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Mainstreaming Science Investigation Skills of Grade 7 In-Service Teachers in the Philippines

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Abstract: This study aimed to investigate the Science Investigation Skills (SIS) of the Grade 7 in-service teachers in the Philippines. The study utilized a descriptive survey design to assess the respondents preparedness in teaching Grade 7 Science Investigation of Special Science Program. Eighteen basic and integrated Science process skills item were administered and the results indicated that mean scores are higher in basic process skills than in the integrated process skills, thus, scores are significantly different. It also revealed that scores were not significantly different when grouped according to years of experience in teaching, while educational attainment data revealed no significant difference. This study recommends development in the curriculum involving Science Investigation Skills for both elementary and secondary Science teachers.

Key Words: Science investigation skills; Science basic process skills; Science integrated process skills; curriculum development; descriptive design, Philippines

1. INTRODUCTION

Special Science schools in the Philippines are organized in conformity with the implementation of the Expanded Basic Education also known as the K to 12 program. These schools are comprised of the Regional Science High School, Legislated Science High School and Science, Technology, Engineering and Math Schools. The organization of these schools drives the development of the curriculum to cater the students with high aptitude in Science and Mathematics. One of the unique features of these schools is the Science Investigative program which is embedded in the regular Science program and serves a culminating task of every scientific pursuit.

However, in this reform, Science investigative program becomes a separate learning area which primarily nurtures investigation skills amongst students. Through this program formal learning will be given to emphasize the Science process skills and its transformation in conducting Scientific research. Aktamis & Ergin (2008) This process skills are important in creation of scientific information to be conducted using research and in solving problems. In this study, Science process

skills is referred as Science Investigation Skills (SIS) which comprises of the basic Science process skills and the integrated process skills. Skamp (1998) the basic process skills are the foundation of the integrated process skills. The basic process skills cover: observing, measuring, inferring, predicting, and communicating, while the integrated process skills cover: controlling variable, hypothesizing, experimentation, and data interpretation (Zeidan & Jayosi, 2014).

Conversely, Colvil & Pattie (2002) presumes that learning activities involving SIS define the dimension of Scientific literacy. These skills are needed in realizing the potential of Science and Technology to solve societal problems (Akinbobola & Afolabi, 2010). The acquisition of the skills will help the students to become problem solver; and specially in facing mutli-dimensional problems of the 21st century (Feyzioglu, 2009). Thus, the roles of the teachers to optimize this potential are deemed necessary (Erkol & Ugulu, 2013). Furthermore, sound teachers' training and quality teaching of SIS predicts the success of the learnings in every school (Duran, Isik, Mihladiz, & Ozdemir, 2011).

Specifically, this study aimed to describe SIS in terms of basic and integrated process skills.



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This is to further assess the readiness of the Department of Education to offer Science Investigation amongst special Science school. It also sought significant difference between the respondents' SIS when grouped according to their years of teaching and highest educational attainment as well as the significant difference between the respondents' basic science process skills and integrated science process skills. Meanwhile, it benchmarked the areas that are needed to be calibrated for quality delivery of pedagogical-content knowledge regarding SIS.

2. METHODOLOGY

This study employed the descriptive survey design. Survey instrument was administered in electronic form. Participants accessed the survey instrument through a uniform resource locator and was administered towards the end of the Mass Training of Teachers (MTOT). The participants involved in the study were in-service Science teachers of the Department of Education. They are participants of the Science Investigatory Project making and are presently handling students in the special Science public schools in the Philippines. Additionally, participants were representing their schools in the MTOT for the implementation of the new curriculum for Science Investigation under the Expanded Basic Education Curriculum (K to 12 Program).

The instrument used in the study was adopted from the study of Zeidan & Jayosi, (2014), which consisted of 10 items on basic process skills and 8 items on integrated process skills. Basic process skills involved observation, measuring, classifying, predicting and communicating while the integrated process skills refer to controlling variables, hypothesizing, experimentation and data interpretation. The instrument was reported to have a high reliability coefficient (Cronbach alpha=0.95).

To describe the science process skills of the respondents, mean, percentage and standard deviation were calculated. Paired t-test was used to determine the significant difference between the basic process skills and integrated process skills of the respondents. Analysis of Variance (ANOVA) was used to determine the significant difference of teachers' science process skills when grouped according to their profile.

3. RESULTS AND DISCUSSION

Table 1 shows the mean, percentage, and standard deviation of the science process skills of teachers. Teacher's basic skills in science processes (mean percentage = 77%) gleaned a higher mean percentage compared to their integrated skills (52.13%). Overall, the science process skills of the respondents gained a mean score of 11.87 out of the 18 items on the SPST, that is, 65.94 %.

Table 1. Mean, Percentage, and Standard Deviation of the Science Process Skills of Teachers

Science Process Skills	Mean	%	SD
Basic Skills (10 items)	7.70	77%	1.32
Integrated Skills (8 items)	4.17	52.13%	1.07
Overall Science Process Skills	11.87	65.94%	1.91

Shown in Table 2 is the ANOVA result of the science process skills of the respondents when grouped according to their years of teaching and highest educational attainment. The data revealed no significant difference between the science process skills and the respondents' years of teaching (F-value= 0.659, p-value= 0.622) and highest educational attainment (F-value=0.36, p-value= 0.964), respectively. The mean between each group of teachers in terms of their years in teaching reveals slim difference on their science process skills scores. However, teachers' with years in service between 7 to 12 years gained the highest mean (X= 12.31) while those with 25 to 30 years of teaching experience gained the lowest mean score (X= 11.63). Interestingly, teachers with Masteral degree gained the highest mean (X=11.91) while those doctoral degree holders scored the lowest mean (X=11.67).



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Table 2. Difference on the Science Process Skills of the Respondents when grouped according to their profile.

Profile	Science Process Skills			
	Mean	SD	F-value	p-value
Years of Teaching			.659	.622
1-6	11.72	2.19		
7-12	12.31	1.55		
13-18	11.68	1.76		
19-24	11.90	1.73		
25-30	11.63	1.51		
	Levene Statistic = .770			
Highest Educational Attainment			.036	.964
Bachelor	11.85	2.03		
Masterate	11.91	1.75		
Doctorate	11.67	1.53		
	Levene Statistic = .918			

The t-test result of the science process skills of teachers is presented in Table 3. The data revealed that the scores on the basic skills in science processes (\bar{x} = 7.70, SD = 1.32) is significantly different to their integrated skills in science processes (t-value = 29/073, $p < 0.01$).

Table 3. T-test result of the science process skills of teachers

	Science Process Skills				
	Mean	SD	t-value	df	p-value
Science Process Skills			29.073	142	.000
Basic Skills (10 items)	7.70 (7.70%)	1.32			
Integrated Skills (8 items)	4.18 (52.13%)	1.07			

4. CONCLUSION

Science Investigation Skills of the teacher respondent is higher in terms of basic process skills over the integrated process skills. The groupings revealed no significant difference on SIS in terms of years of teaching experience and educational attainment. It is recommended in the training and curriculum development phase that the basic process skill should be emphasized to the elementary teachers. Therefore, advanced training on the science integrated skills should be emphasized during the in-service training activity for the teachers.

5. ACKNOWLEDGEMENT

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