

# THE STRENGTH OF THE REACT (RELATING-EXPERIENCING-APPLYING-COOPERATING- TRANSFERRING) TEACHING STRATEGY IN A CONTEXTUALIZED GRADE 8 SCIENCE SPIRAL CURRICULUM CLASS

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**Paper Received:** 21.12.2022 / **Paper Accepted:** 15.02.2023 / **Paper Published:** 17.02.2023

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## Abstract

This quasi-experiment was designed to determine the strength of the REACT Teaching Strategy, vis-a-vis a Contextualized Grade 8 Science Spiral Curriculum. It was intended to drive students toward pragmatic meaning-making, leading them towards being society's problem-solvers and critical thinkers. Student subjects were grade eight students enrolled in a public school in Caloocan City, a first-class urbanized city in Metropolitan Manila. Via the Solomon Four-Group Design and using Stanine Scaling, students were categorized into three (3) groups: Below Average, Average, and the Above Average group. Aided by the Extreme Group Approach (EGA) as the sampling technique, only the extreme groups, specifically, those students classified as below average and above average were the ones assigned to both experimental and control groups, thereby forming two control groups and two experimental groups. Following the rigors of the Solomon four-group design, two groups were subjected to pre-testing, while the other two groups did not. All the four groups, however, were subjected to post-testing. Using dependent and independent T-tests to determine significant differences within groups and beyond groups, and as substantiated by statistically determining the learning gains of all experimental groups and student feedback, the REACT strategy was proven to be a strong teaching strategy with significant differences computed on the two experimental groups' pretest and post-test, and in comparison with the two control groups. Further, the Below Average Experimental Group posted a learning gain that is significantly higher than that of the Above Average Experimental Group revealing the stronger viability of the REACT Strategy to maximize the learning potential of the Below Average students who may be struggling to find a "goodness-of-fit" between wanting to learn and finding the "best way" to learn.

**Keywords:** Extreme Group Approach, Quasi Experiment, Action Research, Science Education.

## Introduction

The Philippines is said to have performed dismally in its first participation to the Program for International Students Assessment in 2018 as it ranked lowest in Reading literacy and second to the lowest in Science and Mathematics literacy (PISA 2018 [13] National Report of the Philippines, 2019). Challenged by this poor showing, the country's Department of Education continues to strive to innovate and improve the quality of teaching and learning in the country with the hope that students will very soon, perform better in national and international assessments.

Years before the PISA Assessment, there were already strong calls to innovate Philippine education. Balbuena (2014) surmises that teachers face difficulty as there are the obvious lack of basic teaching and learning tools alongside conducive learning environments while Jalmasco (2014) [9] seems to affirm this observation when he posited that the teaching preparation of public-school teachers in science is a critical factor in poor student learning; this was observed by students' inability to associate their daily lives with scientific knowledge (Ultay & Calik, et al., 2016 [18]).

Context-based learning is slowly gaining recognition worldwide as an innovative approach in education. Hadley (2013) describes it as a process that enables students to develop their individual competence within the spectrum of their actual life experiences.

It is manifested when a unique meaning is created in the learners' mind, allowing him to make a connection between the context to be studied and the real-world situation (Hubball & Kennedy, 2009).

The need to do this research spawned from local and international assessments placing the Filipino student poorly in terms of science learning in comparison with other students from Asia and the world. The Philippines performed dismally in the first participation in the Program for International Students Assessment or PISA in 2018. They ranked second to the lowest in Science and Mathematics literacy. Based on NAT 2014 & TIMSS 2003, the same poor scores were observed in the learners' performance of our country. The country's participation again in TIMSS 2019, recommends continuous improvement in the implementation of relevant intervention programs. Challenged by this result, DepEd continues to strive to innovate and

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improve the quality of teaching and learning, hoping that students can perform better next time. According to Balbuena (2014), we teachers should be challenged to be innovative people. Jalmasco (2014) [9] speculated that the teaching preparation of public-school teachers in science is a critical factor in poor student learning. This was observed by students' inability to associate their daily lives with scientific knowledge (Ultay & Calik, et al., 2016 [18]). Students in Science in Bagumbong, as per pre-research talks with some Science faculty and upon observing student outputs and performance also resonated the same alarming concern. Students perform poorly while teachers continue to find ways to engage them in studying. These issues and gaps in student learning in science as personally observed, drove the researchers to design, implement and evaluate the effectiveness of REACT (Relating-Experiencing-Appling-Cooperating-Transferring) teaching strategy in selected classes.

In an effort to enable students to construct and use knowledge in Science even in real-life scenarios, Crawford (2001) mapped the REACT Strategy, an acronym which is derived from its five stages namely: Relating, Experiencing, Applying, Cooperating, and Transferring.

**Relating** refers to the act of learning in the context of a person's life experiences or pre-existing knowledge. **Experiencing** is learning by practice, exploration, discovery, and invention. **Applying** is learning by using the concepts and pieces of knowledge in the field. **Cooperating** refers to learning in the context of sharing, responding and communicating with other learners, and **Transferring** is using knowledge in a new situation. (Crawford 2001)

Grade 8 Science Spiral Curriculum covers six topics in Biology which are found to be misaligned with the competencies set by the Trends in International Mathematics and Science Study (TIMSS), another international literacy assessment (Balagtas, 2019). Some competencies are found in lower grades while some are found in Grades 9, and 10. In this same study, continuous evaluation alongside intervention programs is recommended to be exacted to address the gaps on absent or misaligned competencies in relation to international standards.

DepEd Memorandum No. 71, s. 2018 entitled, "K to 10 Training of Teachers on Critical Content" intended to address this aforesaid dilemma by the provision of a rigid training intended for grade 4 and grade 8 science teachers (Llego 2018 [10]). All sciences, such as Physics, Earth Science, Chemistry and Biology are covered as they are vital in the proper implementation of the K-12 spiral

curriculum. This is conducted in two phases: Phase 1- National Training of Trainer (NTOT), and Phase 2- Training of Teachers. This training paved the way towards teacher upskilling and retooling critical content in grade 8 science consisting of spiral subjects such as Physics, Earth Science, Chemistry and Biology. The REACT strategy was one of the many innovative and constructivist teaching approaches introduced.

## Theoretical Framework

The REACT strategy is theoretically anchored to the Contextual and Constructivist Learning Theories, two significant 21st century innovative approaches in teaching and learning. The Contextual Learning Theory sees learning as occurring only when learners could process new information that makes sense to them in relation to their experiences (CORD 2016 [6]). It focuses on the many aspects of the learning environment such as the classroom, laboratory, library, field, court, or physical location where one can clearly see and assess desired learning outcomes. With this environment, learners are targeted to discover meaningful relationships between abstract ideas while deriving practical applications from these same mental abstractions. Further, the concepts are expected to be internalized by learners through the process of discovering, reinforcing, and relating.

The Constructivist Learning Theory, on the other hand, posits that learners produce knowledge and form meaning from what they themselves, experienced and reflected on (Reyes 2013 [14]). This is supposed to be a form of self-constructed learning. These two relevant theories in learning served as the standpoints in the mapping of the activities and protocols in this quasi-experiment featuring the REACT strategy. Alongside contextualization, a process of relating the curriculum to a particular situation to make the competencies relevant, meaningful and useful to learners, localization was also considered which made use of relating content to local information and materials from the learners' community (Artiza 2017 [2]).

Crawford (2001) clarifies the five REACT strategy stages:

- 1) Relating- where the lesson is linked with everyday events, conditions, and issues that allows learners to relate familiar situations to new information to be processed;
- 2) Experiencing- where hands-on activities are designed to allow learners to explore and discover new knowledge;
- 3) Applying- where learners apply the concepts learned to real world problems and issues;

- 4) Cooperating- where learners are given the opportunity to solve problems with co-learners to reinforce knowledge and develop collaborative skills- sharing, responding and communicating;
- 5) Transferring- where learners use the “familiar information” they have to approach “unfamiliar situations”, thereby addressing problems with confidence.

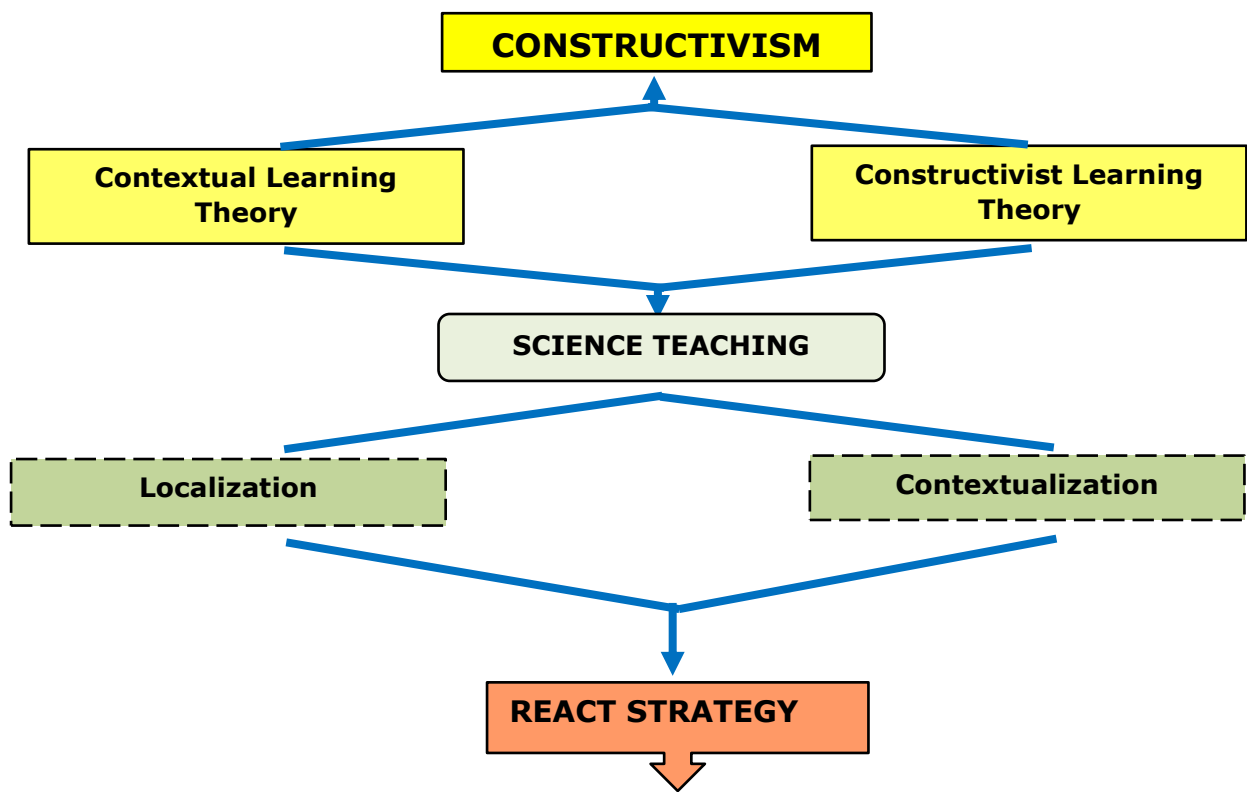
The REACT strategy allows learners to link scientific knowledge with events they encounter in everyday life (Ultay 2017), an idea that strongly parallels the earlier discussed theories: the Contextual Learning Theory and the Constructivist Learning Theory. The Constructivist theory is anchored to the idea that effective meaning- making or learning happens when learners could connect it to their own experiences (Suhendi and Purwano 2018 [16]). Aljohani (2017) [1] supports this premise when he suggests that the teacher must not teach all the lesson details so that students will discover or create them themselves using their life experiences.

The REACT strategy employs both localization and contextualization. In the paper of Artiza (2017) [2],

contextualization is defined as an educational process which relates the curriculum to a particular situation or area of application to make the competencies relevant, meaningful, and useful to learners. On the other hand, localization is defined as the process of relating content to local information and materials from the learners’ community.

To further the objective of the REACT strategy, there is the need for effective learning transfer. This will mean that students, after being immersed in this innovative set-up, should be able to confidently use what they have learned, processed, and understood in dealing with unfamiliar situations and issues. Together with localization and contextualization as part of the implementation process, the use of the REACT strategy ensures that learning competencies are met and that they remain relevant, meaningful, and useful to learners.

Figure 1, found below, shows the interplay between the theoretical framework and the research variables.

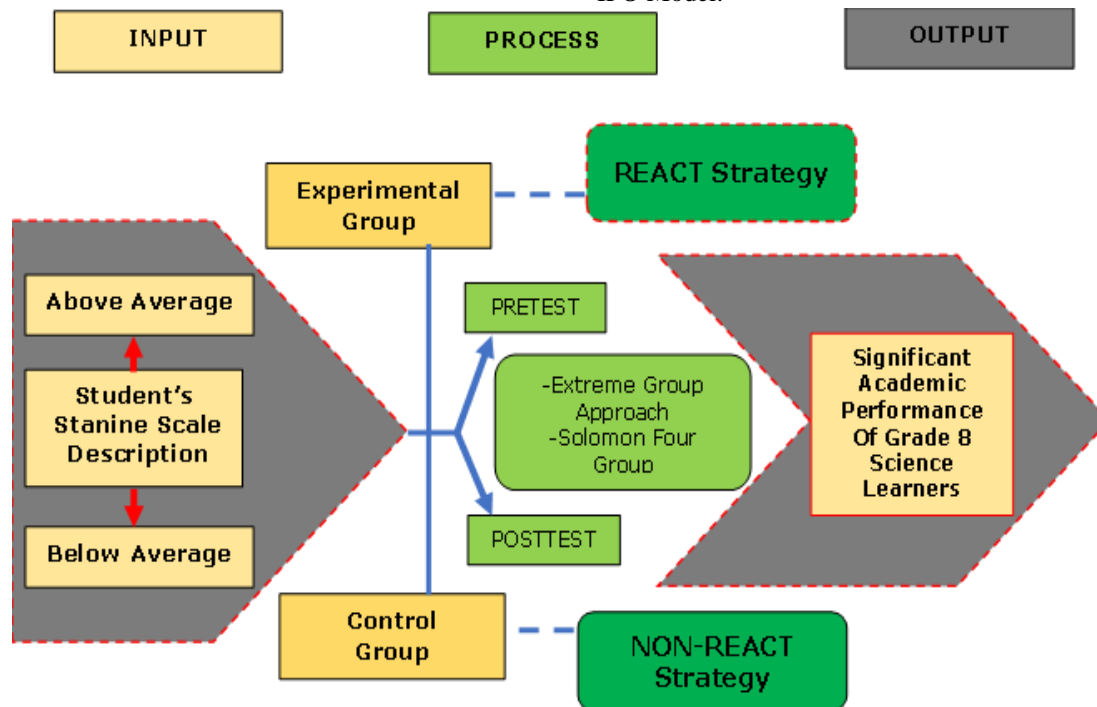


**Improved Academic Performance**

**Figure 1: Theoretical Framework**

## Conceptual Framework

The succeeding figure, on the other end, showcases the research's conceptual framework featuring the IPO Model:



**Figure 2: Conceptual Framework**

Standard nine or the Stanine Scale was used to categorize the subjects' academic performance as revealed by a diagnostic assessment in Science. This served as the INPUT data. As per the Extreme Group Approach (EGA) requirement, only the "extreme groups", in this context, the above average and below average students, were chosen to participate in the quasi-experiment. Using the Solomon four-group design, 2 sub-groups were formed for each categorical group thereby composing the two experimental and two control groups with the REACT Strategy being the treatment or the independent variable and with the academic performance of the students as the predictor or dependent variable.

The immersion or the non-immersion of the student groups to the REACT teaching strategy as the treatment served as the PROCESS data.

Finally, the anticipated improved academic performance of the students across their differing academic performances or categories upon immersion to the REACT teaching strategy served as the OUTPUT data.

### Statement of The Problem

As a result of this aforesaid attempt to upskill and retool the Science Teacher to consequently improve student performance in international learning assessments, this study attempted to immerse

selected classes with the REACT teaching strategy and consequently, document its strength via resolving these research questions:

1. What is the profile of the selected student-subjects in terms of their academic performance in Science ?
2. Is there a significant difference existing between the pretest and post- test performances of the
  - 2.1. below average experimental group; and
  - 2.2. above average control group?
3. Is there a significant difference existing between the post- test performances of the
  - 3.1. below average experimental and below average control groups; and
  - 3.2. above average experimental and above average control groups?
4. What student perspectives and feedback could be derived from the experimental implementation of the REACT teaching strategy?

Further, the following hypotheses were tested at 95% level of confidence:

Null Hypothesis 1: There is no significant difference between the pretest and posttest performance of the below average experimental group.

Null Hypothesis 2: There is no significant difference between the pretest and posttest performance of the above average control group.

Null Hypothesis 3: There is no significant difference between the posttest performances of the below average experimental and control groups.

Null Hypothesis 4: There is no significant difference between the posttest performances of the above average experimental and control groups.

### Scope and Delimitation

The research locale is a public high school in Caloocan where the principal author is a classroom teacher. It involved two classes of grade eight students during the School Year 2019-2020 with a total of 48 students. One section was designated as the experimental group while the other was the control group. Using Stanine Scale to interpret their Science 7 Final Grades, students were categorized into three, they, being above average, average, and below average. These classifications of students were made confidential and were not, in any way, divulged to student-subjects nor to other teachers or persons to avoid causing any discomfort or anxiety to students.

The experimental group consisted of 11 below average and 14 above average students. The control group, on the other hand, had 13 above average and ten below average students.

Following the rigors of the Solomon Four- Group research design vis-a-vis the Extreme Group Approach, these groups were formed:

- 1) Experimental- Below Average group,
- 2) Experimental- Above Average group,
- 3) Control- Below Average group, and
- 4) Control- Above Average group.

The experimental- below average and control- above average groups received the pretest while the rest of the groups did not. All groups were subjected to a posttest.

The implementation period ran for seven (7) weeks.

Lessons in Biology, identified as lesson gaps in the workshop papers by the National Academy of

Science and Technology- Philippines (2008), were prepared, integrated in the daily lesson plans, and implemented. Also, a validated 70-item pre and post tests were used in this research.

### Methodology

#### ● Research Design

This quasi-experiment made use of the explanatory sequential mixed method research design. It is a two-phase design where the quantitative data was collected and analyzed first and with the qualitative feedback substantiating the quantitative results (Creswell, J.W. & Creswell, J.D., 2018 [5]).

#### ● Participants/Respondents of the Study

Student- subjects were subjected to purposive sampling by using their academic performance as the inclusion criterion and as interpreted through Stanine Scaling.

The Stanine Scale, with its corresponding descriptors, is shown below:

Stanine Scale	Description
1-3	Below Average
4-6	Average
7-9	Above Average

**Table 1: Stanine Scale and Description**

The subjects of the study were selected Grade- 8 students in one public school in Caloocan City, Philippines in the current school year. Two sections with forty-four (44) students were initially assessed using a diagnostic Science Test to allow their assignment into one of the three groups using the Stanine Scale. Following the rigors of the Extreme Group Approach (EGA) as a sampling technique, only the below average and above average students were purposively selected to participate in this quasi experiment.

The table below showcases the distribution of students in the formed two (2) extreme experimental and control groups:

Student Category and Groups	Total number of students
Below Average control group	13
Below Average experimental group	11
Above average control group	10
Above average experimental group	14

**Table 2: Experimental and Control Groups' Distribution**

## GROUPS

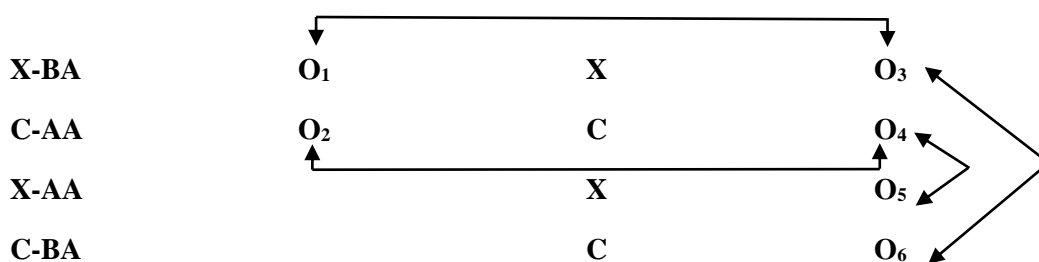


Figure 3: Solomon Four- Group Design

Where:

- X-BA** - is the *below average* experimental group
- C-AA** - is the *above average* control group
- X-AA** - is the *above average* experimental group
- C-BA** - is the *below average* control group
- O<sub>1</sub>** - is the pretest given to the *below average* experimental group
- O<sub>2</sub>** - is the pretest given to the *above average* control group
- O<sub>3</sub>** - is the posttest given to the *below average* experimental group
- O<sub>4</sub>** - is the posttest given to the *above average* control group
- O<sub>5</sub>** - is the posttest given to the *above average* experimental group
- O<sub>6</sub>** - is the posttest given to the *below average* control group

### • Instrument/s of the Study

Duly validated teacher-made tests were used to measure the academic performance of the Science grade 8 learners.

Research instruments included: lesson plans featuring REACT strategy, teacher-made tests, table of specifications, and semi-structured questionnaires. These were validated by four subject-matter experts in a series of content-checking, consultations, and revisions.

### • Data Collection and Analysis

The quantitative data gathered was eventually subjected to apt statistical procedures. Whereas student feedback during their immersion to the REACT strategy underwent thematic analysis. The quantitative results, which were basically student test scores, upon converting to Stanine scales, were subjected to significant difference testing via independent and dependent T-test. Stanine was used to normalize the test scores

according to rank as it scaled the test scores on a nine-point scale. Weighted mean, Test of normality and standard deviation were initially determined before proceeding to significant difference testing via T-test to establish homogeneity and closely clustered data.

## Results and Discussions

Through apt statistical procedures, and as triangulated by the thematic analysis of student feedbacks, the research results are presented herein:

1. *What is the profile of the selected student-subjects in terms of their academic performance in Science 7?*

The table below shows how the final grades of the student-subjects in Science 7 were categorized using Stanine Scaling. This eventually was used as the basis of the student assignment into either the experimental and control extreme groups.

Experimental Groups			Control Groups		
Student Number	Stanine Scale	Description	Student Number	Stanine Scale	Description
4	1	Below Average	29	1	Below Average
13	1	Below Average	4	2	Below Average
3	2	Below Average	6	2	Below Average
15	2	Below Average	7	2	Below Average

40	2	Below Average	8	2	Below Average
5	3	Below Average	28	2	Below Average
6	3	Below Average	36	2	Below Average
14	3	Below Average	9	3	Below Average
17	3	Below Average	10	3	Below Average
20	3	Below Average	20	3	Below Average
39	3	Below Average	24	3	Below Average
1	7	Above Average	39	3	Below Average
7	7	Above Average	42	3	Below Average
8	7	Above Average	19	7	Above Average
21	7	Above Average	34	7	Above Average
44	7	Above Average	2	8	Above Average
2	8	Above Average	13	8	Above Average
11	8	Above Average	16	8	Above Average
16	8	Above Average	26	8	Above Average
25	8	Above Average	38	8	Above Average
27	8	Above Average	11	9	Above Average
33	8	Above Average	12	9	Above Average
36	8	Above Average	40	9	Above Average
38	8	Above Average			
44	8	Above Average			

**Table 3: Students' Profile Based on their Science 7 Final Grades**

This table shows an uneven distribution of students per category. This is acceptable as the Extreme Group Approach (EGA) would only make use of the two "extreme" groups, they being the above average and the below average groups. Below average sub-groups are with 11 and 13 students, while 14 and 10 students compose the above average sub-groups.

Valdevieso (2016) [19] used stanine to normalize the test scores according to rank. Using the stanine scale, the subjects were categorized as below

average (BA), average (A), and above average (AA).

2. Is there a significant difference existing between the pretest and post- test performances of the:

2.1. below average experimental group; and

2.2. above average control group.

To find if a significant difference existed between the pretest and post- test performances of the below average experimental group and above average control group, the dependent t-test, as a statistic, was used.

Below Ave Experimental Group	N	Mean	SD $\sigma$	t-computed	t-critical	p-value	Interpretation	Decision
Pretest	11	27.27	4.17	-9.11	±2.09	0.00	Significant	Reject Ho
Posttest	11	55.73	9.48					

**Table 4: Dependent T-test Result between the Pretest and Posttest Performances of the Below Average Experimental Group**

Table 4 shows eleven (11) students composing the below average experimental group. The mean in the pretest and posttest were 27.27 and 55.73, respectively.

Upon subjecting these results into a statistical analysis via a dependent T-test, a significant difference is found to exist between the pretest and posttest mean scores which will mean rejecting the null hypothesis and acknowledging that the immersion of the below average experimental group

to the REACT teaching strategy improved their academic performance.

Sapad (2015) [15] and Vivo (2006) collectively agreed that constructivist approaches in teaching are critical factors that influence student learning. In this context, the REACT Strategy is the constructivist teaching approach.

Suhendi & Purwarno (2018) [16], Jia (2010) and Sumarmi (2016) also conducted similar quasi-experiments featuring constructivism in selected

classes and came up with the same generalization: constructivism, as used as a teaching approach, indeed, has a positive outcome in the learning of students.

Table 5 below, presents the dependent T-test result between the pretest and posttest performances of the other “extreme group”, the above average control group.

Above Ave Control Group	N	Mean	SD $\sigma$	t-computed	t-critical	p-value	Interpretation	Decision
Pretest	10	21.1	5.78	-4.74	$\pm 2.10$	0.00	Significant	Reject Ho
Posttest	10	39.6	10.91					

**Table 5: Dependent T-test result between the Pretest and Posttest Performances of the Above Average Control Group**

Ten (10) students comprise the above average control group. The group’s pretest and posttest mean scores are 21.1 and 39.6, respectively.

With a posttest mean higher than the pretest and a standard deviation revealing a distribution that is more spread out in the posttest as compared to its pretest, and with the t-value computed to be -4.74, the null hypothesis is rejected.

Therefore, it could be said that there was a significant difference between the pretest and posttest mean scores of the above average control group. This indicates that in the absence of the REACT teaching strategy, there was still significant student learning.

*3. Is there a significant difference existing between the post- test performances of the:*

*3.1. below average experimental and below average control groups; and*

*3.2. above average experimental and above average control groups.*

Posttests are given to provide the summative input to teachers and students. Through posttest, teachers can reflect on the student’s mastery of learning. Thus, ensuring the appropriate future learning activities.

To find the significant differences existing between the posttest performances of the first extreme group—the below average experimental and control groups and the second extreme group—the above average experimental and control groups, the independent T-test assuming unequal variances was used.

Posttest	N	Mean	SD $\sigma$	t-computed	t-critical	p-value	Interpretation	Decision
Below average experimental group	11	55.72	9.48	5.13	$\pm 2.09$	0.00	Significant	Reject Ho
Below average control group	13	36.92	8.28					

**Table 6: Independent T-test result between the Posttest Performances of the Below Average Experimental and Control Groups**

Table 6 shows the student composition of the below average control and experimental groups and the independent t-test result of their posttests.

With 5.13 as the computed t-value, the null hypothesis was rejected and a significant difference between the 2 groups’ posttests is ascertained to exist. This meant that the REACT Strategy was successful in improving the academic performance of the below average students.

This yielded data can be associated with the study of Nicanor (2019) [12] which she conducted at Bagumbong High school in the Philippines where she made use of reciprocal teaching revealing effective outcomes. The learners were documented to showcase the ability to construct their own meaning out of shared learning experiences.



Likewise, Tabago (2011) [17] utilized the constructivist approach in designing Physics experiments for Isabela State University. He concluded that both the academic achievement and attitudes of students were significantly improved upon the use of the constructivist approach, the foundation of the REACT Strategy.

After comparing the posttest mean scores of the below average experimental and control groups, a comparison of the posttest mean scores of the above average experimental and control groups were also recorded and data analyzed.

Posttest of the Above Average Groups	N	Mean	SD $\sigma$	t-computed	t-critical	p-value	Interpretation	Decision
Experimental	14	56.5	7.31	4.26	$\pm 2.13$	0.00	Significant	Reject Ho
Control	10	39.6	10.91					

**Table 7: Independent T-test result between the Posttest Performances of the Above Average Experimental and Control Groups**

Table 7 reveals the student composition of the above average experimental and control groups alongside their posttest mean scores. These mean scores were subjected to statistical analysis via the Independent T-test. The computed t-value, 4.26, points to rejecting the null hypothesis and acknowledging the existence of a significant difference between the posttest scores of the above average experimental and control groups.

This recorded posttest performance of the above average groups can be related to the study of Reyes (2013) [14] on the utilization of the constructivist teaching and learning approach towards an outcome-based education in chemistry laboratory instruction. It was revealed that learners became competent, credible, committed and collaborative with others as they were immersed with the constructivist teaching and learning process. As there were improved learning outcomes, Reyes (2013) [14] proposed an educational plan of action for effective chemistry laboratory instruction centering on constructivism.

Likewise, Nawas (2018) [11] aimed to investigate the effectiveness of contextual teaching and learning through REACT strategies and discovered that it also improved students' critical thinking as they were documented to develop higher order thinking skills.

*4. What student perspectives and feedback could be derived from the experimental implementation of the REACT teaching strategy?*

Firstly, a simple checklist that is answerable by a YES-NO response was prepared. A copy of the checklist is found below.

Secondly, unstructured interviews on students composing the two experimental groups were conducted to further understand and analyze their generated scores, to identify opportunities for improvement of its implementation, and to gauge their appreciation (or the reverse of it) of the set-up.

**Figure 4: Sample Validated REACT Strategy Questionnaire**

Figure 4 shows the duly validated REACT strategy questionnaire. Five subjects each from the below average and above average experimental group were chosen to be interviewed.

The summary of the students' responses is shown in Table 8.

Item Nos.	Below Average Group				Above Average Group			
	YES frequency	%	NO frequency	%	YES frequency	%	NO frequency	%
1	5	10	0	0	5	10	0	0
2	5	10	0	0	5	10	0	0
3	5	10	0	0	5	10	0	0
4	5	10	0	0	5	10	0	0
5	5	10	0	0	5	10	0	0
6	5	10	0	0	5	10	0	0
7	5	10	0	0	5	10	0	0
8	5	10	0	0	5	10	0	0
9	5	10	0	0	5	10	0	0
10	5	10	0	0	5	10	0	0
T	50	100	0	0	50	100	0	0

**Table 8: Summary of the Yes-No Responses of Students to the Survey-Questionnaire**

It is clearly depicted in this Table that 100% of the subjects answered YES, indicating their affirmative recognition of the REACT teaching strategy, specifically. The items constructed were geared towards assessing these features of the REACT strategy:

- Item 1- Relating
- Item 2- Experiencing
- Item 3- Applying
- Item 4- Cooperating
- Item 5- Transferring
- Item 6- Relevance
- Item 7- Collaboration
- Item 8- Allows improvement
- Item 9- Gaining Focus
- Item 10- Opportunity to do better next time

The thematic analysis of the student feedbacks points to the following:

1. The two extreme groups who received treatment thought that the classes were fun, they enjoyed the lessons and noted how easy it was for them to understand the lessons through the REACT strategy.
2. The two extreme groups who received treatment were also, able to relate the lessons to real-life and were curious of issues beyond the details of the lesson presented by the teacher; lastly,
3. The two extreme groups who received treatment are thinking of how it would be like if other subjects or their other classes would also use the REACT Teaching strategy.

This synthesized mixed-method data affirms the improved academic performance of the students alongside their appreciation of the REACT teaching strategy used in this quasi- experiment

### Conclusion

The data gathered and interpreted in this quasi experiment affirm the following:

The significant difference existing between the posttest performances of the below average experimental and below average control groups; and between the above average experimental and above average control groups, manifested the effectiveness of the REACT as a teaching strategy. As the REACT strategy is anchored to the contextual learning theory and constructivism, it could therefore be affirmed that these theories are appropriate and fitting in the design of lessons for Science Classes, specifically for Science 8.

The difference between the posttest mean scores of the below average and above average experimental groups was also found to be statistically significant revealing further, the strength of the REACT teaching strategy as a way to improve student learning. Feedbacks gathered from students after the experimentation triangulated and re-affirmed the veracity of the research results.

### Recommendations

It is henceforth, recommended to:

1. increase the number of subjects for the below average and above average groups to further validate the research results;
2. lengthen the number of weeks or months of immersion with the REACT teaching strategy to eliminate probable biases;
3. adopt the time- series design within the extreme group sampling technique which will mean subjecting the two extreme groups to multiple pre and post testing.

## Conflicts of Interest

The authors declare there are no significant competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript. The study involves only human participants who volunteered for this study and informed consent was obtained from them.

## Acknowledgement

The authors would like to extend their sincere gratitude and deepest appreciation to their affiliations and to the participants that led to the possible accomplishment of this research work.

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