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IS THERE A RETURN OF INVESTMENT? A TRACER STUDY OF GRADUATE DOST-SEI SCHOLARS IN SCIENCE

[*]Ricky M. Magno
[**]Hilda C. Montaño
[***]Edsel O. Coronado

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Corresponding Author: Ricky M. Magno; **Email:** rickymagno02@gmail.com; doi: 10.46360/globus.edu.220232004

Abstract

This paper seeks to know what happened to the graduates who availed of a DOST-SEI scholarship grant at the College of Education-Graduate School of a higher education institution in the Philippines. The data in this research were gathered through an online questionnaire; quantitative and qualitative data were collected. Both close-ended and open-ended questions were included. The participants in this research were the cohort of scholars and grantees from 2007 until 2013 who finished their master's or doctorate degree. These scholars came from the MAEd (Physics & Biology) and PhD in Science Education (Biology Education) programs of the College of Education-Graduate School. The data were analyzed using mean scores, points, and thematic analysis. The study revealed that the DOST-SEI graduate students' in Science were locally employed and had a permanent employment status. There was a high percentage of promotion among DOST-SEI scholar graduate students in Science, in which 68% were promoted while 32% were retained in their position or designation. In terms of their compensation, 68% have experienced an increase, while 32% have no increase in their salary. It implies a great assurance to be employed and has reasonable compensation if you are a DOST-SEI graduate scholar. The graduates were satisfied with the scholarship privileges and obligations that greatly contributed to their personality, family, career, and community. The extent to which the graduate science education program contributed to the scholar graduates research achievement enabled them to present their research paper at an International conference, receive any research-related recognition during or after the scholarship, publish their thesis/dissertation in a peer-reviewed journal, and to coach/adviser of a student who engaged in research or science investigation. The graduate scholars' critical thinking skills showed excellent results in both the cognitive and affective domains. This indicates that the program gave a great extent to the essential skills of thinking of the graduate students'. On the other hand, the self-efficacy after undergoing DOST-SEI's scholarship program greatly benefits the graduate student's innate ability to achieve their life and career goals.

Keywords: DOST - SEI, College of Education, Western Visayas State University, Graduate School, Return of Investment.

Background of the Study

One way to develop human resource potential in Southeast Asia is by enhancing higher education quality through student scholarships (Fayyaz, 2014). The Philippines has answered the call for human resource development through the scholarship programs of the Science Education Institute (SEI), a service agency of the Department of Science and Technology (DOST). This institute is mandated to develop a scientifically and technologically literate citizenry and accelerate the development of Science and Technology human resources needed for socio-economic development (DOST-SEI, 2012).

Given this mandate, the DOST-SEI created a National Consortium in Graduate Science and Mathematics Education (NCGSME) in 2007 as part of the Accelerated Science and Technology Human Resource Development Program. The primary aim of the consortium is to establish a common quality graduate program and to accelerate the development of a critical mass of experts in science and mathematics education. The consortium started with four universities: Mindanao State University - Marawi, Western Mindanao State University, University of San Carlos, and West Visayas State University. The consortium was eventually expanded in 2014 to include six other universities in Luzon such as Ateneo de Manila University, Bicol University, Philippine Normal University, De La Salle University, Mariano Marcos State University, and Central Luzon State University.

** Ph.D., West Visayas State University, Iloilo City, Philippines.*
*** Ed.D., RGC., West Visayas State University, Iloilo City, Philippines.*
**** Ph.D., Iloilo Science and Technology University - Miagao Campus, Iloilo, Philippines.*

The scholarship is on a competitive basis, and applicants need to meet the eligibility criteria set by the DOST-SEI and WVSU-COEGS. Scholars enjoy the following privileges (ASTHRDP-NCGSME Flyer): (1) free tuition and other school fees, (2) stipend of PhP 25,000.00 (master's) and PhP 33,000.00 (doctorate) per month, (3) book allowance of PhP 10,000.00 every academic year, (4) transportation allowance in the form of an economy round-trip fare every academic year for those who will study outside their home province, (5) group insurance, (6) thesis allowance of up to PhP 50,000.00 and dissertation allowance of PhP 100,000, and (7) a non-scholar graduate student in science and math education can also avail of a thesis grant of up to PhP 50,000.00 and dissertation grant of PhP 100,000.00.

DOST-SEI allocates a sizeable amount of money for the scholars. This means that the Philippine government is investing money to meet the goal of developing a critical mass of science and mathematics graduate education scholars who will return to their teaching posts with the end in view of improving the quality of science and math education in the country.

Considering the investments of DOST-SEI to develop human capital, it is in this light that this study is proposed to determine if needed such investments resulted to the desired scholarship services and scholars' skills. Hence, "return of investment in this study" is not described in the context of finance.

The results of the study can be a feedback mechanism to inform DOST-SEI of the status of the scholars after graduation. This research will enable the institute to check whether or not the scholarship program meets its goal of accelerating the number of well-equipped and competent science and mathematics teachers and at the same time to find out that their employment best utilizes their education. Also, the results can also be the basis of policy review particularly those pertaining to the admission criteria and selection of scholars. This study will hopefully be able to provide relevant information to the DOST-SEI officials to assist them to make informed decisions and fine-tune the program.

Furthermore, at the level of the University, this can also provide a basis to look into the admission process of the College of Education - Graduate School and the various services extended to the scholars to help them finish the degree.

Research Purpose and Questions

The Accelerated Science and Technology Human Resource Development Program - National Consortium in Graduate Science and Mathematics Education (ASTHRDP - NCGSME) of the Department of Science & Technology - Science Education Institute (DOST - SEI) began in 2007. Since then hundreds of graduate students in the MAEd (Mathematics, Physics, & Biology) and Ph.D. Sci. Ed. (Biology & Mathematics) have availed of the scholarship grant.

The College of Education, as a member school of the Consortium is interested to pursue the conduct of a tracer study to know what happened to the graduates who availed of a DOST-SEI scholarship grant. The ILO Thesaurus 2005 defines a tracer study as an assessment tool where "the impact on target groups is traced back to specific elements of a project or program so that effective and ineffective program components may be defined" (as cited by Gines, 2014).

Specifically, this study sought to answer the following questions:

1. What are the DOST-SEI scholar graduates' in Science profile in terms of (a) employment status, (b) position after graduation, (c) promotion opportunities, and (d) increase in income?
2. What are the scholar graduates' in Science level of satisfaction with DOST-SEI's scholarship privileges and obligations?
3. What is the extent to which the graduate science education program contributed to the scholar graduates (a) research achievements, (b) critical thinking skills, and (c) self-efficacy?

Review of Literature

Tracer studies constitute one form of empirical study that appropriately evaluates the outcomes of a particular program. By bringing together different types of information such as level of employment, the correspondence between educational qualifications and employment and the students' experiences can indicate possible deficits in a given educational program.

The Philippine Normal University (PNU) conducted a tracer study among its graduates of 2009-2011 to evaluate the impact of teacher education as one of its research priorities. It documented the employment characteristics, transition to employment and the level of satisfaction. The findings revealed that the PNU graduates are predominantly females and in their early twenties. A great number of the graduates were employed immediately after graduation by application and not because of political connections. In addition, the graduates expressed their high level of satisfaction with the University's services, learning environment and facilities while they were moderately satisfied with the computer laboratories of the university (Gines, 2014).

Another study in the Philippines was conducted by a team of researchers from the Rizal Technological University (RTU). It determined whether the field of specialization in the different colleges of its graduates and their academic-academic acquired skills and competencies were related to their occupations. The researchers found out that the RTU graduates were mostly females and single who preferred to work in the country rather go abroad. They were mostly employed in their fields of specialization and that their school-acquired skills and competencies were relevant to their chosen occupation and greatly helped in the performance of their jobs (Ramirez, et. al., 2014).

Several other studies were pursued by Philippine universities to trace their graduates' whereabouts after their specific degrees. One study was undertaken to look into culture of entrepreneurship and employment among graduates of a business university. The study revealed that one of four graduates who took up entrepreneurial education became entrepreneurs while the rest opted to become employed. The result became an eye-opener that the Filipino youth still needs to take root in the young people's mind set (de Ocampo, et.al., 2014).

As a way to evaluate the employment status of its Computer Science graduates from 2009 - 2014, the Lyceum of the Philippines University (LPU) conducted a tracer study. The findings served as a basis to improve, update or enhance the Computer Science curriculum in order to make it more responsive to the changing times. The graduates of Lyceum were gainfully employed with a short waiting time between graduation and employment. They were able to utilize their LPU-acquired information technology and communication skills in their present job (Macatangay, 2013).

Undoubtedly, tracer studies are a powerful tool which can document employment characteristics, level of satisfaction or be a curricular product evaluation to determine curricular effectiveness.

Research Design

This study employed the survey design, which is geared toward the description of the target population, the DOST-SEI scholars. Through a questionnaire administered online, both quantitative and qualitative data was gathered. Both close-ended and open-ended questions were included. This study covered the profile of scholars, scholars' level of satisfaction, scholars' research, critical, and problem-solving skills, scholars' work attitudes, effectiveness and adequacy of the DOST-SEI scholarship, relevance and adequacy of the University's support services.

This study gathered data from the cohort of scholars and grantees from 2007 until 2013 who finished their master's or doctorate degree. These scholars came from the MAEd (Physics & Biology) and PhD in Science Education (Biology Education) programs of the College of Education-Graduate School. There were 25 scholars responded in the survey.

The research commenced with the planning stage during which the researchers prepared the needed materials and the construction of the data-gathering tools after a thorough review of literature. Research instruments of the study were validated.

A directory of scholars were prepared to enable the researchers to know where they can be tracked. The survey was done online, by mail or through answering the instruments

Results

The DOST-SEI graduates' in Science profile in terms of **employment status** revealed that all graduate students' in Science were locally employed and have a permanent status of employment (see Figure 1 & 2). On the other hand, the graduate students' **position after graduation** revealed that most of them were employed in the DepEd while others in the SUC. In the DepEd, six (6) of them were Teacher III, one (1) Teacher I, one (1) Master Teacher I, four (4) Master Teacher II, one (1) Special Science Teacher IV, and one (1) Education Program Specialist I with a total of fourteen (14) graduate students' in Science (refer to Table 1). In the SUC, three (3) of them were Assistant Professor I, one (1) Instructor I, one (1) Assistant Professor II, one (1) Assistant Professor III, one (1) Associate Professor I, one (1) Associate Professor II, one (1) Associate Professor III, one (1) Associate Professor IV, and one (1) Professor I with a total of eleven (11) graduate students' in Science (refer to Table 1).

Figure 1: Current Employment Status

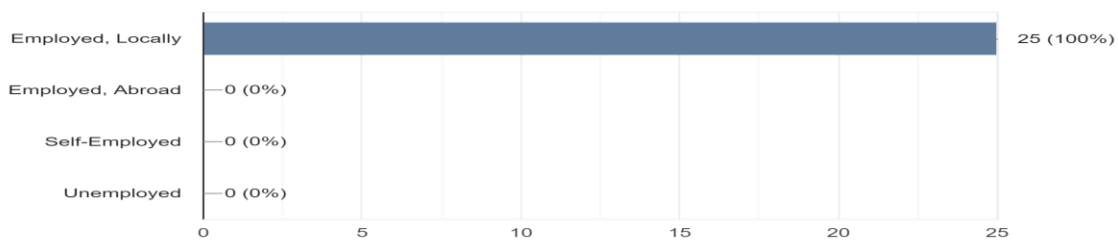

Figure 2: Employment Status

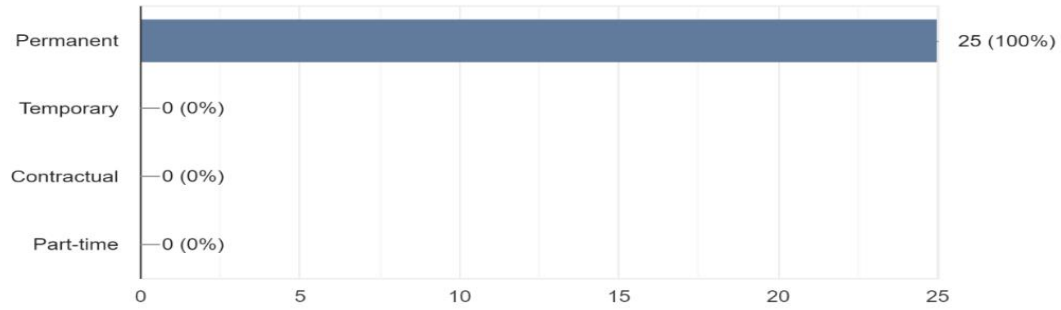

Table 1: Distribution of Graduate Scholars by Current Position/Designation

Position/Designation	N	%
DepEd		
Teacher I	1	4%
Teacher III	6	24%
Master Teacher I	1	4%
Master Teacher II	4	16%
Special Science Teacher IV	1	4%
EPS	1	4%
SUC		
Instructor I	1	4%
Assistant Professor I	3	12%
Assistant Professor II	1	4%
Assistant Professor III	1	4%
Associate Professor I	1	4%
Associate Professor II	1	4%
Associate Professor III	1	4%
Associate Professor IV	1	4%
Professor I	1	4%
TOTAL	**25**	**100%**

Moreover, the DOST-SEI scholar graduate students' in Science profile in terms of **promotion opportunities** revealed that seventeen (17) or 68% of them were promoted while eight (8) or 32% of them were retained to their position or designation. While there was a high percentage of promotion opportunities among DOST-SEI scholar graduate students' in Science, there were seventeen (17) or 68% have experienced an increased in their salary while eight (8) or 32% have no increase in their salary.

Table 2: Promotion Opportunities

Participant	Previous position/designation	Current position/designation	Status
1	Teacher I	Assistant Professor I	PROMOTED
2	Teacher I	Instructor I	PROMOTED
3	Teacher III	Education Program Specialist	PROMOTED
4	Associate Professor II	Associate Professor II	RETAINED
5	Teacher III	Master Teacher II	PROMOTED
6	Teacher I	Teacher III	PROMOTED
7	Instructor I	Associate Professor IV	PROMOTED
8	Teacher III	Master Teacher II	PROMOTED
9	Instructor I	Assistant Professor III	PROMOTED
10	Teacher III	Master Teacher II	PROMOTED
11	Professor I	Professor I	RETAINED
12	Teacher III	Master Teacher II	PROMOTED

13	Teacher I	Assistant Professor II	PROMOTED
14	Teacher I	Teacher III	PROMOTED
15	Teacher III	Teacher III	RETAINED
16	Special Science Teacher IV	Special Science Teacher IV	RETAINED
17	Master Teacher I	Master Teacher I	RETAINED
18	Associate Professor I	Associate Professor I	RETAINED
19	Teacher I	Teacher I	RETAINED
20	Teacher III	Teacher III	RETAINED
21	Teacher I	Teacher III	PROMOTED
22	Teacher I	Teacher III	PROMOTED
23	Teacher III	Assistant Professor I	PROMOTED
24	Instructor I	Assistant Professor I	PROMOTED
25	Medical Technologist	Associate Professor III	PROMOTED
Number of Promoted		**Percent**	
17		68%	
Number of Retained		**Percent**	
8		32%	

Table 3: Increase in Income (in Philippine pesos)

Participant	Previous Salary	Current Salary	Increase	% of Increase
1	22,149.00	29,010.00	6,861.00	31%
2	20,179.00	22,149.00	1,970.00	9.8%
3	24,224.00	58,717.00	34,493.00	142%
4	47,037.00	47,037.00	0	0%
5	24,224.00	42,099.00	17,875.00	74%
6	20,179.00	24,224.00	4,045.00	20%
7	22,149.00	58,717.00	36,568.00	165%
8	24,224.00	42,099.00	17,875.00	74%
9	22,149.00	36,053.00	13,904.00	63%
10	24,224.00	42,099.00	17,875.00	74%
11	73,299.00	73,299.00	0	0%
12	24,224.00	42,099.00	17,875.00	74%
13	20,179.00	31,765.00	11,586.00	57%
14	20,179.00	24,224.00	4,045.00	20%
15	24,224.00	24,224.00	0	0%
16	58,717.00	58,717.00	0	0%
17	38,085.00	38,085.00	0	0%
18	42,099.00	42,099.00	0	0%
19	20,179.00	20,179.00	0	0%
20	24,224.00	24,224.00	0	0%
21	20,179.00	24,224.00	4,045.00	20%
22	20,179.00	24,224.00	4,045.00	20%
23	24,224.00	29,010.00	4,786.00	19.8%
24	22,149.00	29,010.00	6,861.00	31%
25	20,179.00	52,554.00	32,375.00	160%
Number of Participants with an Increase in Income			**Percent**	
17			68%	
Number of Participants without Increase in Income			**Percent**	
8			32%	

The findings of the study also revealed that the scholar graduates' level of satisfaction with DOST-SEI's scholarship privileges and obligations were categorized into personality, family, career, and community.

The graduate scholars' were satisfied based on personality by teaching them how to face different challenges of life, learn to value money that the government invested, finding solutions to problem in the family or even in the workplace, give more confidence in asserting their opinions, boost their personality, improves their self-worth, continue to be grateful, made them to be hardworking, open-minded, made them to become an output/outcome oriented person, helped them improve as a teacher,

increase self-esteem, and empowered to be help to others.

Moreover, the graduate scholars' were also satisfied based on family by helping their finances at home and making their family proud of them as a DOST-SEI scholar.

Furthermore, the graduate scholars' satisfaction based on career were opportunities to widen their horizon, manages different work task in their present career, gives more credibility in presenting and publishing papers, developed professional growth, serves as an edge in job application, made them more effective and efficient teacher, developing network with other teachers in their field of teaching, enhances their skills in doing research, and to be equipped to perform job.

Lastly, the graduate scholars' satisfaction based on community were helping the quality assurance of teaching science education in the country, establishing linkages with other agencies, provides an avenue for all scholars and researchers to display and share knowledge on recent discoveries especially in research, giving time and making letters or recommendations on whatever problem arises in the community, helping also in building a greener and cleaner community, and playing a vital role in nation building.

The findings also revealed that the Teachers' Self-Efficacy after undergoing DOST-SEI's scholarship program has a very great extent. This is shown in table 4 below.

Table 4: Self-Efficacy

Participant	Mean	Description
1	4.21	Very Great Extent
2	3.10	Great Extent
3	4.38	Very Great Extent
4	4.69	Very Great Extent
5	4.14	Very Great Extent
6	3.55	Great Extent
7	5.00	Very Great Extent
8	3.97	Great Extent
9	4.86	Very Great Extent
10	4.14	Very Great Extent
11	4.00	Great Extent
12	4.21	Very Great Extent
13	4.62	Very Great Extent
14	3.72	Great Extent
15	3.72	Great Extent
16	3.83	Great Extent
17	4.55	Very Great Extent
18	4.34	Very Great Extent
19	4.41	Very Great Extent
20	3.24	Great Extent
21	3.93	Great Extent
22	4.59	Very Great Extent
23	4.17	Very Great Extent
24	4.28	Very Great Extent
25	4.10	Very Great Extent
Overall	**4.15**	**Very Great Extent**

Based on the Critical Thinking Self-Appraisal Test in the Cognitive Domain showed excellent findings. This is shown in Table 5 below.

Table 5: The Critical Thinking Self-Appraisal Test (Cognitive Domain)

Participant	Mean	Description
1	4.07	Very Good
2	3.83	Very Good
3	5.00	Excellent
4	4.83	Excellent

5	4.03	Very Good
6	3.77	Very Good
7	5.00	Excellent
8	3.97	Very Good
9	4.50	Excellent
10	4.13	Excellent
11	3.97	Very Good
12	3.97	Very Good
13	4.53	Excellent
14	3.83	Very Good
15	3.80	Very Good
16	3.63	Very Good
17	4.63	Excellent
18	4.50	Excellent
19	4.00	Very Good
20	3.90	Very Good
21	3.97	Very Good
22	4.27	Excellent
23	4.00	Very Good
24	3.93	Very Good
25	4.90	Excellent
Overall	**4.20**	**Excellent**

Moreover, the Critical Thinking Self-Appraisal Test in the Affective Domain showed an excellent findings also. This is shown in Table 6.

Table 6: The Critical Thinking Self-Appraisal Test (Affective Domain)

Participant	Mean	Description
1	4.00	Very Good
2	3.93	Very Good
3	5.00	Excellent
4	5.00	Excellent
5	4.13	Excellent
6	3.63	Very Good
7	4.83	Excellent
8	3.97	Very Good
9	4.23	Excellent
10	4.03	Very Good
11	3.90	Very Good
12	4.40	Excellent
13	4.47	Excellent
14	4.30	Excellent
15	3.93	Very Good
16	3.30	Very Good
17	4.67	Excellent
18	4.77	Excellent
19	4.20	Excellent
20	2.97	Good
21	3.97	Very Good
22	4.90	Excellent
23	4.00	Very Good
24	4.00	Very Good
25	4.90	Excellent
Overall	**4.22**	**Excellent**

Furthermore, the Critical Thinking Self-Appraisal Test both in the Cognitive Domain and Affective Domain showed an excellent findings. This is shown in Table 7 below.

Table 7: The Critical Thinking Self-Appraisal Test (Cognitive and Affective Domain)

Participant	Cognitive Domain (Mean)	Affective Domain (Mean)	Critical Thinking Skills (Cognitive and Affective Domain)	Description
1	4.07	4.00	4.04	Very Good
2	3.83	3.93	3.88	Very Good
3	5.00	5.00	5.00	Excellent
4	4.83	5.00	4.92	Excellent
5	4.03	4.13	4.08	Very Good
6	3.77	3.63	3.70	Very Good
7	5.00	4.83	4.92	Excellent
8	3.97	3.97	3.97	Very Good
9	4.50	4.23	4.37	Excellent
10	4.13	4.03	4.08	Very Good
11	3.97	3.90	3.94	Very Good
12	3.97	4.40	4.19	Excellent
13	4.53	4.47	4.50	Excellent
14	3.83	4.30	4.07	Very Good
15	3.80	3.93	3.87	Very Good
16	3.63	3.30	3.47	Very Good
17	4.63	4.67	4.65	Excellent
18	4.50	4.77	4.64	Excellent
19	4.00	4.20	4.10	Excellent
20	3.90	2.97	3.44	Very Good
21	3.97	3.97	3.97	Very Good
22	4.27	4.90	4.59	Excellent
23	4.00	4.00	4.00	Very Good
24	3.93	4.00	3.97	Very Good
25	4.90	4.90	4.90	Excellent
Total	**4.20**	**4.22**	**4.21**	**Excellent**

The findings of the study also revealed the Research Achievements of the graduate students' in which 7 of them were able to present their research paper in an International conference, 9 in a National conference, 2 in a Local conference and 7 did not present any research paper. In addition, 6 of the scholars were able to receive any research-related or recognition during or after the scholarship. Moreover, 5 of them were able to published his/her Thesis/Dissertation in a peer reviewed journal and 2 of them were able to published any article aside from their Thesis/Dissertation during or after the scholarship. Furthermore, 14 of them were able to coach/adviser of a student who engaged in research or science investigation. This is shown in table 8 below.

Table 8: Research Achievements

Participant	Highest Level of Conference Attended and Presented a Research Paper	Was able to receive any Research-related or Recognition during or after the scholarship	Was able to Published his/her Thesis/ Dissertation	Was able to published any article (aside from thesis/dissertation) during or after the scholarship	Was able to coach/adviser of a student who is engaged in research or science investigation
1	International	No	No	No	No
2		No	No	No	No
3	National	No	Yes	No	No
4	National	No	No	No	Yes
5	National	Yes	Yes	No	Yes
6		No	No	No	No

7	International	Yes	Yes	Yes	Yes
8	National	No	No	No	Yes
9		No	No	No	No
10	National	No	No	No	Yes
11	International	No	Yes	Yes	Yes
12	National	No	Yes	No	No
13	International	No	No	No	Yes
14	National	No	No	No	No
15		No	No	No	Yes
16	National	Yes	No	No	No
17	Local	Yes	No	No	No
18	International	Yes	No	No	Yes
19		No	No	No	Yes
20		No	No	No	Yes
21	National	No	No	No	Yes
22		No	No	No	Yes
23	International	No	No	No	No
24	International	No	No	No	No
25	Local	Yes	No	No	Yes

Conclusion

After graduation, The DOST-SEI graduate students' in Science were locally employed and have a permanent status of employment. Fourteen (14) of them were employed in the DepEd and eleven (11) were employed in the SUC. Moreover, there was a high percentage of promotion among DOST-SEI scholar graduate students in Science in which seventeen (17) or 68% of them were promoted while eight (8) or 32% of them were retained to their position or designation. In terms of their compensation, there were seventeen (17) or 68% have experienced an increased while eight (8) or 32% have no increase in their salary. This simply shows that there is a great assurance to be employed and have a good compensation if you are a DOST-SEI graduate scholar.

The DOST-SEI scholar graduates were satisfied in the scholarship privileges and obligations and it were categorized into personality, family, career, and community. In their personality, it helped them to face the challenges of life, give them more confidence in asserting opinions, boost their personality, improves their self-worth, continue to be grateful, made them to be hardworking, open-minded, made them to become an output/outcome oriented person, helped them improve as a teacher, increase self-esteem, and empowered to be help to others. In their family, it helped their finances at home and making their family proud of them. In their career, it enabled opportunities to widen their horizon, manages different work task in their present career, gives more credibility in presenting and publishing papers, developed professional growth, serves as an edge in job application, made them more effective and efficient teacher, developing network with other teachers in their field of teaching, enhances their skills in doing research, and to be equipped to perform job. Lastly, in their community, it helped the quality assurance of teaching science education in the country, establishing linkages with other agencies, provides an avenue for all scholars and researchers to display and share knowledge on recent discoveries especially in research, giving time and making letters or recommendations on whatever problem arises in the community, helping also in building a greener and cleaner community, and playing a vital role in nation building.

The extent to which the graduate science education program contributed to the scholar graduates research achievement enabled them to present their research paper in an International conference, received any research-related or recognition during or after the scholarship, published their thesis/dissertation in a peer reviewed journal and to coach/adviser of a student who engaged in research or science investigation. Moreover, their critical thinking skills in the cognitive domain showed an excellent findings that implies that there was a great extent to the graduate scholars. Furthermore, their critical thinking skills in the affective domain showed an excellent findings that also implies a great extent to the graduate scholars. Both the cognitive and affective domain combined showed an excellent result in their critical thinking skills. This simply shows that the program gave a great extent to the critical thinking skills of the graduate students'. On the other hand, the self-efficacy after undergoing DOST-SEI's scholarship program has a very great extent to the graduate students innate ability to achieve their goals in life and in their career.

Conflict of Interest

The authors declare no conflict of interest in the conduct of this research.

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