-made items. The test contained topics in chemical change, reaction kinetics, Le Chatelier's principle of Chemical equilibrium, chemical reactions, and the Second Law Thermodynamics. In this study, the students' performance in Chemistry was taken twice; first, prior to the survey and second was during the survey.

Students' performance in Chemistry during the first evaluation. Table 4 shows the students' performance in Chemistry during the first performance evaluation.

Table 4. Students' performance in respective Chemistry concepts during the first evaluation.

Chemistry Concepts	Frequency	Percentage
Chemical Change		
Scores		
0	7	6.3
1	15	13.5
2	33	29.7
3	38	34.2
4	15	13.5
5	3	2.7
Total	111	100
Chemical Reaction		
Scores		
2	6	5.4
3	7	6.3
4	21	18.9
5	33	29.7
6	18	16.2
7	15	13.5
8	4	3.6
9	1	0.9
10	4	3.6
11	1	0.9
14	1	0.9
Total	111	100

Table 4. Continuation

Chemistry Concepts	Frequency	Percentage
Reaction Kinetics		
Scores		
0	2	1.8
1	13	11.7
2	18	16.2
3	34	30.3
4	24	21.6
5	9	8.1

6	9	8.1
7	2	1.8
Total	111	100
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Le Chatelier's Principle Chemical Equilibrium		
Scores		
0	9	8.1
1	18	16.2
2	29	26.1
3	24	21.6
4	18	16.2
5	13	11.7
Total	111	100
<hr/>		
Second Law of Thermodynamics		
Scores		
0	23	20.7
1	44	39.6
2	30	27.0
3	13	11.7
4	1	0.9
Total	111	100

Chemical Change. It can be seen in the table that the lowest score for the lesson on chemical change was zero (0) with a frequency of (7) or 6.3% and the highest score of five (5) with a frequency of (3) or 2.7%; 15 or 13.5% for the score of one (1); 33 or 29.7% for the score of two (2) a little more than one third (34.2%) for the score of three (3); 15 or 13.5% for the score of (4); and three (3) or 2.7% for the score of five (5). The mean score posted at 2.43

Chemical reaction. The table showed that the lowest score was two (2) with a frequency of six (6) or 5.4%; seven (7) or 6.3% for the score of three (3); 21 or 18.9% for the score of four (4); 33 or 29.7% for the score of five (5); 18 or 16.2% for the score of six (6); 15 or 13.5% for the score of seven (7); four (4) or 3.6% for the score of eight (8); one (1) or 0.9% for the score of nine (9); four (4) or 3.6% for the score of ten (10); one (1) or 0.9% for the score of 11 or 14 respectively. Their mean score was 5.41.

Reaction kinetics. As gleaned in the table out of 111 respondents, there were two (2) or 1.8% who obtained the lowest score of zero(0) and also two (2) or 1.8% who obtained the highest score of seven (7). Results showed that 34 or 30.6% of the respondents were able to obtain a score of three (3) The mean score was 3.24.

Le Chatelier's principle of chemical equilibrium. Table 4 showed the lowest and highest scores of zero (0) and six (6) respectively. It can be shown also that the first performance evaluation score for the lesson is three (3) with a little less than one fourth (23.4%). The mean score of the students in this topic was 2.30.

Second Law of thermodynamics. The data on the table showed that out of 111 respondents, 31 or 27.9% were able to get a score zero (0); 47 or 42.3% obtained a score of one (1); a little more than one fifth (21.6%) got a score of two (2) and nine (9) or 8.1% were able to get a score of three (3). Results revealed that majority of the respondents got a score of one (1). A mean score of only 1.10 was obtained by the students.

Total score of students during the first evaluation. The total scores of the students during the first evaluation are presented in Table 5.

It can be gleaned on the table that out of 111 respondents only one (1) or 0.9% among them was able to get the highest and the lowest score of 23 and one (1) respectively. The mean score of the students was 14.49.

Table 5. Total score of the students in Chemistry during the first evaluation.

Scores	Frequency (<i>f</i>)	Percentage (%)
23	1	0.9
22	2	1.8
19	7	6.3
18	7	6.3
17	7	6.3
16	15	13.5
15	20	18.0
14	18	16.2
13	9	8.1
12	6	5.4
11	7	6.3
10	5	4.5
9	3	2.7
8	3	2.4
4	1	0.9
Total	111	100

This simply implied that the respondents found difficulty in taking the first performance evaluation in Chemistry. Due to their insufficient knowledge of the lessons mainly because they were still to be exposed to these ideas and skills later on. That is why both highest and lowest scores were not so high because the lessons were not familiar to them or the lessons were not discussed to them.

Based on the categorization, the performance score of the students during the first evaluation is illustrated in Figure 2.

As illustrated in the figure, the students' performance in Chemistry during the first evaluation was generally average.

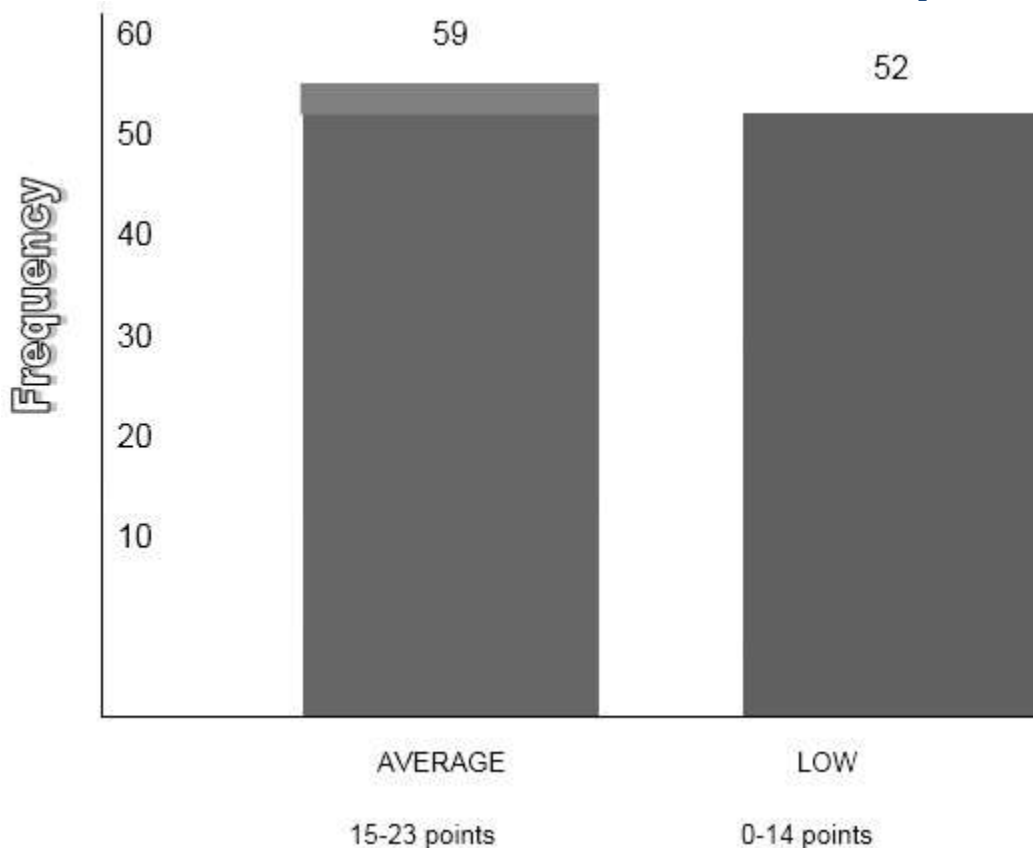


Figure 2. Students' level of performance in Chemistry during the first evaluation.

Students' performance in Chemistry during the second evaluation. The 40 test items contained in Appendix E was again given to the students, It was the same set of questionnaire given to the respondents during the first performance evaluation. Table 6 shows the result of students' Chemistry performance during the second evaluation.

Chemical change. As shown in the table, out of 111 respondents, seven (7) or 6.3% were able to get the lowest score of zero (0); there were five (5) who obtained a score of one (1); 22 or 19.8% obtained a score of two (2); 45 or 40.5 % got a score of three (3); 22 or 19.6% obtained a score of four (4); and 11 or 9.9 were able to get the highest score of five (5). Their mean score was 2.93.

Table 6. Students' performance in respective Chemistry concepts during the second evaluation.

Chemistry Concepts	Frequency	Percentage
Chemical Change		
Scores		
0	7	6.3
1	5	4.5
2	21	18.9
3	45	40.5
4	22	19.8
5	11	9.9
Total	111	100

Chemical Reaction

Scores	Frequency	Percentage
1	1	0.9
3	4	3.6
4	12	10.8
5	19	17.1
6	21	18.9
7	22	19.8
8	18	16.2
9	8	7.2
10	5	4.5
11	1	0.9
Total	111	100

Table 6. Continuation

Chemistry Concepts	Frequency	Percentage
Reaction Kinetics		
Scores		
0	5	4.5
1	5	4.5
2	9	8.1
3	20	18.1
4	29	18.1
5	24	26.1
6	9	21.6
7	7	6.3
8	3	2.7
Total	111	100

Le Chatelier's Principle of Chemical Equilibrium

Scores	Frequency	Percentage
0	9	8.1
1	18	16.2
2	29	26.1
3	24	21.6
4	18	16.2
5	13	11.7
Total	111	100

Table 6. Continuation

Chemistry Concepts	Frequency	Percentage
Second Law of Thermodynamics		
Scores		
0	23	20.7
1	44	39.6
2	30	27.0
3	13	11.7
4	1	0.9
Total	111	100

Chemical reaction. It can be seen in the table that only one (1) or 0.9% was able to obtain the lowest and the highest score of one (1) and 11 respectively. Results revealed that the second performance evaluation score for chemical reaction is seven (7). Their mean score was 6.42.

Reaction kinetics. It can be gleaned that out of the 111 respondents, five (5) or 4.5% were able to get the lowest score of zero (0) and three (3) or 2.7% were able to get the highest of three (3). The obtained mean score of the students posted at 4.02.

Le Chatelier's principle of chemical equilibrium. There were nine (9) or 8.1% who were able to get the lowest score of zero (0); and 13 or 11.7% obtained the highest score of five (5). Majority of the respondents were able to get the score of two (2) with 29 or 26.1%. Only a mean of 2.57% was achieved by the students.

Second law of thermodynamics. The data showed that one fifth (20.7%) were able to get the lowest score of zero (0); one (1) or 0.9% obtained the highest score of four (4); and majority of the respondents score one (1) with a frequency of 44 or 39.6%. A minimal mean score of 1.32 was obtained by the students.

Total scores during the second evaluation. The students' total scores during the second evaluation are presented in Table 7.

Table 7. Students' total scores in Chemistry during the second performance evaluation.

Scores	Frequency (f)	Percentage (%)
25	1	0.9
24	4	3.6
23	2	1.8
22	7	6.3
21	3	2.7
20	7	6.3
19	12	10.8
18	11	9.9
17	9	17.1
16	15	13.5
15	9	8.1
14	9	8.1
13	6	5.4
12	3	2.7
11	1	0.9
10	1	0.9
Total	111	100

It can be gleaned in the table that there was a change or increase of scores compared to the first evaluation. Although only one (1) or 0.9% among the respondents got the highest score of 25 out of the 40 total test items and the lowest score of seven (7) out of 111 respondents. The mean total score obtained by the students was 17.26. This implied that the respondents had already a background or stock knowledge in chemistry concepts.

Level of performance in Chemistry during the second evaluation. The level of performance in Chemistry of the students during the second evaluation is illustrated in Figure 3.

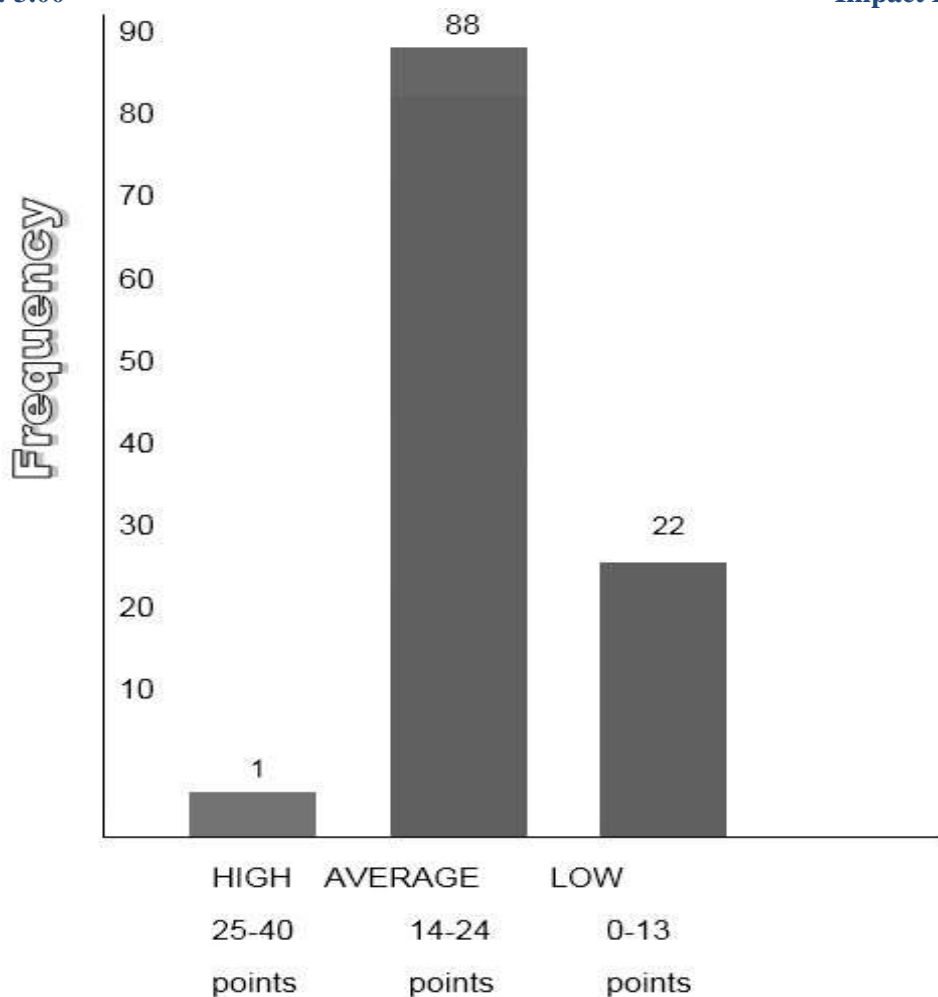


Figure 3. Students' level of performance during the second evaluation.

As shown in the figure, the number of low performers was reduced, while the number of average performers greatly increase. One high performer had already emerged during the second evaluation.

Differences of the Students' Performance Evaluation in Chemistry during the First and Second Evaluation.

This segment presents the differences of the students' performance in Chemistry during the first and second evaluation in terms of their mean, standard deviation, t-value, and degree of freedom. Table 8 illustrate the test of differences of the Students' performance in Chemistry during the First and Second Performance Evaluation.

Table 8. Test of differences of the students' Chemistry performance between the first and second evaluation.

Variables	Mean	SD	t	df	Sig. (2-tailed)
First Evaluation Chemical Change Second Evaluation Chemical Change	2.43 2.93	1.507	3.465	110	.001**
First Evaluation Chemical Reaction Second Evaluation Chemical Reaction	5.41 6.42	2.197	4.838	110	.000**
First Evaluation Reaction Kinetics	3.24	2.210	3.693	110	.000*

Second Evaluation Reaction Kinetics	4.02				
First Evaluation Le Chatellier's	2.30	1.911	1.490	110	.139 ^{ns}
Second Evaluation LeChatellier's	2.57				
First Evaluation 2 nd Law of Thermo	1.10	1.340	1.771	110	.079 ^{ns}
Second Evaluation 2 nd Law of Thermo	1.32				
First Evaluation Score	14.49	3.521	8.304	110	.000**
Second Evaluation Score	17.26				

** Significant at the 0.01 level (2-tailed)

^{ns} - Not significant

The t-test revealed highly significant differences between the first and second performances of the students in Chemistry, except in the topics Le Chatellier's principle of chemical equilibrium and 2nd law of thermodynamics. In chemical change topic, a highly significant difference was noted between the first and second performance evaluation, ($t=3.465$, $p < .01$), with the second evaluation yielding a higher score ($M=2.93$) than the first evaluation ($M=2.43$). In the topic chemical reaction, again a highly significant difference was noted between the first and second performance evaluation, ($t = 4.838$, $p < .01$), with the second evaluation yielding a higher score ($M = 6.42$) than the first evaluation ($M = 5.41$).

A highly significant difference was noted between the first and second performance evaluation in the topic reaction kinetics, ($t=3.693$, $p < .01$), with the second evaluation yielding a higher score ($M = 4.02$) than the first evaluation ($M=3.24$).

Interestingly, the total scores of the students between the first and second evaluations were found to be highly significant different, ($t=8.304$, $p < .01$), with the second evaluation yielding a higher score ($M=17.26$) than the first evaluation ($M = 14.49$). The results would imply that a significant difference on the students' chemistry performance between the first and second performance evaluation existed and that their performance scores in the second evaluation were higher than their first evaluation scores

RELATIONSHIP OF VARIABLES

This segment presents the relationship of variables such as students' profile exposure to Chemistry concepts in educational TV programs, and performance in Chemistry. Results of the Pearson correlation analysis is presented in Table 9.

Table 9. Correlation matrix of the relationship of student's profile and performance in Chemistry.

	Variables	Performance
Income	Pearson correlation	.141 ^{ns}
	Sig. (2-tailed)	.140
Grades in General Science	Pearson correlation	.277**
	Sig. (2-tailed)	.003
Grades in Biology	Pearson correlation	.285**
	Sig. (2-tailed)	.002
Time spent in studying	Pearson correlation	-.082 ^{ns}
	Sig. (2-tailed)	.39

*Correlation is significant at the 0.01 level (2-tailed)

^{ns} - Not significant

Results revealed that family income of the students was not related to their performance.

However, the Pearson correlation analysis showed that the students' grade in General Science was highly related to their performance in Chemistry ($r = .277$, $p < .01$), indicating that the higher was the grade obtained by the student in General Science, the higher was the score in the Chemistry evaluation test. Likewise, students' grade in Biology was highly related to their performance in Chemistry ($r = .285$, $p < .01$), indicating that the higher was the grade obtained by the student in Biology, the higher was the score in the Chemistry evaluation test.

Time spent by the students in studying Chemistry was not related to their Chemistry performance. Results may imply that the predictors of Chemistry performance of the students are the grades in General Science and Biology subjects.

Chi-square test was used to find out the relationship of students' sex, income, grades, and time spent in studying, exposure to Chemistry concepts in ETV programs and performance in Chemistry. Results of the Chi-square test is shown in Table 10.

The Chi-square test revealed that all variables tested were not found significantly related. This means that students' sex, family income, and grades in General Science and Biology and time spent in studying Chemistry had no relationship with their exposure to the Chemistry concepts portrayed in the ETV programs. Likewise, students' exposure to the Chemistry concepts in ETV programs. Likewise, students' exposure to the Chemistry concepts in ETV programs was not related to their performance in Chemistry.

Table 10. Relationship between students' profile and exposure to Chemistry concepts in ETV programs and performance in Chemistry.

Variables	X ²	df	Exact Sig.	Interpretation
Sex and Exposure	.160	1	.418	Not significant
Income and Exposure	18.031	23	.756	Not significant
Grade in Gen. Science and Exposure	18.744	12	.095	Not significant
Grade in Biology and Exposure	18.565	14	.182	Not significant
Time spent and Exposure	7.082	5	.215	Not significant
Exposure and Performance in Chemistry	18.794	16	.279	Not significant

Results would imply that the students' performance in Chemistry was not associated with their exposure to the topics or concepts on Chemistry that were portrayed in the educational TV shows. The increase in performance of the students during the second evaluation could be solely associated to their attendance and exposure to the lectures given to them by Chemistry teacher during classes.

CONCLUSIONS

Based on the results, the following conclusions were drawn: The female respondents in the study dominate the male respondents. The mean monthly family income of the respondents is posted at P11,103.30. The students have average grades in General Science and Biology. The students have spent a considerable time of almost two hours for studying Chemistry. The students have access to educational television at home. The students have been exposed to Chemistry topics through the educational TV programs in cable channels. The students have captured topics related to chemical change, chemical reaction, reaction kinetics, and other related topics. But they have not watched topics related to Le Chatelier's principle of chemical equilibrium and 2nd law of thermodynamics. Students' performance ratings in Chemistry during the first and second evaluation are generally at average level. The first evaluation performance of the students is significantly lower and different from their second evaluation performance. Hence, the first null hypothesis is hereby rejected. Students' grades in General Science and Biology are significantly related to the Chemistry performance. Hence, the 3rd null hypothesis is rejected. But the 2nd null hypothesis is accepted. The students' exposure to Chemistry concepts on ETV programs is not significantly related to their performance in Chemistry. Thus, the 4th null hypothesis is accepted.

RECOMMENDATIONS

In the light of the findings and conclusions in this study. The following recommendations are presented. Exposure to educational TV program, particularly Knowledge Channel, must be employed by the teacher as teaching strategy particularly at the laboratory high school to develop the students' higher thinking skills in Chemistry. The school administrators should provide access to educational television facilities in educational television programs like Knowledge Channel in schools as medium of instruction, so that students who do not have TV or cable connection at home, can access to the educational television programs for educational purposes. Teachers must be sent to trainings

and seminars to update themselves in the technology to enhance students' performance in Chemistry. Further studies should be conducted to employ a larger scope of topics and duration of the experiment, since the study was limited to the third year laboratory high school classes.

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