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Research Article

AGHAMIC Action Approach (A^3): Its Effects on the Pupils' Conceptual Understanding on Matter

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Abstract
We are now at the onset of Fourth Industrial Revolution, thus, Education 4.0 requires more innovative and more engaging pedagogical strategies to develop globally-competitive and functionally-literate learners. Teachers must continue to innovate strategies and approaches to make Science teaching more engaging, more fun and more collaborative. This two-group quasi-experimental action research seeks to explore the effects of the developed AGHAMIC Action Approach (A^3) on the conceptual understanding on matter of Grade 6 pupils. The study involved 23 pupils in the control group taught using traditional method of instruction (TMI) and 24 pupils in the experimental group taught using the A^3 in a public elementary school in Zambales, Philippines for the school year 2019-2020. Pretest and posttest were administered before and after the application of the intervention. The study found out that use A^3 and TMI improved the conceptual understanding of the pupils. However, pupils exposed to the use of A^3 yielded a higher gain score compared to the use of the conventional approach of teaching. Science teachers may utilize the AGHAMIC Action Approach to improve pupils' conceptual understanding in science.

Keywords:
action research, AGHAMIC action approach, conceptual understanding, elementary pupils, science teaching

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Introduction

The onset of Fourth Industrial Revolution transformed the educational landscape of today now known as the Education 4.0 which requires more innovative and more engaging pedagogical strategies to develop globally-competitive and functionally-literate learners. Science education is a quintessential component of economic progress and self-sufficiency. It is an impetus for sustainable development. Today's educational landscape demands more innovative and more engaging teaching strategies that would enhance learning, arouse learners' interest and facilitate better education for the Generation Z students (Rogayan & Bautista, 2019; Rogayan, 2019a).

Teaching Science in the new industrial era has been a challenge to many educators. For several years, teachers, researchers and other education stakeholders have been debating about different approaches to science teaching and learning (Mokiwa & Agbenyeku, 2019). Kaya (2013) also pointed out that students might have some difficulties in understanding the concepts in science lessons. This is for the reason that teachers, specifically in the elementary level, modify and innovate teaching strategies relentlessly to improve science education. Teachers are the key elements to change and scaffold students to meet the goals of education, and the requirements needed to become 21st century citizens (Wisetsat & Nuangchalerm, 2019). Globally, the Philippines lags behind other countries in terms of the quality of education, particularly in science education. According to the World Economic Forum (WEF, 2018), the Philippines ranked 55th out of 137 participating countries in terms of higher education and ranked 76th out of 137 countries in the quality of math and science education.

The researchers developed a learning model which they called the AGHAMIC Action Approach (A^3) based from the principles of collaborative learning and anchored on collaboration skills, one of the 21st century skills that learners must possess. Aghamic is an anglicized word from the Filipino term *"agham"* which means science. The word aghamic literally means relating to or used in science. The instructional strategy AGHAMIC is also an acronym which spells out its different steps. These steps are *A*ctive engagement, *G*etting the prior knowledge, *H*and over the learning task, *A*gham learning task, *M*onitoring and facilitating, *I*nteractive presentation, and *C*hecking of the conceptual understanding.

Conceptual understanding enables children grasp ideas in a transferrable way (Macanas & Rogayan, 2019). It facilitates the learners take what they learn in class and apply it in their life (Omari & Chen, 2016). In order to achieve conceptual understanding of a certain subject, learner s need to form a coherent mental model of the information (Schnotz, 2005; Seufert, 2003).

The effects of the developed instructional strategy on students' conceptual understanding, as well as which aspect of A^3 is beneficial, remain unclear. This study will fill the above gaps; it empirically examines the effects of A³ on students' conceptual understanding in science instruction specifically on matter.

Figure 1 shows the diagrammatical framework of the study.

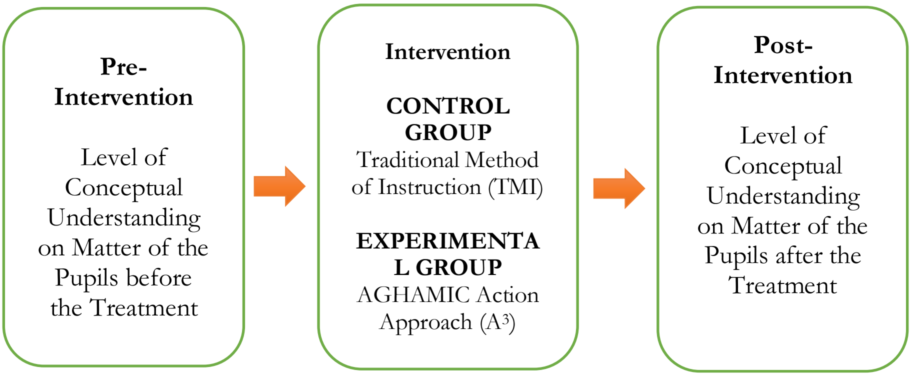

Figure 1.
Diagrammatical Framework of the Study

Figure 1 shows the paradigm of the study. The pre-intervention gauges the level of conceptual understanding on matter of the Science pupils before the treatment. The process includes two treatments, the traditional method of instruction (TMI) in the control group and the AGHAMIC Action Approach (A³) in the experimental group. The output will be the level of conceptual understanding on matter of Grade 6 pupils both in the control and experimental group.

Research Problems

This research determined the effects of AGHAMIC Action Approach (A³) in improving the conceptual understanding on matter of the Grade 6 pupils. Specifically, it aimed to answer the following questions:

- What is the level of conceptual understanding on matter of the Grade 6 pupils in the control and experimental group based on the pretest?
- How is the conceptual understanding enhanced during the application of the intervention based on written works and performance task scores?
- What is the level of conceptual understanding on matter of the Grade 6 pupils in the control and experimental group based on the posttest?
- Is there a significant difference on the conceptual understanding on matter of the pupils in the control and experimental group before and after the treatment?
- What are the reflections of the teacher-implementer in the application of the AGHAMIC Action Approach (A³) in Science class?

Method

Research Design

This study is a two-group quasi-experimental action research. The control group was taught using the traditional method of instruction (TMI) while the experimental group was taught using the AGHAMIC Action Approach (A^3). It described the level of conceptual understanding on matter of the pupils before and after the application of the TMI and A^3.

Participants

A total of 47 Grade 6 pupils of a one public elementary school in the current school year served as the participants of the study, 23 pupils for the control group (Grade 6 Mayumi) and 24 pupils (Grade 6 Magilas) for the experimental group. The details of the classes are as follows:

Table 1.
Descriptions of the Class

Class	Number of Students	Instructional Strategy	Class Schedule
Experimental	24	AGHAMIC Action Approach (A^3)	1:30-2:20 PM
Control	23	Traditional Method of Instruction (TMI)	9:00 – 9:50 AM

Data Collection

The pretest was conducted at the start of the lesson to measure the conceptual understanding on matter of the class before the application of the technique. On the other hand, post-test was administered toward the end of the study to determine how much the said technique helped in improving the level of conceptual understanding on matter. The pretest and posttest are composed of 50 items.

Pretest was administered before the start of the unit to determine the weaknesses of the pupils on matter and its properties. The results of the pretest likewise served as the basis of the grouping of the pupils for their AGHAMIC group in the experimental group. Posttest was administered to the pupils at the end of the unit to determine the improvement after exposure to A^3 and to the conventional way of teaching.

The traditional method of instruction (TMI) involved the conventional lecture done by teachers to deliver the lessons. On the other hand, the AGHAMIC Action Approach (A^3), as a collaborative learning strategy, is a pupil-centered and activity-based intervention. Table 2 shows the A-G-H-A-M-I-C steps followed in the experimental group (see Appendix).

Table 2.
Steps of the AGHAMIC Action Approach (A^3)

Step	Title	Description
1	Active Engagement	The teacher engaged her pupils through the use of various motivational activities such as using video clips, flat pictures, songs and thought-provoking question.
2	Getting the Prior Knowledge	Before the AGHAMIC learning task, the teacher elicited the prior knowledge and understanding of the pupils on the topic of the day.
3	Hand Over the Learning Task	The teacher discussed the AGHAMIC learning task to be accomplished by the AGHAMIC groups.
4	Agham Learning Task	The different AGHAMIC groups worked on their respective AGHAM learning tasks (ALT) provided by the teacher through collaborating with their respective learning AGHAM buddies. The AGHAM learning tasks are focused on the concept of matter, its properties and changes that materials undergo. The ALT is composed of the following parts: (a) Pre-lab Activity. The teacher asks questions about the laboratory safety precaution and the learner has to familiarize the materials to use. The teacher will also discuss the objectives and procedures of the activity. Then the pupils will proceed to their respective AGHAMIC groups; (b) Lab Activity Proper. Actual conduct of the laboratory. The pupils were given the time to work with to their AGHAMIC groups and discuss their work; and (c) Post-Lab Discussion. Member of each AGHAMIC groups answers all specific questions raised by the teacher.
5	Monitoring and Facilitating	The teacher served as facilitator while the pupils are working in their respective ALT. Questions by the pupils are entertained minimally by the teacher.
6	Interactive presentation.	Chosen presenters in each AGHAMIC group presented their respective outputs based from the ALT given. The teacher then critiqued and evaluated the presented inquiry tasks using rubrics.
7	Checking of the Conceptual Understanding	The pupils' conceptual understanding of the day is evaluated by means of check-up quizzes and other written works. Deepening of the concepts and checking of the misconceptions were also done.

Compared to the traditional method of instruction (TMI) wherein teachers serve as lecturers and sole purveyors of knowledge, the A^3 intervention focused on the experiential learning of the pupils—rather than simply presenting established facts or portraying a smooth path to knowledge. It does not only enhance conceptual understanding of the pupils but also improve their investigative skills. With the use of AGHAMIC Action Approach (A3) as a major strategy in teaching, the researcher used several materials in facilitating learning in a more efficient way. Such material includes laboratory apparatuses, photographic images and real objects. Table 3 shows the procedure for implementing the two classes.

Table 3.
Procedure for Implementing Experimental and Control Classes

	Meeting							
Weeks	1	2	3	4	5	6	7	8
Class	O_1	Experimental (A^3)						O_2
		Control (TMI)						O_2

Legend:
O_1 = Measurement of conceptual understanding (pretest)
O_2 = Measurement of conceptual understanding (posttest)

The intervention lasted for eight weeks. This quasi-experimental research was conducted from June 17 to August 5, 2019.

Data Collection Tools

To gather the data in determining the effects of AGHAMIC Action Approach (A^3) among Grade 6 pupils, several instruments were used by the researchers.

Pretest/ posttest. The 50-item test measured the level of conceptual understanding on matter of Grade 6 pupils. The topics covered in the test is the Properties of Matter during the first quarter of Science 6. In this test, the learners shall demonstrate understanding of different types of mixtures and their characteristics. Item analysis of the test was done to ensure its reliability and validity.

Written works. These instruments ensure that learners are able to express skills and concepts in written form. These include check-up quizzes about the topic which help strengthen test-taking skills among the learners.

Performance tasks. These allow learners to demonstrate what they know and are able to do in diverse ways. They may create or innovate products or do performance-based tasks. Performance-based tasks may include skills demonstration, laboratory work, and group presentations.

Data Analysis

To determine the effects of A^3, the data were analyzed using item analysis, frequency count and percent, weighted mean, standard deviation, t-test and test of homogeneity using the Levene's test. The item analysis was used to measure the difficulty of the test items given during pretest and posttest. This likewise determined the proficiency of learners in each sub-skill. The frequency counts and percent were used for tabular presentation of the raw scores of the pupils during the pre-test and post-test. These were also used in the frequency counts of correct answers from pupils for every item in the tests. The mean was used to determine the average scores of the pupils in the pretest/posttest, written works, and performance tasks. Using the mean, the researchers are able to identify the level of conceptual understanding of pupils before and after the application of the intervention. The score interpretations are as follows:

*Score Interpretation in Pretest and Posttest**

Scores	Abbreviation	Verbal Description (VD)
41-50	O	Outstanding
31-40	VS	Very Satisfactory
21-30	S	Satisfactory
11-20	FS	Fairly Satisfactory
1-10	DNM	Did Not Meet Expectations

**Based from Department of Education (DepEd) Order No. 8, s. 2015*

*Score Interpretation in Written Works and Performance Tasks**

Percent	Abbreviation	Verbal Description (VD)
96-100	M	Mastered
86-95	CAM	Closely Approximating Mastery
66-85	MTM	Moving Towards Mastery
35-65	A	Average
16-34	L	Low
5-15	VL	Very Low
0-4	ANM	Absolutely No Mastery

**Based from DepEd National Achievement Test (NAT) Standards*

Results and Discussion

Pupils' Level of Conceptual Understanding on Matter before the Treatment

The results of the pretest determined the level of conceptual understanding of the pupils in the control and experimental group prior to the infusion of the AGHAMIC Action Approach (Table 4).

Table 4.
Level of Conceptual Understanding of Pupils before the Treatment

Pre-Test Scores	Control Group		Experimental Group	
	Frequency	Percent	Frequency	Percent
11-20	15	65.22	16	66.67
1-10	8	34.78	8	33.33
Total	23	100.0	24	100.0
Average	**12.87 (Fairly Satisfactory)**		**12.42 (Fairly Satisfactory)**	

The results of the pre-test of pupils in the control group showed that the group belonged to the Fairly Satisfactory level in terms of level of performance as revealed by the weighted mean of 12.87 (SD=3.77). The test scores came majority from the bracket of 11 to 20 out of the 50-item Science test. Meanwhile, the experimental group yielded a weighted mean of 12.42 (SD=2.90) in the pre-test which is likewise classified as Fairly Satisfactory. Majority of the pupils got scores within the bracket of 11 to 20 out of the 50-item test.

Before the use of the intervention, the level of conceptual understanding on matter of the pupils is very low as revealed by the weighted mean of both groups. The pretest performance of the experimental group is lower than the performance of the control group.

Cooperative learning as a pedagogical tool, like the AGHAMIC Action Approach, is particularly good for developing pupils' interpersonal and social skills, the practice of these forming an essential element of discussion. The use of this instructional tool will engage better the learners in the actual teaching-learning cycle.

To further analyze the score distribution of the pretest in the control and experimental group, histograms were presented in Figure 2.

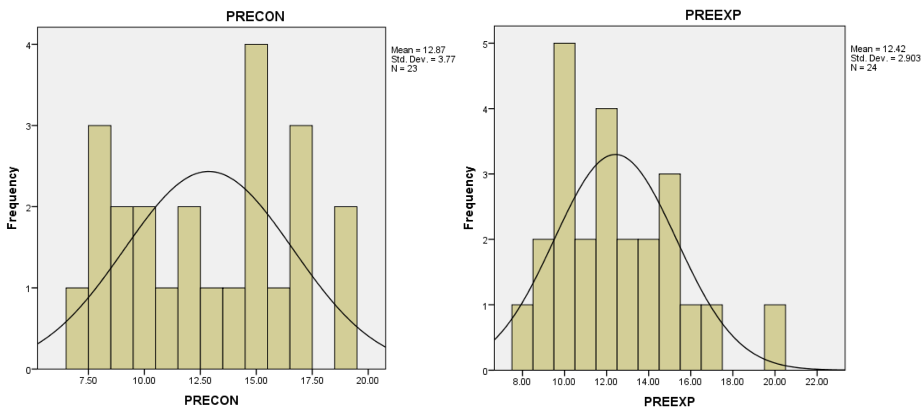

Figure 2.
Score Distribution in Pretest in the Control and Experimental Group

The skewness coefficient of the control group is 0.022 while the experimental group has a skewness coefficient of 0.768. Both of the values are positive which imply that the score distributions are positively skewed before the intervention. Most of the scores are low; hence, most of the pupils got scores below the mean value.

To test if the two groups are homogenous, a Levene's test of homogeneity of variances was calculated based on the pretest results of the control and experimental group (Table 5).

Table 5.
Levene's Test Table of Homogeneity of Variances in the Pretest

Levene Statistic	df1	df2	Sig.
3.594	1	45	0.064

Significant p<0.05 **equal variances are assumed*

The table shows that the Levene statistic is F (1,45) = 0.214, p =0.064. The significant value of 0.064 is greater than 0.05, therefore, it is not statistically significant. It indicates that the assumption of the homogeneity of variances was not violated. Therefore, the two groups are assumed as equal and so the study was carried out.

Pupils' Level of Conceptual Understanding on Matter during the Treatment

To monitor the progress of the learners' conceptual understanding during the application of the A^3, written works and performance tasks scores were recorded. Table 6 shows the summary of scores in the three written works (WW).

Table 6.
Pupils' Scores in the Written Works

Written Work	Control Group				Experimental Group			
	Mean	SD	%	VD	Mean	SD	%	VD
WW 1 (20 items)	11.48	2.06	57.39	A	13.21	2.06	66.04	MTM
WW 2 (20 items)	13.00	1.57	65.00	A	14.63	2.08	73.13	MTM
WW 3 (20 items)	12.78	2.45	63.91	A	14.50	2.19	72.50	MTM
Overall	**12.42**	**0.67**	**62.10**	**A**	**14.11**	**0.64**	**70.56**	**MTM**

Legend: M-Mastered (96-100%); CAM-Clearly Approximating Mastery(86-95%); MTM-Moving Towards Mastery (66-85%); A-Average (35-65%); L-Low (16-34%); VL-Very Low (5-15%); Absolutely No Mastery (0-4%)

As shown in the table, the control group's weighted scores in the written works are in the Average Level during the application of the strategy as revealed by the 61.95% overall performance. Meanwhile, a higher written works mean scores were obtained in the experimental group yielding 71.67% class performance which belongs to the Moving towards Mastery level. The results suggest that the performance of the pupils in the experimental group is higher than the control group with the use of the pedagogical strategy.

The results are parallel with several studies (Acar & Tarhan, 2008; Cohen, 1994; Qin, Johnson, & Johnson, 1995) that working and learning in groups improves achievement, motivation, social interactions and problem-solving in science.

Table 7 shows the summary of scores in pupils' performance tasks.

Table 7.
Pupils' Scores in the Performance Tasks

Performance Task	Control Group				Experimental Group			
	Mean	SD	%	VD	Mean	SD	%	VD
PT 1 (20 items)	14.43	2.04	72.17	MTM	15.58	2.64	77.92	MTM
PT 2 (25 items)	19.26	1.54	77.04	MTM	18.29	2.74	73.17	MTM
PT 3 (25 items)	20.26	1.42	81.04	MTM	20.63	2.60	82.50	MTM
Overall	**17.99**	**3.88**	**89.93**	**MTM**	**18.17**	**2.06**	**90.83**	**CAM**

Legend: M-Mastered (96-100%); CAM-Clearly Approximating Mastery(86-95%); MTM-Moving Towards Mastery (66-85%); A-Average (35-65%); L-Low (16-34%); VL-Very Low (5-15%); Absolutely No Mastery (0-4%)

In terms of performance task, the control group obtained an 89.83% overall performance which is in the Moving towards Mastery level. Meanwhile, the experimental group yielded a 90.83% class performance which is likewise interpreted as Moving towards Mastery. It can be deduced that the experimental group yielded higher mean scores in performance task compared to the control group, suggesting the effectiveness of the AGHAMIC Action Approach (A^3).

Sandoval and Reiser (2004) claimed that scientific inquiry is more than just doing science but also an epistemic practice; that is, students' empirical practice of building theories and models and revising them provides the conceptual framework or epistemic scaffolds for doing science. This can be assessed through the different performance tasks in class.

Pupils' Level of Conceptual Understanding on Matter after the Treatment

To assess the effectiveness of the strategy used by the researcher, a post-test was administered after the application of the TMI and A^3 (Table 8).

Table 8.

Level of Conceptual Understanding of Pupils after the Treatment

Post-Test Scores	Control Group		Experimental Group	
	Frequency	Percent	Frequency	Percent
41-50	0	0.00	8	33.33
31-40	15	65.22	12	50.00
21-30	8	34.78	4	16.67
Total	23	100.0	24	100.0
Average	**32.87 (Very Satisfactory)**		**37.54 (Very Satisfactory)**	

Post-test results showed that none of the class belonged to did not meet expectations level and fairly satisfactory level in the control and experimental group. The bulk of test scores in the post-test of the control group was in the bracket of 31 to 40 with 15 pupils (65.22%). With the weighted mean of 32.87, the control group was classified in the Very Satisfactory level after the use of traditional method of instruction (TMI). Meanwhile, the bulk of test scores in the post-test of the experimental group was in the bracket of 31 to 40 with 12 pupils (50.00%). Eight (8) pupils (30.00%) belonged to Outstanding level after the use of AGHAMIC Action Approach (A^3).

Several studies have confirmed that collaborative learning strategies, like the developed instructional tool, are effective pedagogy in science. Woods-McConney, Wosnitza and Sturrock (2016) averred that the strength of cooperative group work lies in the interactive and learner-centered nature of the learning environment. Intense, mutual exchanges of ideas are valued, and it can be argued, a main goal of cooperative group work (Chi, 2009).

To further analyze the score distribution of the posttest in the control and experimental group, histograms were presented in Figure 3.

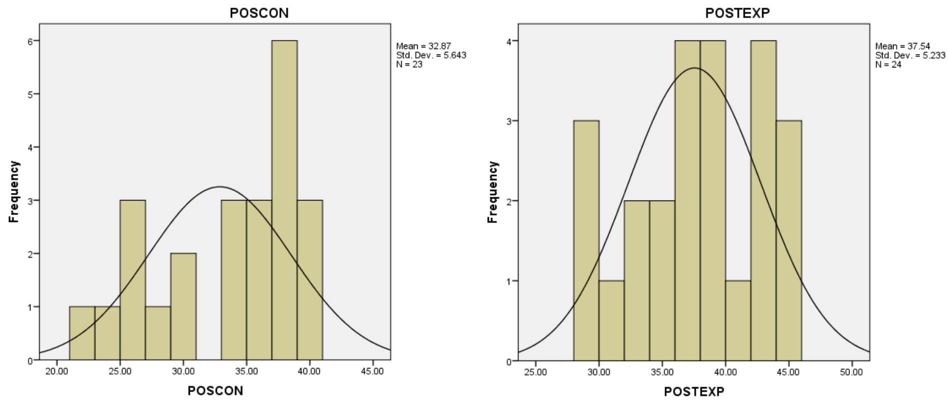

Figure 3.
Score Distribution in Posttest in the Control and Experimental Group

The skewness coefficient of the control group is -0.655 while the experimental group has a skewness coefficient of -0.296. Both of the values are negative which imply that the score distributions are negatively skewed after the intervention. Most of the scores are high; hence, most of the pupils performed well in the posttest. To easily compare the mean scores of the two groups in the pretest and posttest, a graph is presented (Figure 4).

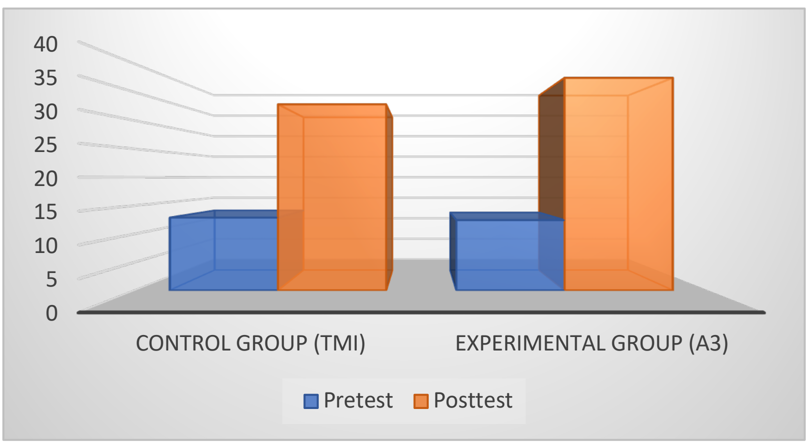

Figure 4.
Mean Comparison of Pretest and Posttest Scores in Two Groups

It can be seen from the graph that prior to the intervention, both groups have low conceptual understanding on matter. After the treatment, the control group using the TMI has improved the pupils' conceptual understanding while the experimental group using the A3 likewise improved pupils' conceptual understanding. However, it can be noted that higher posttest mean score in the experimental group (M=37.54) was obtained compared to the control group (M=32.87).

Learners should have a deep understanding of the content knowledge in Science which may help them become scientifically-, technologically-, environmentally-literate and productive member of the society, as the K to 12 Science curriculum envisions (Acuña, Gutierrez, & Areta, 2015). Further, Rogayan and Albino (2019) reiterated that misconceptions are threats that impede successful learning of scientific concepts and phenomena, thus, correcting students' misconceptions can lead to the development of inquisitive and scientific-minded students.

Difference in the Conceptual Understanding on Matter prior and after the Treatment

To measure the significant difference after the use of the teaching strategy, the mean difference between the scores in pretest and posttest in both the control and experimental groups is presented in Table 9.

Table 9.

T-test of the Pretest and Posttest Mean Gain of the Control and Experimental Groups in the Science Test

Group	Posttest Mean	Pretest Mean	Gain Score	*t*-value	*p*-value	Remarks
Control	32.87	12.87	20.00	24.471	0.0000	Significant
Experimental	37.54	12.42	25.12	35.113	0.0000	Significant

Significant at p<.05 **equal variances assumed*

The Grade 6 class in the control group obtained a mean gain score of 20.00 from the posttest score of 32.87 and pretest score of 12.87. Using the t-test for paired samples, a t-value of 24.471 was computed and the p-value was 0.0000 implying that there is a significant difference in the level of conceptual understanding on matter of pupils after the traditional method of instruction (TMI). Although, there is a significant difference in the control group, the experimental group yielded a higher gain score of 25.12 from the post-test score of 37.54 and pretest score of 12.42. Using the t-test for paired samples, a t-value of 35.113 was computed and the p-value was 0.0000 implying that there is a significant difference in the level of conceptual understanding on matter of pupils after the use of AGHAMIC Action Approach (A^3).

The findings of this study support the previous researches on the use of more innovative instructional strategies compared to the conventional one may enhance students' conceptual understanding. Kaya (2013) found out that argumentation practices significantly improved conceptual understanding of the experimental group when compared to the control group. Cetin-Dindar and Geban (2017) concludeed that 5E learning cycle model oriented instruction students outperformed the traditional teacher-centered instruction students in terms of conceptual understanding about acids and bases. Hong (2010) reported that the expeimental group students using collaborative science intervention experienced significant impact as seen through increased attitudes and decreased anxiety of learning science.

Results of the study of Gernale, Arañes and Duad (2015) suggest that both the experimental group and the control group registered significant differences and changes in terms of achievement and attitude towards science. However, the gain scores in the achievement and attitude revealed that the students in the experimental group using the Predict-ObserveExplain (POE) approach performed better than the control group. In the same vein, the creative visualization activities made the pupils learn the science concepts better, redounding to a signifiant increase in the their post-test scores as compared to their pretest scores (Sunga & Hermosisima, 2016).

Furthermore, the diverse learning characteristics displayed by learners in today's schools make it necessary for teachers to implement a wide variety of activities in their classes (Bender, 2012). As classrooms become more culturally diverse, it becomes more imperative to differentiate instruction (Cox, 2008).

Reflections of the Teacher-Implementer in the Application of the AGHAMIC Action Approach (A^3) in Science class

Based on the journal entries of the teacher-researcher in the implementation of the AGHAMIC Action Approach (A^3), the intervention used in the experimental group was said to be an appropriate and effective technique that teachers can use in order to enhancing pupils' conceptual understanding on matter. Pupils in the control group are inactive and unreceptive in learning compared to the pupils in the experimental group. The pupils exposed to A^3 exhibit motivation and interest in the AGHAMIC learning tasks compared to those exposed in the traditional teacher-centered instruction. Critical and creative thinking skills are more developed among the pupils in the experimental group compared to their counterparts as shown from their written works and performance tasks. Science education is in a unique position to help young people develop skills which should enable them to respond critically to various platforms such as media reports on issues with a science dimension (Day & Bryce, 2013). The teacher-implementer likewise realized that critical review of the AGHAMIC learning tasks using rubrics is also important to ensure the successful attainment of the learning outcomes.

As to the problems encountered, teachers must be mindful of the time allotted in the AGHAMIC learning task (ALT) so the other parts of the learning model may not sacrifice. There are times that students fail to meet the required time in accomplishing the ALT. Moreover, the use of code-switching (use of English then Filipino) in Science class may be allowed so students will be able to fully explain their understanding on the concepts being discussed. The code-switching may help further in the development of the pupils' conceptual understanding since English is their second language.

In order for pupils to receive the maximum benefit from A^3, teachers must be informed and be confident in using this method of instruction. Learners demonstrate varying learning abilities, academic levels, learning styles, and learning preferences and need tailored instruction to meet their unique needs (Bender, 2012). Collaborative learning recognizes the value and worth that exist in each individual; it allows learners from all backgrounds and with diverse abilities to demonstrate what they know, understand, and are capable of doing (Adami, 2004). Rogayan (2019b) further recommends that Science teachers must be equipped of different instructional methods including such as employing science investigations, making models and prototypes and conducting science research.

Conclusions and Recommendations

The study sought to ascertain the effects of the AGHAMIC Action Approach (A^3) on the pupils' conceptual understanding on matter. The Grade 6 pupils in both the control and experimental groups are performing Fairly Satisfactory in terms of conceptual understanding on matter before the intervention. During the intervention, the conceptual understanding of the pupils in the experimental group has enhanced to moving towards mastery level in written works and clearly approximating mastery in performance tasks. Meanwhile, the control group likewise improved their performance to average in their written works and to moving towards mastery in their performance tasks. After the intervention, there is a significant difference in the level of conceptual understanding of Science pupils in both the control and experimental group. However, a higher mean gain score was recorded in the experimental group which used the A^3 compared to the control group using TMI suggesting the exposure to A^3 may enhance more the pupils' conceptual understanding. The teacher-implementer realized that the use of A^3 as a collaborative learning strategy enhances pupils' conceptual understanding.

The recommendations of this study are for Science teachers to utilize the A^3 to improve pupils' conceptual understanding. School heads may include the A^3 basic principles in conducting learning action cells (LAC) for Science teachers to reacquaint them of the basic rudiments of the AGHAMIC Action Approach (A^3) which is based on collaborative learning. Pupils may be given varied roles in the AGHAM learning tasks so that they can better work as a group. Science teachers may differentiate the AGHAMIC learning tasks (ALT) to be performed by the pupils to make it more engaging and more collaborative in nature. Anecdotal record may be generated in every AGHAM learning tasks so that behavioral changes among the pupils will be recorded in a detailed manner. Future research may be conducted by other teacher-researchers to validate the effects of the intervention in enhancing pupils' conceptual understanding in other Science topics and in other grade levels. The effect of code-switching in Science classes may also be explored. The involvement of larger number of pupils may also be considered in future researches.

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Appendix

Steps Involved in the AGHAMIC ACTION Approach (A³)

Active Engagement

Getting the Prior Knowledge

Hand Over the Learning Task

Agham Learning Task

Monitoring and Facilitating

Interactive Presentation

Checking of the Conceptual Understanding

**Note: Informed consent was secured prior to the inclusion of the pupils' photos in this research article.*