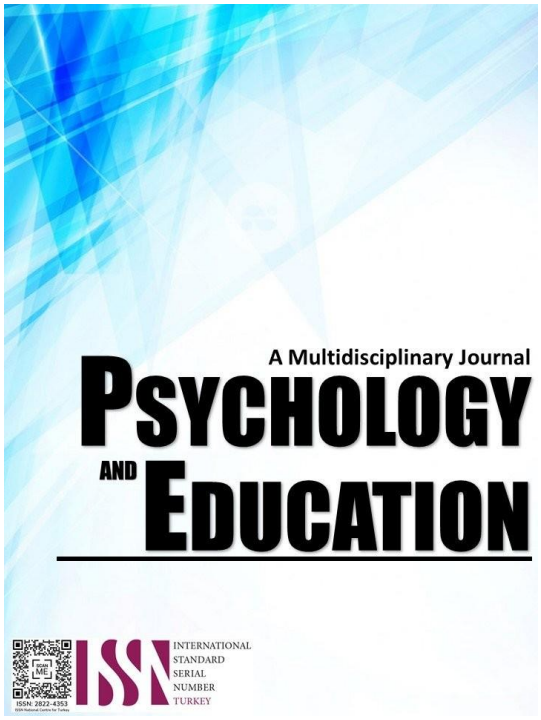
# INTERACTIVE MULTIMEDIA MATERIALS IN CHEMISTRY 10

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Research Article

# Interactive Multimedia Materials in Chemistry 10

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**Abstract**

The study sought to determine the effectiveness of the developed and validated Interactive Multimedia Materials in selected topics in Chemistry for Grade 10 students at Sta. Lucia High School, Division of Pasig City. Descriptive method and one- group experimental method of research were used in the study. The researcher used 52 Grade 10 students. The least mastered topics in Chemistry were Gas Laws. The experts and the teachers' respondents evaluated the developed IMM as "Satisfactory" with respect to Format, Content, Appropriateness and Updatedness. On the other hand, in terms of Presentation and Organization, the experts evaluated it as "Very Satisfactory" while the science teachers as "Satisfactory". In terms of its Technical Aspect, both groups of the respondents evaluated the IMM as "Very Satisfactory". Likewise, there was no significant difference between the perceptions of the experts and the science teachers on the developed material. Moreover, the level of performance of the learner respondents in the pretest was "Satisfactory", "Moderately Satisfactory" and "Needs Improvement". On the other hand, the level of performance of the learners in the Posttest was "Very Satisfactory" and "Satisfactory" for the topics in Gas Law and there was a significant difference in the mean scores of the pretest and posttest of the learners. Comments and suggestions were given by the respondents to further improve the interactive multimedia materials in Chemistry 10.

**Keywords:** *interactive multimedia materials, Chemistry, level of performance*

## Introduction

Science and Technology is essential for the national development and progress. Hence, the Philippine Constitution highlights its importance as Article XIV, Section 10 states, "The State shall give priority to research and development, invention and their education, training and services. It shall support indigenous, appropriate, and self-reliant scientific and technological capabilities and their application to the country's productive systems and national life".

It was the first time for the Philippines to join the Programmed for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD) in 2018, as part of the Quality Basic Education reform plan and a step towards globalizing the quality of Philippine basic education. Released on December 3, the 2018 PISA results revealed that the Philippines scored 353 in Mathematics, 357 in Science, and 340 in Reading, all below the average of participating OECD countries.

Teaching of the subject Chemistry is a challenging endeavor that calls for teacher engagement in a variety of methodologies and techniques in science to make the teaching-learning process meaningful. Despite the various approaches, methods, techniques, and strategies suggested, problems of students in learning science remain one of the most difficult tasks among science teachers. Thus, this predicament has called for the adaptation and utilization of sensible instructional materials.In support to Piaget's theory, the cognitive constructivist theory of multimedia (CCTM) was developed stating that designing interactive digital materials using the principles of CCTM produces functional interactive teacher-made digital learning materials that engage and motivate learners. In relation to this, teachers' role is to prepare suitable instructional materials that fit to the intellectual capacity of the students and monitor the development of the learners.

This is apparent in the integration of computer-based literacy programs in word analysis, text comprehension, and fluency, alongside shared stories (Castillejos, 2017). Computers inside the teaching space are highly used in many institutions such as the traditional or outdated, advanced and varied institutions. As the application of computers in the classroom develops, its prospective influence on learner's information retention and comprehension are immeasurably unknown.One such device that uses computer is the multimedia. Multimedia is a combination of text, animated graphics, videos, and sound delivered to learners by teachers via some electronic means. Educators use them because it appeals to students' sensitivity and makes the learning process more interactive. In a generic sense, multimedia is simply the use of more than one media elements. One has encountered multimedia if he has listened to a music clip from an online music store, played interactive games on the Web, or purchased a product or service using an interactive format and e-

commerce Web site.It is in this premise that the researcher was motivated to conduct this study, hopefully to bring to the fore the importance of multimedia as a device to advance the intellectual skills of the learners and to integrate and change enormous quantities of information that explain today's fast paced changing culture.

**Research Questions**

This study aimed to determine the effectiveness of the developed interactive multimedia materials in selected topics in Chemistry for Grade 10 students of Sta.Lucia High School during the school year 2019-2020. Specifically, it sought answers to the following questions:

1. What are the topics in Chemistry 10 that are suitable for the development of Interactive Multimedia Materials?
2. How do the experts and the Chemistry teachers evaluate the developed multimedia instructional materials in terms of the following criteria?
   2.1 Format;
   2.2 Content;
   2.3 Presentation and Organization;
   2.4 Appropriateness and Updatedness; and
   2.5 Technical Aspect?
3. Is there a significant difference in the evaluation of the two groups of respondents on the developed interactive materials?
4. What is the performance level of the learner's respondents before and after using the developed materials based on their pretest and posttest mean score?
5. Is there a significant difference between the pretest and posttest mean scores of the respondents?
6. What are the comments and suggestions of the two groups of respondents to improve the developed multimedia instructional materials?
7. What are the perceptions of the learner respondents on the use of the developed Interactive Multimedia Materials?

## Literature Review

Jamela (2011:67), as cited by Marces (2015) stated that the low performance of students is attributed to the deficiency of textbook and instructional materials in teaching the subject. Thus, it is important for the teacher to know how to develop interactive multimedia materials. The selection of the materials should be based on the needs, interest, and capabilities of the students.In addition, Solar (2016) had argued that the adoption of ICT enhances the quality of learning and improves the quality of education. This is consistent with the study by Gallego (2017) who argued that, for a successful improvement of the quality of education, a country needs implementation of ICT policies and regulations that must be effective and vigorous at all levels.Relatively, Se (2016) proved in their study that computer assisted instruction group performed significantly better in mathematics learning and that the time taken by the computer assisted instruction group was nearly two-thirds of the time taken by the traditional group to complete the instruction on the selected topic.

Multimedia learning tools could assist and help motivate students by supplementing traditional teaching modalities with learner-centered learning through application and practice (Son & Simonian, 2016). Likewise, Ignacio (2017) mentioned in his study that interactive multimedia learning contributed to the development of independent learning skills in students. Independent learning strategies elevate the students' interest in their subjects and competitiveness when it comes to different concepts and lessons. This kind of method does not only require the students to depend on the teacher's lectures, but they are also given the right to explore and discover new knowledge on their own. This also prepares them for their future careers as they take responsibility for the important things that must be done.

Another study about multimedia was conducted by Soriano (2015) entitled "Interactive Multimedia Materials in Physics and its Implication" which showed that there was a significant difference in the achievement of the students taught using multimedia materials. Thus, the students with improved instructional materials obtained the highest achievements score at posttest. Also, utilization of the improved interactive multimedia materials promotes and enhances effective teaching learning process in Physics.

Furthermore, Barredo (2015) in his study "Studying the Impact of Using Multimedia Interactive Programs on Children's Ability to Learn Basic Skills in Science" showed that there was an improvement in students' learning skills, which was not a proposal for the replacement of traditional education. Rather, interactive-enhanced learning could provide a very useful alternative to traditional education, especially in cases where it is not applicable to teach through traditional methods.Lastly, Belen (2017) conducted a study to find out the impact of using the computerized program of a multimedia structure on students'

cognitive traits and the educational methods which were ignored in the traditional method. The study showed a statistically significant difference in the average marks of the experimental group and the control group in favor of the experimental group which studied using the multimedia method.

## Methodology

The descriptive type of research was used to evaluate the developed IMM based on five criteria namely, format, content, presentation and organization, appropriateness, and updatedness. As stated by Zulueta (2010) the descriptive method focuses on the present condition of the person or class and may involve induction, analysis, and measurement. Descriptive method was applied because the problems were to test the level of acceptability and significant effect of the interactive materials as perceived by the respondents using the z-test.

On the other hand, the experimental type of research that is quasi experimental one group design was used to determine if the developed IMM will enhance the performance of the learners in selected topics in Chemistry 10 through try-out of the materials by the experimental group. As stated by Zulueta (2010), the experimental research describes what would be and when a certain factor was carefully controlled. The emphasis was on the cause-effect relationship wherein the variables were carefully manipulated for the purpose of determining their influences.

**Participants of the Study**

The main sources of data to determine the acceptability of the developed IMM were the five selected experts and 15 Science teachers who used an evaluation instrument to relate the material itself: using the five-point Likert Scale. On the other hand, the main source of data to determine the develop IMMs that would enhance the academic performance of the learner respondents in selected topics for Chemistry 10 were the 52 learners from one section of grade level 10 in Sta.Lucia High School. Both groups of respondents were selected through purposive sampling.

**Instruments of the Study**

There were three research instruments used in the study to gather the needed data. The first was the evaluation instrument which was adopted from the thesis of Castillejos (2018) which was also evaluated by experts in Science in Rizal High School. Since the instrument had already been validated, the researcher did not subject it to validation process. The second research instrument used was developed by the researcher. It consisted of a 30 item questions that covered all the topics included in the IMM. The teacher made pretest/posttest on the scope of IMM in line with the learning competencies in teaching Science in order to determine its validity in terms of effectiveness The pretest and the posttest were validated by the Chemistry teachers, master teachers and the adviser. The third research instruments used was the researcher-made instrument that determined the perception of the learners' respondents on the developed IMM.

**Procedure**

A letter of request was addressed to the principal of Sta.Lucia High School before the conduct of the study. Upon approval, the respondents of the study were identified. The researcher also asked permission from the coordinator of the Science Department to allow her colleagues in the department to conduct the study. The researcher discussed to the selected respondents the objective of the IMM for Chemistry 10. The pretest and the posttest were validated by the experts and Science teachers respectively. After the validation of the test, the pretest was administered to 52 learner respondents who were enrolled in Sta. Lucia High School.The posttest was administered after the learners had undergone the use of IMM. The data gathered from the different instruments were analyzed with the use of appropriate statistical tools. The results of the analysis of data were used in determining the effects of IMM on the performance of the learners in Chemistry.

**Ethical Considerations**

The researcher herself explained and gave the informed consent to each participant before the conduct of the study. She ensured them that the information would be used with utmost confidentiality and within the purpose of the study only.

## Results and Discussion

**Selection of Topics in Chemistry 10 Suitable for Development of Interactive Multimedia Materials**

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Table 1. *Least Mastered Topics in Chemistry 10 Based on the Fourth Periodical Test, School Year 2018-2019*

| *Topics* | *Learning Competencies* | *% of Correct* | *Ranking* |
|---|---|---|---|
| Gas Law | Solve problems on volume and pressure relationship at constant temperature of a gas | 19.25% | 2 |
| | Calculate for each unknown on volume and temperature relationship at constant pressure of a gas | 16.35% | 1 |
| | Calculate for each unknown on volume and number of moles relationship | 26.74% | 3 |
| Bio molecules | Identify biomolecules based on the result of physical and chemical tests or based on its function | 42.84% | 4 |
| | Identify the different biomolecules present on food labels | 44.43% | 5 |
| Chemical Reaction | Discuss how the physical state and the concentration of reacting materials affects the rate of chemical reaction | 54.06% | 6 |
| | Identify and describe the different types of chemical reactions | 56.66% | 7 |

It can be observed from the table the different topics in Chemistry 10 as reflected in the Curriculum Guide provided by the Department of Education. Based on the data, the topic, Gas Law was found to be the least mastered by the Grade 10 students at Sta. Lucia High School. This means that the said topic was not understood well by the students; hence, there was a need for an intervention material. Likewise, based on the ranking, it was the most selected topic that was suitable for development of Interactive Multimedia Materials.

**Respondents' Evaluation on the Developed Interactive Multimedia Materials**

Table 2. *Respondents' Evaluation on the Developed Interactive Multimedia Materials in Chemistry 10 in terms of Format*

| *Indicator* | *Experts* | | *Science Teachers* | |
|---|---|---|---|---|
| | *WM* | *VI* | *WM* | *VI* |
| 1. Graphics and color are used for appropriate instructional reasons. | 4.65 | VS | 4.15 | S |
| 2. The material stimulates learner's creativity. | 4.55 | VS | 4.30 | S |
| 3.The rate and sequence of presentation are at level of the learners. | 4.25 | S | 4.60 | VS |
| 4. The size and fonts are readable and can easily be recognized. | 4.40 | S | 4.40 | S |
| 5. The directions are understandable and easy to follow. | 4.25 | S | 4.35 | S |
| Average Weighted Mean | 4.42 | S | 4.36 | S |

It can be gleaned in the table that the average weighted mean obtained from the experts was 4.42 interpreted as Satisfactory and from the teachers was 4.36 average weighted mean which was also interpreted as Satisfactory.

From the results, it could be implied that the perceptions of the two groups of respondents in terms of Format were the same and that the IMM was good and presentable that will help the learner to understand the topics about the Gas Laws.

Table 3. *Respondents' Evaluation on the Developed Interactive Multimedia Materials in Chemistry 10 in terms of Content*

| *Indicator* | *Experts* | | *Science Teachers* | |
|---|---|---|---|---|
| | *WM* | *VI* | *WM* | *VI* |
| 1. The content of the IMM are well stated of what are expected from the learners. | 4.65 | VS | 4.80 | VS |
| 2. The content of the IMM enables the students to think critically and analytically. | 4.55 | VS | 4.25 | S |
| 3. The different parts of the IMM can help achieve its purpose. | 4.25 | S | 4.35 | S |
| 4. The topics are well arranged to provide clear sequence of understanding. | 4.40 | S | 4.45 | S |
| 5. The generic ideas and concepts are well expressed in the material. | 4.25 | S | 4.40 | S |
| Average Weighted Mean | 4.42 | S | 4.45 | S |

The table shows that with respect to the contents, the average weighted means obtained was 4.42 for the experts and 4.45 for the teachers which were both interpreted as Satisfactory. The group of experts and teachers claimed that the objectives of the IMM were well stated and what was expected from the learners was Very Satisfactory as proven by the highest weighted mean of 4. 65 for experts and 4.80 for teachers.

From the results, it can be seen that the perception of the experts and the teachers' respondents on the evaluation of the developed IMM with respect to contents was the same.

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Table 4. *Respondents' Evaluation on the Developed Interactive Multimedia Materials in Chemistry 10 in terms of Presentation and Organization*

| *Indicator* | *Experts* | | *Science Teachers* | |
|---|---|---|---|---|
| | *WM* | *VI* | *WM* | *VI* |
| 1. The topics are presented in logically arranged manners. | 4.85 | VS | 4.80 | S |
| 2. The varied exercises, examples figures serve as instruments to attain the learning process. | 4.50 | S | 4.50 | S |
| 3. The illustration are appropriate and helpful in understanding the concepts. | 4.45 | S | 4.45 | VS |
| 4. The diagrams are clearly laid out. | 4.60 | VS | 4.25 | S |
| 5. The style presenting the topics will make the students to enjoy the IMM. | 4.25 | S | 4.30 | S |
| Average Weighted Mean | 4.53 | VS | 4.42 | S |

As reflected in the table the evaluation of the multimedia with respect to presentation and organization obtained weighted mean of 4.53 for the experts which was interpreted as Very Satisfactory and 4.42 for the teachers with an interpretation of Satisfactory.

From the results, it can be implied that there is a matched perception between the two groups of respondents with regard to the effectiveness of Multimedia with respect to the presentation and organization.

Table 5. *Respondents' Evaluation on the Developed Interactive Multimedia Materials in Chemistry 10 in terms of Appropriateness and Updatedness*

| *Indicator* | *Experts* | | *Science Teachers* | |
|---|---|---|---|---|
| | *WM* | *VI* | *WM* | *VI* |
| 1. The multimedia graphics are appropriate to the concepts and helpful in understanding the concepts. | 4.65 | VS | 4.15 | S |
| 2. The concepts, videos, and the materials in the multimedia are up-to-date. | 4.55 | VS | 4.30 | S |
| 3. The multimedia is suitable to the learning ability of the learners. | 4.25 | S | 4.60 | VS |
| 4. Level of difficulty is appropriate for the intended target user. | 4.40 | S | 4.40 | S |
| 5. Activities are unique yet trendy. | 4.25 | S | 4.35 | S |
| Average Weighted Mean | 4.42 | S | 4.36 | S |

This table discloses that with respect to Appropriateness and Updatedness the average mean obtained for experts was 4.42 and for the teachers was 4.36 also interpreted as Satisfactory.

The result implied that the two group of respondents pointed out that the IMM are suitable to use because it gives the learner the recent information and concrete explanations about the Gas Law.

Table 6. *Respondents' Evaluation on the Developed Interactive Multimedia Materials in Chemistry 10 in terms of Technical Aspect*

| *Indicator* | *Experts* | | *Science Teachers* | |
|---|---|---|---|---|
| | *WM* | *VI* | *WM* | *VI* |
| 1. The sound and graphics are clear and congruent to the concepts. | 4.75 | VS | 4.80 | VS |
| 2. The language used the materials is understandable. | 4.65 | VS | 4.55 | VS |
| 3. The multimedia allows a multi-sensory learning to the learners. | 4.40 | S | 4.60 | VS |
| 4. The interface of the multimedia presentation is interactive | 4.50 | S | 4.30 | S |
| 5. The materials are comprehensive and effective | 4.40 | S | 4.45 | S |
| Average Weighted Mean | 4.54 | VS | 4.54 | VS |

The group of experts and teachers expressed that the sound and graphics are clear and congruent to the concepts which obtained the highest mean of 4.75 and 4.8 respectively and was interpreted as Very Satisfactory.

The result implies similarity in the outlook of the two groups of respondents in technical aspect. Both the expert and the teachers perceived a higher degree of evaluation.

**Test of Significant Difference in the Evaluation of the Two Group of Respondents on the Developed Interactive Multimedia**

Table 7. *Test of Significant Difference on Format*

| *Respondents* | *N* | *WM* | *SD* | *Computed t-value* | *Critical t-value* | *Decision* | *Interpretation* |
|---|---|---|---|---|---|---|---|
| Experts | 5 | 4.42 | 0.13 | 0.74 | <.05 | Failed to reject Ho | Not Significant |
| Science Teachers | 15 | 4.36 | 0.32 | | | | |

Table 7 shows that the computed t-value of 0.74 was greater than the critical value of <.05 under the one tailed test. Therefore, it failed to reject the null hypothesis; hence there was no significant difference in the evaluation of the two groups of respondents on the developed IMM in terms of Format. It only means

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that both experts and Science teachers agreed that the format of the developed IMM had a good presentation and well-organized delivery that invites the learners' curiosity and interest.

Table 8. *Test of Significant Difference on Content*

| *Respondents* | *N* | *WM* | *SD* | *Computed t-value* | *Critical t-value* | *Decision* | *Interpretation* |
|---|---|---|---|---|---|---|---|
| Experts | 5 | 4.42 | 0.13 | 0.31 | <.05 | Failed to reject Ho | Not Significant |
| Science Teachers | 15 | 4.45 | 0.52 | | | | |

Table 8 shows that the computed t-value of 0.31 was greater than the critical value of <.05 under the one tailed test. Therefore, it failed to reject the null hypothesis; hence there was no significant difference in the evaluation of the two groups of respondents on the developed IMM in terms of Content. It only means that both experts and Science teachers agreed that the content of the developed IMM are well stated of what are expected from the learners that help achieve its purpose.

Table 9. *Test of Significant Difference on Presentation and Organization*

| *Respondents* | *N* | *WM* | *SD* | *Computed t-value* | *Critical t-value* | *Decision* | *Interpretation* |
|---|---|---|---|---|---|---|---|
| Experts | 5 | 4.53 | 0.13 | 0.66 | <.05 | Failed to reject Ho | Not Significant |
| Science Teachers | 15 | 4.42 | 0.52 | | | | |

Table 9 shows that the computed t-value of 0.66 was greater than the critical value of <.05 under the one tailed test. Therefore, it failed to reject the null hypothesis; hence there was no significant difference in the evaluation of the two groups of respondents on the developed IMM in terms of Presentation and Organization. It only means that both experts and Science teachers agreed that the presentation and organization of the developed IMM has a sequence of activities that leads the teachers and students a learning route that is at an appropriate level of difficulty, engaging, and provides both motivating and useful practices.

Table 10. *Test of Significant Difference on Appropriateness and Updatedness*

| *Respondents* | *N* | *WM* | *SD* | *Computed t-value* | *Critical t-value* | *Decision* | *Interpretation* |
|---|---|---|---|---|---|---|---|
| Experts | 5 | 4.42 | 0.13 | 0.74 | <.05 | Failed to reject Ho | Not Significant |
| Science Teachers | 15 | 4.36 | 0.32 | | | | |

Table 10 shows that the computed t-value of 0.74 was greater than the critical value of <.05 under the one tailed test. Therefore, it failed to reject the null hypothesis; hence there was no significant difference in the evaluation of the two groups of respondents on the developed IMM in terms of Appropriateness and Updatedness. It only means that both the experts and the Science teachers agreed that the developed IMM shows that the input materials in the IMM are up to date and that they incorporate the latest information and trends in learning. The level of difficulty of the activities presented in the developed IMM was also appropriate for the intended target learners.

Table 11. *Test of Significant Difference on Technical Aspect*

| *Respondents* | *N* | *WM* | *SD* | *Computed t-value* | *Critical t-value* | *Decision* | *Interpretation* |
|---|---|---|---|---|---|---|---|
| Experts | 5 | 4.54 | 0.10 | 0.00 | <.05 | Failed to reject Ho | Not Significant |
| Science Teachers | 15 | 4.54 | 0.41 | | | | |

Table 11 shows that the computed t-value of 0 was greater than the critical value of <.05 under the one tailed test. Therefore, it failed to reject the null hypothesis; hence there was no significant difference in the evaluation of the two groups of respondents on the developed IMM in terms of Technical Aspects. This means that both experts and Science teachers agreed that the developed IMM shows an interface of interactive learning and allows a multi-sensory learning to the learners.

**Level of Performance of Learner Respondents in the Pretest and Posttest**

Table 12. *Level of Performance of the Learners' Respondents in the Pretest and Posttest of the Developed Interactive Multimedia Materials in Chemistry 10*

| *Pretest* | | | *Posttest* | | |
|---|---|---|---|---|---|
| *Frequency* | *Percentage* | *Level of Performance* | *Frequency* | *Percentage* | *Level of Performance* |
| 0 | 0 | | 0 | 0 | |
| 0 | 0 | | 16 | 30.77 | Very Satisfactory |
| 27 | 51.92 | Satisfactory | 36 | 69.23 | Satisfactory |
| 22 | 42.31 | Moderately Satisfactory | 0 | 0 | |
| 3 | 5.77 | Needs Improvement | 0 | 0 | |
| 52 | 100 | Total | 52 | 100 | Total |

The table reflects that the scores of the group showed a pretest result of 51.92% which was at the satisfactory level, 42.31% in moderately satisfactory level and

5.77% or three students for needs improvement. During the posttest, 36 students or 69.23% were in the satisfactory level with 30.77% in very satisfactory level. The highest score in the pretest is 16 while in posttest was 26. The result implies that the scores of the group increased after their exposure to the developed Interactive Multimedia Materials.

Table 13. *Significant Difference Between the Pretest and Posttest Mean Scores of the Respondents*

| *Test* | *N* | *Mean* | *CV (Zc)* | *Z-value* | *P-value* | *Decision* | *Verbal Interpretation* |
|---|---|---|---|---|---|---|---|
| Pretest | 52 | 10.75 | 1.645 | -15.001 | <0.0001 | Reject Ho | Significant |
| Posttest | 52 | 18.56 | | -28.338 | | | |

The data show the significance level of 0.05 and a critical value of 1.645. Since it was observed that z = -15.001 ≤ zc = 1.645, it was concluded that the null hypothesis was rejected.

From the result, it is implied that there was a significant difference in the scores of the pretest and posttest. This means that there is an improvement in the performance of the students after teaching them with the use of interactive multimedia.

**Comments and Suggestions Offered by the Experts and the Teacher Respondents**

The comments of the experts and the teacher respondents to further improve the developed Interactive Multimedia Materials in Chemistry 10 included: (a) The program design is interactive; (b) I enjoyed these computer-based learning materials like this one in future lessons; and (c) The content was clear and easy to understand.

Meanwhile, their suggestions were: (a) Include the curriculum guide in the IMM; (b) Simulations must be added to the IMM; (c) Removes clutter and distractions; (d) Change some of the graphics; (e) Rephrase the questions; and (f) Font size and color and style must be improved.

Perceptions of the Grade 10 students on the developed IMM in Chemistry 10

Table 14. *Perceptions of the Grade 10 students on the Developed Instructional Multimedia Materials in Chemistry*

| *Perceptions of the Students* | *WM* | *Interpretation* |
|---|---|---|
| 1. I was able to easily understand the concepts or ideas regarding Gas Law with the aid of Interactive Multimedia Materials in Chemistry 10. | 4.75 | Very Satisfactory |
| 2. I was able to engage in the game presented in the learning activity about Gas Law with the aid of Interactive Multimedia Materials in Chemistry 10. | 4.65 | Very Satisfactory |
| 3. I was challenged to think meaningfully while using the Interactive Multimedia Materials | 4.55 | Very Satisfactory |
| 4. I was able to distinguish the factors that affect the behavior of gas molecules with the help of simulator. | 4.83 | Very Satisfactory |
| 5. I learned to study independently through the help of the IMM | 4.69 | Very Satisfactory |
| 6. I find myself enjoying while studying Gas Law through the help of IMM. | 4.83 | Very Satisfactory |
| 7. I was able to compare the different Gas Law and recognized its different applications through the features in the IMM. | 4.20 | Satisfactory |
| 8. I was able to compute problem sets in Gas Law through the help of IMM. | 4.70 | Very Satisfactory |
| 9. I can easily apply gas law in my daily experience in life because of the knowledge I've learned in the IMM. | 4.60 | Very Satisfactory |
| 10. I will recommend the IMM to my fellow classmates. | 4.55 | Very Satisfactory |
| Average Weighted Mean | 4.64 | Very Satisfactory |

It implies that the developed Interactive Multimedia Materials helps the learners come to a deeper understanding through new supplementary learning materials. It also shows that the learners were actively in the learning process while using the developed IMM. The video clips and the presentations in the IMM had helped them deepen their understanding and delivered more detailed information. The animation and sounds also helped the learners to memorize better.

The learners also expressed that through the use of IMM, learning becomes easy and there will be no worries in terms of problem-solving with regard to Gas Law. The developed Instructional Multimedia Materials is very effective in the teaching-learning process as perceived by the learners.

## Conclusion

Based on the following findings of the study, the following conclusion was arrived at: The developed

Interactive Multimedia Materials are acceptable to teachers and are effective in improving the performance of the student respondents.

In the light of the findings and conclusions, the following recommendations are hereby presented: (1) Development and modification of Interactive Multimedia should be regularly conducted through workshops in order to meet the learning demands of the students and enhance the skills of the teachers in IMM development. (2) The teachers should be encouraged to develop Interactive Multimedia in all subject areas and in other fields to attest the strengths of the findings of the study. (3) Another study should be conducted using the same instrument in a bigger population to validate the results of this study. (4) Other possible computer applications in the Interactive Multimedia Program should be developed in the future. (5) The developed IMM may be submitted to IT experts for further evaluation.

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