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Academic Programs in Statistics in the Philippines

by

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Lisa Grace S. Bersales, Ph.D.[2]

ABSTRACT

This paper takes a closer look at selected academic institutions that offer statistics programs. A survey of such institutions indicates that statistics programs are currently being offered nationwide but with concentration still in Luzon. Enrolment statistics in the programs are encouraging but graduation rate needs to be increased. More faculty trained in both theoretical and applied statistics need to be recruited. More activities for advocacy of the statistics discipline and the promotion of the academic programs in statistics still need to be done.

I. Introduction

The first academic program offered in the Philippines was the Master of Arts in Statistics program of the Statistical Center, now the School of Statistics, of the University of the Philippines (U.P.). This was instituted in 1954. The Commission on Higher Education(CHED) awarded for the first time, in 2006, the Center of Excellence in Statistics and Center of Development in Statistics to institutions offering statistics programs. The former was given to the U.P. School of Statistics while the latter to the U.P. Institute of Statistics. Thus, after 50 years, statistics in the Philippines has found recognition as a discipline in itself. These two institutions have produced majority of the statistical manpower for government, business and industry, and the academe to date. Currently, other academic institutions are also offering statistics academic programs and, thus, contribute more manpower as well as research and training services in the country.

A survey of academic institutions that offer Statistics and Applied Mathematics/Statistics programs show encouraging statistics. However, there is still a need to attract more students, produce more graduates, enhance the academic programs, and provide more facilities. The paper shall present these statistics and give recommendations on how to enhance their academic programs, attract more students with potential, and produce more graduates.

II. The Birth Of Statistics Education In The Philippines

[1] This paper is a revision of the paper that was first presented at the Tito A. Mijares Research Conference, Pasig City in September 2003 and then at the 9th National Convention of Statistics, Manila, October 2004

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The seed of higher level of education in Statistics in the Philippines was planted in 1952 when the first board of directors of the Philippine Statistical Association discussed the possibility of establishing an international statistical center in Manila under the dual sponsorship of the Philippine government and the United Nations(Lorenzo, 1953). This recommendation was a result of their observation that staff doing statistical work then did not have formal training in statistics. At that time, college education offered only three units of elementary statistics and there were no undergraduate and graduate programs in statistics in the Philippines.

In 1953, the Statistical Center was established under a bilateral agreement between the Philippine government and the United Nations. Its first academic program, Master of Arts in Statistics, was instituted in 1954. It was formally turned over to the University of the Philippines in 1963 and , in 1998, it was renamed the School of Statistics of the University of the Philippines in Diliman.

III. Current Academic Programs In Statistics

A study commissioned by the Technical Panel on Science and Mathematics of the Commission on Higher Education (CHED) listed eleven(11) schools offering academic programs in Statistics as of 1999(Bonzo and Patungan, 2000). At present, eighteen(18) schools offer such programs. The following table, Table 1, lists them and the programs they offer: It should be noted that the list does not include schools that may have programs in applied mathematics which include statistics as a specialization but do not have formal statistics programs.

Table 1. Schools Offering Programs in Statistics, AY2005-2006

Island Grouping	School	Academic Programs
NCR	School of Statistics, U.P. Diliman,Quezon City	B.S. Statistics Master of Statistics M.S. Statistics Ph.D. in Statistics
	Polytechnic University of the Philippines(PUP),Manila	Associate in Applied Statistics Bachelor in Applied Statistics

		Master of Arts in Statistics
	De La Salle University,Manila (DLSU Manila)	B.S. Statistics
	Rizal Technological University,Mandaluyong	B.S. Statistics
Luzon	Institute of Statistics, U.P. Los Banos in Laguna	B.S. Statistics M.S. Statistics Ph.D. Statistics
	Central Luzon State University in Munoz, Nueva Ecija	B.S. Applied Statistics
	Benguet Sate University in La Trinidad, Benguet	B.S. Applied Statistics Master of Arts in Applied Statistics
	Batangas State University (formerly Pablo Borbon Memorial Institute of Technology),Batangas City	B.S. Statistics
	University of Northern Philippines ,Vigan, Ilocos Sur	B.S. Mathematics/Statistics Master of Statistics
Visayas	U.P. Visayas (UPV) in Miag-ao, Iloilo	B.S. Statistics
	Leyte State University in Baybay,Leyte	B.S. Statistics
	Leyte Institute of Technology in Tacloban City	B.S. Statistics
	Negros State College of Agriculture in Kabankalan, Negros Occidental	Statistics*
	Samar State Polytechnic College in Catbalogan, Western Samar	B.S. Applied Statistics
Mindanao	Iligan Institute of Technology, Mindanao State University in Iligan	B.S. Statistics Master of Applied Statistics M.S. Statistics
	Mindanao State University, Tawitawi	B.S. Statistics
	University of Southeastern Philippines in Davao City	B.S. Statistics
	Western Mindanao State University in Zamboanga City, Zamboanga del Norte	B.S. Statistics

* Academic Program not specified

It is important to note that the curricular offerings are available nationwide. However, Ph.D. and Masteral offerings are concentrated in Luzon. Outside Luzon, only the Iligan Institute of Technology of Mindanao State University (MSU-IIT) offers graduate degrees(masteral level) in statistics. However, the CHED study mentioned earlier cites two Ph.D. programs in Mathematics that specialize in statistics. These are the Ph.D. in Mathematical

Sciences of the Mindanao Polytechnic State College and the Ph.D. in Mathematics of MSU-IIT. Thus, although the Mindanao region has no Ph.D. Statistics offerings, there are Mathematics programs which focus on statistics. The Visayas region, therefore, needs more help in developing graduate level programs.

A historical review of the institution of academic programs in statistics offered by the University of the Philippines in Diliman, Los Banos and Visayas (U.P. School of Statistics, U.P. Institute of Statistics, U.P. Visayas); DLSU Manila; MSU-IIT; and the Polytechnic University of the Philippines (PUP) shows the following:

Year Instituted	Academic Program
1954	M.A. in Statistics(now abolished) in U.P. School of Statistics
1957	M.S. Statistics in U.P. School of Statistics
1964	B. of Statistics in U.P. School of Statistics
1967	B.S. Statistics in U.P. School of Statistics
1968	Master of Statistics in U.P. School of Statistics
1969	Ph.D. Statistics in U.P. School of Statistics
1970	M.S. Experimental Statistics in U.P. Institute of Statistics
1972	B.S. Statistics in U.P. Institute of Statistics
1977	M.S. Statistics in U.P. Institute of Statistics
1979	Master in Applied Statistics in PUP
1980	B.S. Statistics in MSU-IIT
1985	Ph.D. Statistics in U.P. Institute of Statistics
1995	Master of Applied Statistics of MSU-IIT
2000	new Master in Applied Statistics in PUP
2000	B.S. Statistics of DLSU-Manila
2001	B.S. Statistics in U.P. Visayas
2004	M.S. Statistics in MSU-IIT

The School of Statistics' academic programs started with the training of mainly government statisticians. The Institute of Statistics' programs developed from the Statistics Laboratory of the College of Agriculture of UPLB. The program of UPV was developed by its College of Arts and Sciences and the programs of MSU-IIT were developed by its College of Science. Alumni of the School of Statistics spearheaded these developments.

The Master of Applied Statistics(MAS) of PUP just like the first academic program of the School of Statistics also resulted from a bilateral agreement. The MAS program was formalized in 1979 as an academic program of PUP through a memorandum of agreement between the Philippine National Statistics Office(PNSO) and PUP. This was done through the efforts of Dr. Tito A. Mijares, then the Executive Director of PNSO, who realized the need for those engaged in the practice of statistics to undergo further studies in statistical theory, methods and data analysis. The program was further enhanced in 2000(Africa and Ignacio, 2001).

Faculty

Profiling faculty of schools that offer academic programs in statistics yields the conclusion that there is still a dearth in the teaching workforce. The CHED study reported that, in 1999, all the schools in the survey had, on the average, thirteen (13) full-time faculty and three(3) part-time faculty. Furthermore, the faculty of eleven(11) schools that offer statistics programs had a workforce of twenty one(21) faculty with Ph.D. in Statistics, forty five(45) with Masteral degrees in Statistics, and twenty nine(29) with Bachelor's degrees in Statistics.

A study on scientific and technological human resources in the Philippine education sector being conducted by the U.P. Statistical Center Research Foundation, Inc., the research foundation of the U.P. School of Statistics ,reported that the estimated number of faculty with Statistics degrees is significantly fewer than those with Mathematics degrees. Table 2 below presents the statistics.

Table 2. Number of Faculty in the Basic and Mathematical Sciences by Degree , Philippines, June 2001*

Degree	Number of Faculty
M. Actuarial Science	1
M.S./M.A. Applied Mathematics/Mathematics	507
D.S./Ph.D. Applied Mathematics/Mathematics/ Mathematical Science	81
M./M.S. Statistics/Applied Statistics	64

Ph.D. Statistics/Statistics and Research	17
M.A./M.S. General Science/M. Applied Science	9
M./M.S. Science(specialization not specified) M. Science other sciences)	30 3
Ph.D. (other sciences)	1
Ph.D. in Science (specialization not specified)	3

*Source: Preliminary Report of Projection of Scientific and Technological Human Resources in the Philippine Education Sector, a U.P. Statistical Center Research Foundation, Inc. Project for CHED

A closer look at the profile of faculty of selected schools shows that DLSU-Manila as of AY 2006-2007 has the most highly qualified faculty in terms of highest level of educational attainment. Majority of U.P. School of Statistics faculty as of AY 2005-2006 and MSU-IIT faculty as of AY 2004-2005 have either Ph.D. or M.S. degrees. The following table, Table 3, shows the distribution of faculty. Due to some nonresponses in updating the survey, the profiles of the different faculties are not all for the same academic year.

Table 3. Regular Active Faculty of Selected Schools by Highest Degree Earned

Highest Degree Earned	U.P. School of Statistics***		U.P. Institute of Statistics*		U.P.Visayas*		MSU-IIT**		DLSU-Manila*	
Ph.D. Math/Stat	6	27%	3	14%	0	0%	5	29%	11	58%
Ph.D. other specialization	0	0%	1	5%	0	0%	0	0%	0	0%
M.S. Stat/Math	9	41%	4	19%	2	50%	8	47%	8	42%
B.S. Stat/Math	7	32%	13	62%	2	50%	4	24%	0	0%
Total	22	100%	21	100%	4	100%	17	100%	19	100%

*includes only active faculty teaching in the Stat program in AY2006-2007

**includes faculty teaching in B.S. Statistics, Master of Applied Statistics, Ph.D. Math specializing in Mathematical Statistics in AY2004-2005,

*** includes only active faculty teaching in AY 2005-2006

On the other hand, in AY2004-2005, all of the 16 faculty of PUP in its MAS program were part-time. Majority of these professors were from the National Statistics Office.

Enrolme nt Trends

Nebres(1998) noted the lack of sufficient numbers of talented undergraduate students in the mathematical sciences. This lack in the undergraduate level will, consequently, translate to a lack of students in the graduate level. The CHED study also noted a decline in enrolment in undergraduate programs in statistics from 1996 to 1999. In 2001, estimated enrolment statistics show a lower level of enrolment in statistics at all levels compared with that in mathematics. The following table, Table 4, shows these estimates.

Table 4. Number of Enrolled in Undergraduate and Graduate Programs in the Basic and Mathematical Sciences*
Philippines, June 2001

Program	Level		
	B.S.	M.S.	Ph.D.
Applied Mathematics/Mathematics	4,845	617	98
Math Major in Computer Science	1,725		
Math-Stat	1		
Statistics/Applied Statistics	1,317	104	20
General/Applied Science	353	77	
Science(specialization not specified)	21		

*Source: Preliminary Report of Projection of Scientific and Technological Human Resources in the Philippine Education Sector, a U.P. Statistical Center Research Foundation, Inc. Project for CHED

Undergraduate enrolment in the U.P. School of Statistics shows decline from 2002 to 2004 and a slight increase in freshmen in 2005. On the other hand, that of the U.P. Institute of Statistics, U.P. Visayas , MSU-IIT seem to indicate increasing trend. Enrolment in DLSU-Manila's program seems to indicate decline from 2003. The following tables, Table 5.1 and Table 5.2, show the statistics.

Table 5.1 Distribution of Enrolled Undergraduate Freshmen in Selected Schools AY 1998-1999 to AY 2005-2006

Academic Year	Number of Enrolled Freshmen in the B.S. Statistics Program*				
	U.P. School of Statistics	U.P.Visayas	U.P. Institute of Statistics	MSU-IIT	DLSU-Manila
1998-1999	124	program not yet offered	30	37	
1999-2000	110		28	44	
2000-2001	115		38	33	4
2001-2002	114	20	36	10	(missing)
2002-2003	115	14	46	25	13
2003-2004	106	12	42	21	27
2004-2005	103	16	48	25	18
2005-2006	112	17	50	not available	11

Table 5.2 Distribution of Enrolled Undergraduate Students in Selected Schools AY 1998-1999 to AY 2005-2006

Academic Year	Mean Enrolment per Semester in the B.S. Statistics Program				
	U.P. School of Statistics	U.P.Visayas	U.P. Institute of Statistics	MSU-IIT	DLSU-Manila
1998-1999	466	program not yet offered	114	62	
1999-2000	443		112	68	
2000-2001	463		128	56	4
2001-2002	477	19 (1st year only)	149	36	(missing)
2002-2003	461	28.5 (1st & 2nd yr	182	51	17
2003-2004	441	35.5 (1st to 3rd yr)	193	50	20
2004-2005	411	52.5	226	54*	18.5
2005-2006	403	60.5	227	Not available	13.5

*first semester only

Enrolment in the graduate programs, on the other hand, seems to be different when comparing statistics of U.P. School of Statistics, U.P. Institute of Statistics, and MSU-IIT. The

former has experienced generally increasing enrolment trends. The U.P. Institute of Statistics and MSU-IIT enrolment data, on the other hand, seem to be stationary. It must be noted that MSU-IIT has just offered another masteral program, M.S. Stat, as alternative to the MAS. Table 5.3 below shows the statistics.

Table 5.3 Distribution of Enrolled Graduate Students in Selected Schools AY 1998-1999 to AY 2005-2006

	Mean Enrolment per Semester in the Graduate Programs in Statistics						
	U.P. School of Statistics			U.P. Institute if Statistics		MSU-IIT	
Academic Year	M.S. Stat	Master of Stat	Ph.D. Stat	M.S. Stat	Ph.D. Stat	MAS	M.S. Stat
1998-1999	19	36	11	17	8	11	
1999-2000	30	47	13	17	4	17	
2000-2001	29	63	16	15	3	13	
2001-2002	35	77	14	13	2	13	Program
2002-2003	38	75	15	15	1	8	Offered
2003-2004	61	86	16	17	1	8	In 2004
2004-2005	64	103	21	17	1	10*	17*
2005-2006	70	90	20	17	1	Not available	Not available

* first semester only

A closer look at the profile of graduate students of the School of Statistics in U.P. School of Statistics, reveals that majority of enrolled students are working students from the private sector. The School now schedules graduate classes after 6 p.m. on weekdays as well as during Saturdays. This is one factor attributed to the increase in enrolment. Furthermore, there is now more recognition of the role of statistics in business and industry. This also contributes to the increase in enrolment. Another important factor in the increased enrolment is the availability of scholarships. The following scholarships were and are made available for graduate students in statistics in U.P. School of Statistics :

List of Graduate Scholarships on Statistics

BAS-AASS Master of Statistics Fellowship	June 1990 - 1992
UNDP-SESP(Statistical Education Support Project)	June 5, 1985 - December 31, 1990
ESEP(Engineering and Science Education Support Program)	Jan 1992 - 1997, extended up to 1999
PCASTRD (Philippine Center for Advanced Science Technology Research and Development)	June 1989 to date
Reengineering the Philippine Statistical System-SRTC	June 2001 - 2005

Availability of scholarships has also been cited to increase enrolment in PUP's MAS program(Africa and Ignacio, 2001).

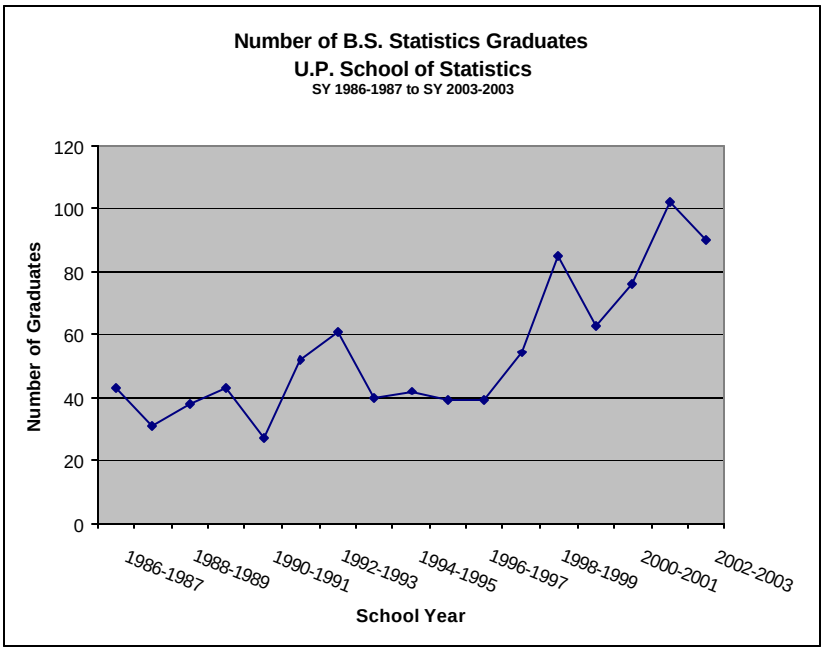
Graduation Trends

The School of Statistics has graduated the following number of students as of Summer 2006:

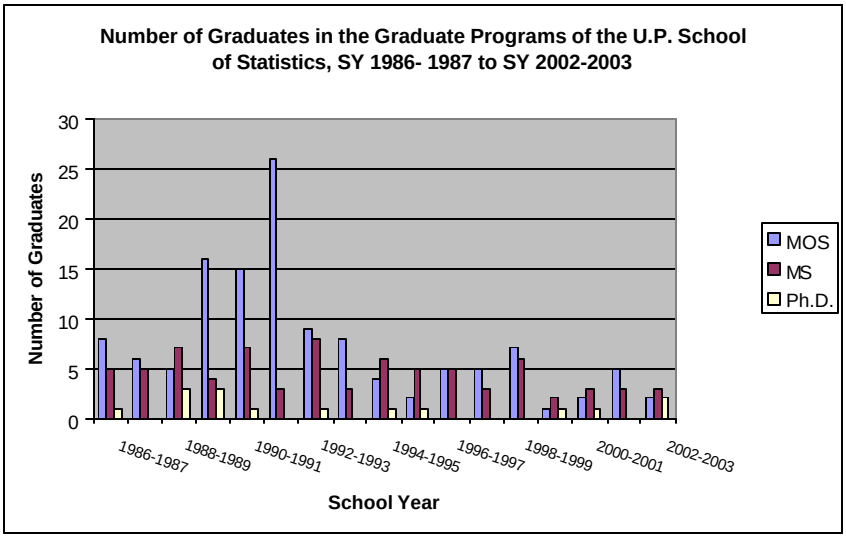
Academic Program	**Number of Graduates**
Bachelor of Statistics*	92
Certificate in Statistics*	8
Diploma in Statistics*	50
B.S. Statistics	2,365
MOS	190
MS	139
Ph.D.	17

*Not Offered Anymore

The following chart shows the U.P. School of Statistics graduation trend for the undergraduate program. It indicates a generally increasing trend with some drops:



The number of graduates in the graduate programs seems to have stabilized at a lower level in the recent years for U.P. School of Statistics and U.P. Institute of Statistcs. It must be noted, though, that the number of graduates from the Ph.D. programs has remained 0 these past recent years. MSU-IIT has achieved higher level of graduates for the recent years wherein data are available. The chart below shows graduation levels from the School of Statistics' graduate programs:



The table below, Table 6, shows graduation statistics.

Table 6. Distribution of Graduates of Selected Schools by Academic Program SY 1986-1987 to SY 2003-2004

School Year	U.P. SCHOOL OF STATISTICS				UPLB			DLSU-Manila	MSU-IIT	
	B.S.	MOS	MS	Ph.D.	B.S.	MS	Ph.D.	B.S.	B.S.	MAS
1986-1987	43	8	5	1	54	8	Program started in 1985	Program Started in 2000		
1987-1988	31	6	5	0	44	5			2	program started in 1995
1988-1989	38	5	7	3	32	4			4	
1989-1990	43	16	4	3	22	9			2	
1990-1991	27	15	7	1	26	3			3	
1991-1992	52	26	3	0	36	2	2		1	
1992-1993	61	9	8	1	43	4	1		2	
1993-1994	40	8	3	0	26	2	1		4	
1994-1995	42	4	6	1	14	1	1		7	
1995-1996	39	2	5	1	25	2	1		4	
1996-1997	39	5	5	0	24	1	1		5	
1997-1998	54	5	3	0	16	2	1		2	
1998-1999	85	7	6	0	23	4	2		8	
1999-2000	63	1	2	1	15	0	0		6	
2000-2001	76	2	3	1	15	0	0		5	5
2001-2002	102	5	3	0	11	4	2		6	0
2002-2003	93	2	3	2	11	1	0		6	2
2003-2004	98	7	3	0	19	0	0		12	0
2004-2005	83	4	5	0	26	0	0	20	8	2
2005-2006	84	3	7	0	23	0	1	10	11	0

Research and Extension Activities

Research being done by faculty and students of the schools offering statistics has been varied and useful. They range from theoretical to applied and encompass work in many areas. These areas include mathematical statistics, biostatistics, sampling, multivariate statistics, categorical data analysis, econometrics, time series analysis . They use varied data from different other disciplines.

Extension services include training for both government and private sector as well as consulting services within the schools. Graduate programs now include statistical consulting. The graduate programs of the School of Statistics and the new MAS of PUP are examples.

Computing Laboratories

Computing laboratories housing updated hardware and software are available in a number of schools and faculty and students have the use of internet for research. The CHED study mentioned specifically the UP system schools with statistics programs and MSU-IIT. Other schools need more support for these facilities.

IV. Recommendations To Enhance Statistics Education

Nebres(1998) mentioned that the impression one gets from available literature is that the need of industry has not been met by academic programs in statistics. The following recommendations were enumerated to address this need:

- undergraduate and graduate programs should focus on the needs of industry
- undergraduate and graduate programs in statistics should be developed
- CHED should encourage joint programs in math and other disciplines
- develop linkage between academe and industry

Mijares(1998) as a supplement to Nebres(1998) wrote that the following may be done in the discipline of statistics:

- promote statistical culture in scientific undertakings by continuing the National Convention in Statistics
- establish linkages and reach out to other professional societies and institutions
- ensure broad individual and institutional memberships in the Philippine Statistical Association
- encourage more colleges/universities to offer statistical courses
- statistical departments to establish linkages with other departments and promote joint research activities

The recommendations above should indeed be pursued. It should be noted that since 1998 more schools have offered statistics programs nationwide. The previous National

Convention on Statistics was well-attended. The next Convention scheduled in October 2004 is expected to have the same reception by the statistics community and those interested in the applications of statistics.

Linkages are important in further developing statistics education and this is recognized by the U.P. Institute of Statistics and the U.P. School of Statistics. They have conducted joint student-faculty of for four years already. It is recommended that this collaboration be extended to include other schools offering statistics academic programs.

The Philippine Statistical Association(PSA) continues to nurture the development of statistics in the country. It has provided academe with venues to interact with the Philippine statistical system. It has contributed much to the advocacy of statistics and has lobbied for the maintenance of statistics scholarships and fellowships. It is noteworthy that the PSA is currently assessing its role and has started to reach out more to the private sector. All these activities point to the importance of linkages.

The Statistical Research and Training Center has actively supported academe through its collaboration with academe in sponsoring lectures of resource persons.

The statistical community should develop linkage with other disciplines-the social sciences, the medical sciences, business and finance, economics, mathematics.

The academe should establish more collaboration among themselves. Collaboration could include co-advising for students to increase graduation rate. Research can then thrive more. Such recommendation is echoed by the administrators that participated in the survey of the selected institutions mentioned in the paper. Regular sharing of experiences among statistics teachers in the different universities is recommended. Other recommendations mentioned by them are:

- Increase number of Computer Laboratories and Statistical Soft wares
- Standardization of academic curricula; set minimum criteria / requirements for Statistics faculty
- Propose outreach programs to enhance capabilities of statistics teachers in the regional level.
- Active recruitment of top high school graduates to pursue career in statistics.
- Prioritize faculty development

- Improve laboratory resources, e.g. books, journals, other references
- Conduct more Statistics related training and workshops
- Provide venues for “Statisticians” to exchange/discuss ideas

Institutions offering statistics programs should continue to communicate to funding institutions the need for statistics fellowships and scholarships. Schools should regularly contact its alumni who can provide not just financial support but also more networking and feedback on the current needs of employers. With the proper linkages in place and thriving, higher level of statistics education in the Philippines shall indeed be *higher level*.

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