



Towards Excellence in Science Research:

AUP RESEARCH GUIDEBOOK

Version 1.2 (March 2016)

WRITERS

Percival F. Almoró
Maria Cecilia G. Conaco
Clarissa C. David
Maria Corazon A. De Ungria
Elmer S. Estacio
Elsie C. Jimenez
Joyce A. Ibana
Jose Florencio F. Lapeña
Renato B. Manaloto
Imee Su-Martinez
Francis N.C. Paraan

EDITORS

Percival F. Almoró
Carla B. Dimalanta
Alice Ross T. Morta

CONSULTANT

Gisela P. Concepcion



Published by the
Office of the Vice President for Academic Affairs
University of the Philippines

COPYRIGHT © 2015
UNIVERSITY OF THE PHILIPPINES

Please send questions and comments to ovpaa@up.edu.ph.

Version 1.2 (March 2016)

CONTENTS

Preface	5
Introduction	6
Chapter 1: Creating a research culture for generating New knowledge	9
1.1 Present research scenario	10
1.2 Present research climate	10
1.3 Research structures	11
1.4 Research culture	11
Chapter 2: Research cycle	13
2.1 The research cycle	13
2.2 Doing high-quality research	14
2.3 Writing research proposals	14
2.4 Writing scientific papers	15
2.5 Duties of authors, reviewers and editors	16
2.6 Performance metrics	16
Chapter 3: Mentoring groups	19
3.1 Concept of mentoring	20
3.2 Scientific mentoring	22
3.3 Research groups	24
The scientific method: when science is done well	34
Pioneering the development of DNA forensics in the Philippines	41
Chapter 4: Research dissemination	50
4.1 Research communication	51
4.2 Integrating research into teaching	51
4.3 Participating in research symposia and lecture series, presenting at conferences, and networking	52
4.4 Submitting papers for publication	52

Chapter 5: Ethics in research	54
5.1 Types of research	54
5.2 Ethics for research	55
5.3 Research misconduct	57
5.4 Complaints or issues that involve research misconduct	58
5.5 Strengthening ethical research in UP	59
5.6 Benefits of ethical research	61
Publish, don't perish: Research and publication	67
Chapter 6: Grants, awards and incentives	73
6.1 Research and development programs	73
6.2 Faculty development programs	81
6.3 Awards and incentives	85
6.4 Project monitoring	94
Gaining competency in science research	96
Chapter 7: Intellectual property rights	101
7.1 UP policy on intellectual property rights	101
7.2 Invention Disclosure Incentive	108

PREFACE

The University of the Philippines (UP) recognizes the fundamental role of research as one of the pillars of higher education. As the national university, it is mandated to lead in basic and applied research and expected to contribute significantly to humanity's quest for knowledge, on both global and national scales, by disseminating new information and utilizing it toward helpful applications.

This research guidebook was compiled to help the University in its goal to become an international leader in research. It contains technical definitions, general policy information and implementing guidelines for programs related to research at the UP System level. The guidebook begins with a brief description of the current research climate in the UP, followed by an explanation of the research cycle and the advantages of organizing research groups for large-scale research efforts. It contains a discussion on the importance of sharing research results to the public and maintaining a code of ethics to ensure the credibility of research output. The guidebook ends with detailed information on specific university programs and policies that are meant to fund scholarly investigations as well as protect the intellectual property rights of UP researchers.

The guidebook is intended for use by either new or experienced researchers. For information specific to the needs of each constituent university, please consult the corresponding Office of the Vice Chancellor for Academic Affairs and/or the Office of the Vice Chancellor for Research and Development or Extension. Finally, the authors of this guidebook acknowledge that it is a work in progress. For comments and suggestions that can make this guidebook more useful, please contact the Office of the Vice President for Academic Affairs.

INTRODUCTION

Gisela P. Concepcion, PhD

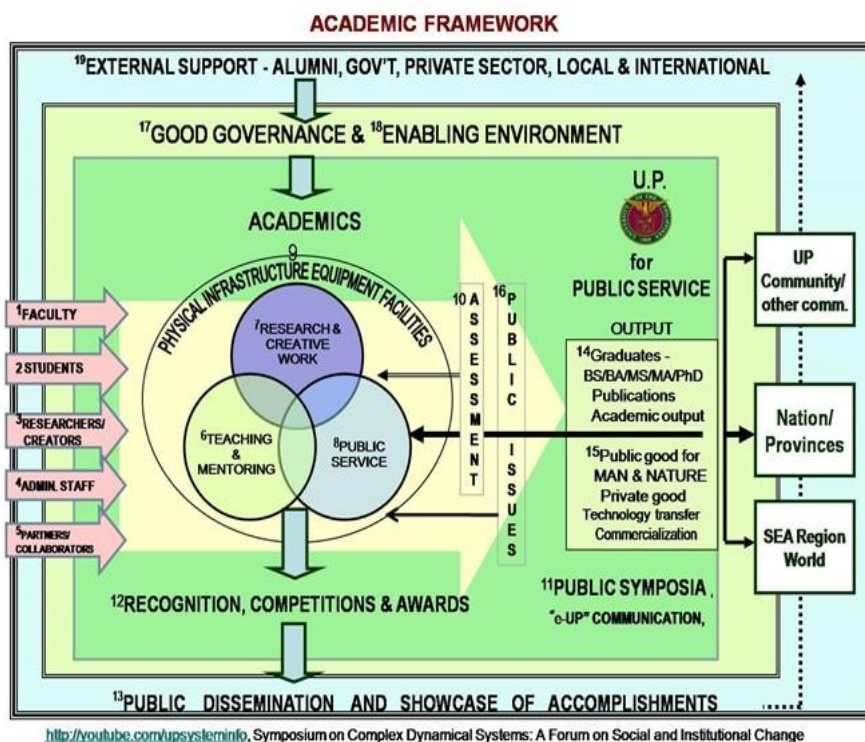
The University of the Philippines, the country's premier institution of higher learning, is also the country's premier research university. Its students are drawn from the country's best and brightest and its corps of faculty members and researchers has an outstanding track record in research and creative work. UP has the country's most state-of-the-art laboratories and multidisciplinary research centers in the sciences, engineering, agriculture, fisheries and aquaculture, biotechnology and biodiversity; centers for the arts and humanities; and regional and cultural studies centers in strategic locations across the country. With its vast scope and reach, the diversity of its programs and fields of study, and its verdant campuses, UP is a fitting home for the country's largest community of scholars.

As the national university, UP is mandated to perform its unique and distinctive leadership role in teaching and research; to harness its considerable body of knowledge in the service of the Filipino people; and to produce from among its students the ethical, committed and progressive leaders who will steer the nation toward true and lasting development. In this globalized, highly competitive and rapidly changing world, where knowledge, information and innovation are the driving forces behind development, UP will play an even bigger role in shaping the country's future.

The faculty and students are the heart, lifeblood and pride of UP. The university exhorts its faculty and students to do more, to become more, to aim even higher, through continuing education and self-improvement, through excellent teaching and mentorship, through rigorous and dynamic research and creative work, and through a commitment to use one's knowledge and learning in true service to the country and its people (Fig. 1). A university is only as good as the people within it. Through the continued renewal and development of its faculty and students, UP has what it takes to attain academic excellence and become the great national and regional university it is meant to be.

UP AS A RESEARCH UNIVERSITY

Under the UP Charter of 2008, UP is envisioned to be transformed into a research university with national relevance and global orientation. The key to this transformation is to significantly increase the number of high-quality faculty members — excellent, highly trained, expert teachers and mentors with PhD degrees and postdoctoral training in key research areas.



1 FACULTY	8 EXTENSION	14 UP's PRODUCTS: GRADUATES
2 STUDENTS	9 PHYSICAL INFRASTRUCTURE, EQUIPMENT, FACILITIES	15 PUBLIC GOOD
3 RESEARCHERS/CREATORS	10 ACADEMIC ASSESSMENT/ACCREDITATION	16 PUBLIC ISSUES
4 ADMIN. STAFF	11 PUBLIC SYMPOSIA/e-COMMUNICATION	17 GOOD GOVERNANCE
5 PARTNERS/COLLABORATORS	12 RECOGNITION, COMPETITIONS & AWARDS	18 ENABLING ENVIRONMENT
6 TEACHING & MENTORING	13 PUBLIC DISSEMINATION & SHOWCASE OF ACCOMPLISHMENTS	19 EXTERNAL SUPPORT - ALUMNI, GOV'T., PRIVATE SECTOR, LOCAL & INTERNATIONAL
7 RESEARCH & CREATIVE WORK		

Figure 1. Academic framework developed by Dr. Gisela P. Concepcion

The success of research ultimately depends on the individuals who lead and implement research initiatives. In UP, faculty members play a major role in establishing, nurturing and sustaining a vibrant research culture and productive research process in UP through generations. They are responsible for the research mentoring and leadership training of our students to ensure that graduate and undergraduate education in UP, in addition to foundational and general education and rote and iterative learning, is infused with a strong orientation towards research, innovation, creativity and problem-solving.

High-quality research is the paramount activity in a research university. Research elevates the quality of education and accelerates academic productivity. Research also greatly improves the quality of our extension work, providing rigorous, scientific analysis, and innovative, technological solutions to pressing problems in society.

HUBS AND SPOKES

The hub-and-spokes framework is currently being adopted in the Emerging Interdisciplinary Research program of the University of the Philippines. This sets the R&D framework of the University towards long-term productivity and progress. The UP constituent universities (CUs) serve as the hubs with Philippine and foreign higher education institutions (HEIs), government agencies, industries and non-government organizations acting as the spokes that connect to the Hubs (Fig. 2).

There are three categories of the R&D hubs and spokes depending on priority areas:

- a. national government priorities (public good)
- b. industry priorities (private good, job creation for public good)
- c. academic and basic "pie-in-the-sky" research priorities

Through this scheme, UP aims to build strong, competent research groups or clusters led by expert senior faculty who mentor junior faculty, postgraduate and undergraduate students for long-term capability building. The set-up also encourages collaborations among science and engineering fields and the arts, culture and humanities.

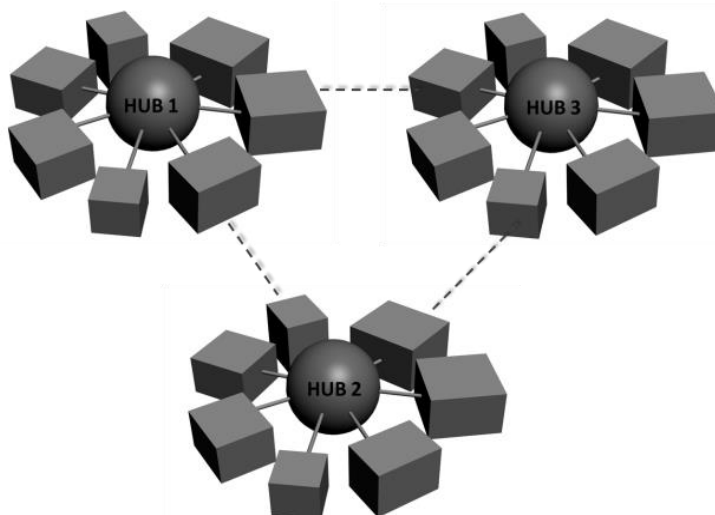


Figure 2. Hub and spokes organizational structure

THE AUTHOR

Dr. Gisela Concepcion received her BS, MS and PhD in Chemistry from UP Diliman. She is an academican of the Philippine National Academy of Science and Technology, and a Fellow of The World Academy of Sciences. A professor at The Marine Science Institute of UP Diliman, she teaches graduate courses and leads research programs on marine natural products and drug discovery. She currently serves as the Vice President for Academic Affairs of the University of the Philippines System.)

Parts of this chapter were first published in "Pursuing academic excellence in UP through faculty development" (The Philippine Star, 23 January 2014).

CHAPTER

1

**CREATING A RESEARCH CULTURE FOR
GENERATING NEW KNOWLEDGE****Imee Su-Martinez, PhD**

The University of the Philippines was founded on 18 June 1908 through Act No. 1870 (otherwise known as the UP Charter) of the First Philippine Legislature to “provide advance instructions in literature, philosophy, the sciences, and arts, and to give professional and technical training.” It was initially composed of four colleges. Situated in Manila were the College of Medicine and Surgery (later renamed to College of Medicine) and the College of Fine Arts. The other two colleges were put up in Los Baños, Laguna: the College of Veterinary Science and the College of Agriculture.

The beginnings of research in UP can be traced back to the College of Agriculture, established not only to teach but also to serve as an agricultural experiment station. Scientific publication was also valued as early as this time: From 1911 to 1918, student theses were published in the journal *Philippine Agriculturalist and Forester*, now known as the *Philippine Agricultural Scientist*.

The decades that followed saw greater expansion in the organizational structure of UP and along with it, a more vibrant academic and research environment. Developments included the creation of other autonomous units (or constituent universities) and, through Presidential Decree No. 58, the University of the Philippines System.

Because of new emerging technologies that require greater expertise as well as the need to reinforce and expand national capability for training scientific leaders and conducting research, national centers of excellence in the basic sciences were also constituted according to Executive Order No. 889.

These included, among others, the National Institute of Physics, the National Institute of Geological Sciences and the Natural Sciences Research Institute in UP Diliman. In UP Los Baños, the Institute of Mathematical Sciences, Institute of Chemistry and Institute of Biological Sciences were established.

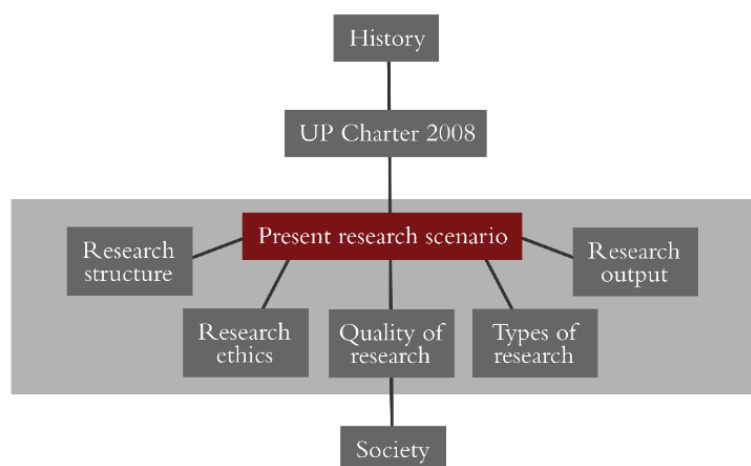


Figure 1. Schematic diagram of UP's present research scenario

1.1

PRESENT RESEARCH SCENARIO

The range of disciplines studied in the various research institutes and centers reflects the diversity of research in the University of the Philippines. UP Diliman has 32 research institutes, seven national institutes and three international centers that deal with various research endeavours in the sciences, humanities and arts. UP Manila, which has 13 research institutes, is more focused on health-related studies. UP Los Baños has six research institutes for agricultural studies while UP Visayas has seven research centers on fisheries and the marine sciences. Lastly, UP Baguio has two research institutes dedicated to the management of and studies related to the Cordilleras.

1.2

PRESENT RESEARCH CLIMATE

UP nurtures a research climate that aims to advance knowledge and develop novel technologies in the country. The UP Charter of 2008 has clearly stipulated its mandates to the University of the Philippines as the national research university. The mandates, rights and responsibilities, and guiding principles stated in the Charter shaped the overall research culture of UP (Figure 1). Programs for the advancement of research in the university have been established in the Office of the Vice President for Academic Affairs at the system level, and the Office of the Vice Chancellor for Research and Development (OVCRD) or the Office of the Vice Chancellor for Research and Extension (OVCRE) at the level of the constituent unit.

Research in UP is creative, innovative, specialized, multi-dimensional, multidisciplinary and collaborative. It is designed for international recognition, with the aim of solving both local and global problems. Those that require immediate solutions such as issues in energy, environment, health and nutrition, poverty, transportation, climate change and disaster risk management are especially given priority.

Since research is done in an academic setting, a project's success is measured not only in terms of obtaining desired results but also in learning and acquiring old and new knowledge.

UP aims for a research culture that molds the next generation of ethical, skillful, creative and passionate researchers who see research as a service to one's country and therefore perform it to the best of their abilities. It instills in the researchers a broad global outlook balanced with a fierce sense of nationalism, enabling them to generate world-class products and information with high social impact and relevance to the nation.

1.4 RESEARCH STRUCTURES

Research in UP is carried out in research institutes and centers (Figure 2). At the department level, research is also carried out by the faculty members individually or as research teams. Each institute houses research groups under a principal investigator. Research groups may have a number of research projects. The groups can form intra- or inter-institute collaborations and may create a research program under a program leader. Structures in a research grouping vary depending on the institute. The other vital contributors to research are the offices supporting research activities in the university, in particular the OVCRD or OVCRE in each campus. Funding agencies are also important as they are the lifeblood of research. Auxiliary or support groups such as the supply and property management office, libraries and accounting office also play a huge role in facilitating research.

1.5 RESEARCH CULTURE

The existing research culture in UP is dictated first and foremost by the quality of researchers in residence in the university, in relation to the academic/education sector and the public sector. Their technical expertise as well as their attitude towards research creates the prevailing research atmosphere. The structure and practices in every research group shape the research acumen and ethics of its members.

Funding opportunities as dictated by mandates and legislations affect the vibrancy of research activities. State-of-the-art equipment and facilities enhance the quantity of cutting-edge research output. National priorities determine the prevalent research fields under study.

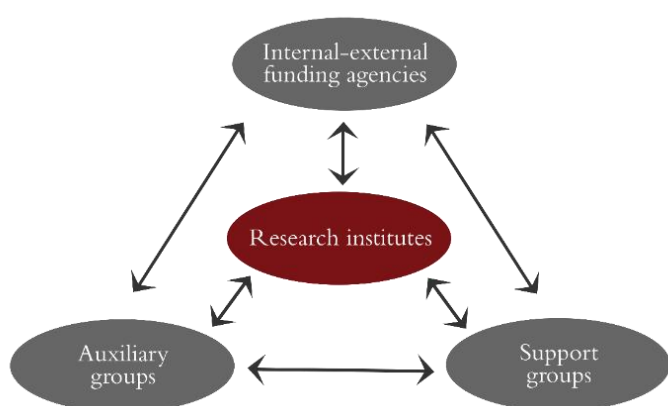


Figure 2. Relationship of UP research institutes with other groups

The efficiency of the supporting groups highly influences research activities in the university. Examples of such groups are those involved in the procurement of necessary instruments and supplies, in campus safety and in human resources.

Lastly, academic freedom is what sets research in UP apart from the rest of the existing research cultures in the country. Researchers are free to think and explore in a highly secular, multicultural, multi-racial, gender diverse, egalitarian environment.

THE AUTHOR

Dr. Imee Su-Martinez finished her BS Chemistry from the University of the Philippines Diliman. She went on to do graduate work on surface chemistry and eventually obtained her PhD from the University of Houston. Her postdoctoral fellowship in Northwestern University was also in the same line of research work. Her current research interest is in the characterization and imaging of surfaces and surface phenomena with applications to sensor development, food safety, green chemistry and biochemistry.

REFERENCES

UP Manila Research Manual, 2011.

The UPLB Research Manual: Guidelines and Procedures Governing Research and Its Related Activities, Office of the Vice-Chancellor for Research and Extension, UPLB, College, Laguna, Philippines, 2008.

Policies and Guidelines for the Research Program of the UP Open University, 2007.
UP Open University, Research Ethical Guidelines, 2011.

CHAPTER

2

RESEARCH CYCLE

Ma. Cecilia G. Conaco, PhD

The research cycle is a research model based on the application of the scientific method. The scientific method is a process of investigating phenomena that involves asking questions, generating hypotheses, predicting outcomes, conducting experiments, analyzing and evaluating results and reporting findings (Figure 1). Findings can be used to predict the outcome of similar situations, design interventions, and serve as the foundation for practical applications. The outcomes of a study may also raise further questions to explore.

2.1 THE RESEARCH CYCLE

In the research cycle, scientists formulate questions, design studies to investigate these questions, produce data or information and analyze and evaluate their results to arrive at answers that allow them to make independent judgements. The active re-evaluation of the hypothesis and research plans based on the analysis of findings plays a central role in the research cycle (McKenzie, 1999).

The research cycle is a non-linear process where the interpretation of new data informs the revision of research plans and the design of further studies. In the research cycle, scientists follow these steps:

a) Formulate a question about a phenomenon

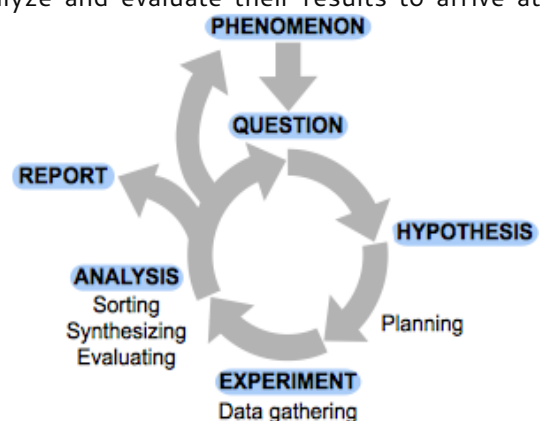


Figure 1. The research cycle based on the scientific method

- b) Generate a hypothesis
- c) Plan the approach to be used in answering the question
- d) Perform experiments or gather data
- e) Analyze results (sort, synthesize and evaluate)
- f) Report findings.

2.2

DOING HIGH-QUALITY RESEARCH

High-quality research provides innovative and creative approaches to a problem. This is typically characterized by measurability, repeatability, consilience, economy and heurism (Figure 2). High-quality research is made possible by an enabling environment, which includes the availability of resources (funding, personnel, infrastructure), organization (mentoring, interdisciplinary collaboration) as well as an ethical research culture. Increasingly, research projects are multidisciplinary collaborations that have the advantage of allowing researchers in one discipline to benefit from the insights and methods of researchers in other disciplines. Furthermore, collaborations permit the pooling of resources and the investigation of different aspects of a research problem.

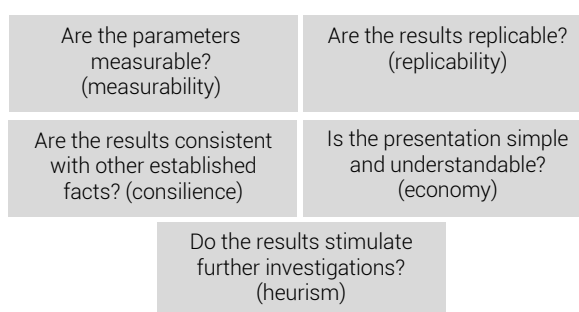


Figure 2. Diagnostic questions for high-quality research

2.3

WRITING RESEARCH PROPOSALS

A research proposal is a structured plan for a research cycle designed to investigate a specific phenomenon. It describes a research problem, its significance and the research design that will be used to investigate it. Eventually, it may be used as the starting point for writing research papers (Rein and Schuster). While research proposal formats may vary, a typical proposal will:

- a) Identify a practical or research problem and describe its context, including why there is a problem and why it needs to be addressed.
- b) Clearly state the research question that will be asked in order to solve the problem.
- c) Indicate the appropriateness of the proposal to one's expertise and access to materials.
- d) Summarize the literature and show how previous findings relate to expected discoveries from the proposed research.
- e) Describe the methods that will be used and indicate why the methods are justifiable and discuss their limitations. Methods may include experiments, database research, field studies, interviews and other sources of information.
- f) Describe the methods of data analysis that will be used.
- g) Discuss the implications or significance of what the study may discover.

- h) Provide a timeline for completion of the various steps in the research.
- i) Provide references.

2.4

WRITING SCIENTIFIC PAPERS

The final step in the research cycle is the reporting of results and the insights that have been gained in the course of the study. The most common method of reporting is the publication of papers in journals specific to each field. Such papers become references for other scientists and are thus subject to high standards of quality.

JOURNAL ARTICLES AND THESES OR DISSERTATIONS

Journal articles or papers are descriptions of experiments and data that contribute to the existing body of knowledge in a field of study. Typically, they have minimal introductory sections that highlight the significance of the research question and of the results. Before publication, papers undergo peer review to ensure the validity of results.

Theses and dissertations are intended to demonstrate a student's expertise in a subject and report findings that contribute to the advancement of knowledge. Typically, they include a thorough literature review, methods used and results. Exceptionally, a dissertation may form the basis of a book; more often chapters of it may form the basis of journal articles.

Sections of a scientific paper

Research papers are for reporting research findings with other scientists or for reviewing the research conducted by others. These papers are central to the advancement of science, with the work of one scientist building upon that of others. The structure of a scientific paper includes the following:

- a) Abstract: a short section that identifies a problem, the methodology, the findings and insights.
- b) Introduction: provides the motivation and background necessary to understand the work. This section should be concise and should end with a short description of what the paper is about.
- c) Methods: detailed description of the methods, written in a way that experiments are replicable.
- d) Results and discussion: describes and interprets the results obtained.
- e) Conclusion: highlights the most important outcome of the work and the insights on the problem that were gained.

GUIDELINES FOR EFFECTIVELY COMMUNICATING RESEARCH IN WRITTEN FORM

Effective scientific papers are interesting and useful to many readers, including experts and newcomers to the field. Thus, papers must not only present a chronological account of the research work, but also the validity and significance of the work. The information should be conveyed clearly, accurately, and concisely. Effective papers present the content in a way that is easy for the reader to follow. Here are some guidelines:

- a) Select the content for the paper and organize it in a reader-friendly way.

- b) Briefly summarize the motivation, the results, and the significance of the findings in the abstract, which appears at the beginning of the paper.
- c) Place more detailed and less important parts at the end of the paper or in the supplementary materials so that they do not interfere with the understanding of the main points of the paper.
- f) Structure the content in the body in a manner that is easy to remember by presenting findings in a theorem–proof fashion, stating first a finding then presenting the supporting evidence. In most sections of a paper, paragraphs should begin with a topic sentence to provide readers with a clear idea of what it is about.
- g) Revise for correctness, paying attention to the details of the language.
- d) For more useful tips on communicating research effectively, see *Doumont, J., ed. English Communication for Scientists. Cambridge, MA: NPG Education, 2010.*

2.5

DUTIES OF AUTHORS, REVIEWERS AND EDITORS

Aside from authoring papers on their work, researchers may also review papers from other groups and act as editors of journals in their field.

AUTHORS

- a) Describe the work truthfully and with sufficient detail so that other scientists may be able to replicate their results
- b) Make data and materials in their papers available to other scientists
- c) Limited to those who have made a significant contribution to the concept, design, execution, or interpretation of the research study (Dance, 2012)
- d) All co–authors should be given the opportunity to review a manuscript.

REVIEWERS*

- a) Invited by editors to review papers
- b) Objectively judge the quality of the research and explain their comments in a way that can be understood and addressed by the editors and authors
- c) Point out relevant published work that had not been cited by the authors
- d) Disclose conflicts of interest owing to competitive, collaborative, or other relationships with any of the authors
- e) Keep the contents of manuscripts confidential

* Also reviewers of proposals

EDITORS

- a) Responsible for accepting or rejecting submitted papers
- b) Give prompt and unbiased decisions
- c) Oversee the review process
- d) Find suitable reviewers for submitted papers

2.6

PERFORMANCE METRICS

The outcomes of the research cycle may include publications, conference presentations, products and patents. The findings that are shared through scientific papers contribute to the state of knowledge and promote advancement of science. Thus, the number of published

papers and their importance are often viewed as a reflection of a scientist's achievements. Performance metrics are used by evaluators as an estimate of productivity and the overall impact of contributions to the field. Favorable metrics may be used by a research group to further improve its competitiveness.

RESEARCH IMPACT AND INFLUENCE

Journal impact factor

The journal impact factor is a tool for quantitative ranking, evaluating, categorizing and comparing the importance of journals within their field. Publication in a high-impact journal ensures visibility of the work. However, specialized journals that are nevertheless well respected in certain fields may have lower overall impact factors compared to journals that have a broader subject range.

The impact factor reflects the average number of citations of recent articles. According to Thomson Reuters, it is calculated by dividing the number of current year citations to the articles published in the journal during the previous two years. It must be considered with caution/reservation.

First introduced by the Institute for Scientific Information (ISI) in the 1960s, the impact factors of journals indexed by Thomson Reuters (formerly ISI Web of Knowledge) have been published annually in the Journal Citation Reports since 1975.

For more information on impact factor, please see: <http://bit.ly/1gkFhfe>.

Individual's impact

The h-index reflects both the number of publications and the number of citations per publication as a measure of productivity and impact of the published work.

Developed by physicist Jorge Hirsch in 2005, the h-index measures both the number of publications and the number of citations per publication (Hirsch, 2012). A scientist with an h-index of 22, for example, has 22 papers that have been cited at least 22 times.

There are now variations and modifications to the h-index as scientists try to capture a better metric to evaluate the quality of a scientific work. Thus, the h-index as an indication of an author's research impact or influence must be used with caution.

For one, the h-index varies depending on the database used in the computation. Publication databases such as Scopus, Web of Knowledge and Google Scholar give different h-index values for the same scientist because the scope and coverage of their databases vary.

The period covered by the h-index must also be examined. Some h-indices are computed for the whole duration of a scientist's scholarly history (from the first publication recorded in the database) while others pertain to a specific time period (e.g., Google Scholar may show h-index from 2010 onward).

H-index values also depend on the discipline or field of specialization. For example, medical scientists have h-index values ranging from 11 to 19, with high values of 30 and above. Physicists have h-index values between 12 to 20, with high values of 45 and above. The typical h-index values in the social sciences are 2.8 (law), 3.4 (political science), 3.7 (sociology) and 6.5 (geography). This is because they have fewer scientists and therefore have fewer papers and fewer citations.

Google Scholar uses the i10-Index which refers to the number of publications with more than 10 citations.

THE AUTHOR

Dr. Cecilia Conaco, BS in Molecular Biology and Biotechnology (University of the Philippines Diliman) and PhD in Molecular and Cellular Biology (Stony Brook University, New York), is an assistant professor at the Marine Science Institute of the UP Diliman College of Science.

REFERENCES

McKenzie, J. (1999) From Now On: The Educational Technology Journal 9(4).

Rein, M. and Schuster, M. (n.d.) "Elements in a Doctoral Research Paper Proposal." Handout for Doctoral Research Paper Seminar. Cambridge, Mass.: Department of Urban Studies and Planning, MIT

Dance, A. (2012) Nature 489:591–593 doi:10.1038/nj7417–591a.

Doumont, J., ed. (2010) English Communication for Scientists. Cambridge, MA: NPG Education.

Hirsch, J.E. (2005) PNAS 102(46):16569–16572.

Thomson Reuters. Available at <http://thomsonreuters.com/en.html>

CHAPTER

3

MENTORING GROUPS**Percival F. Almoró, PhD**

UP is a teaching and research university, yet it is organized more for teaching than for research. It still lacks a vigorous intensive and extensive research culture, and focuses more on transferring knowledge rather than creating it. In this chapter, the role of mentoring in developing a research culture and the ways to enhance the mentoring system in UP will be presented.

In scientific research there are many paths to excellence; a path that is increasingly recognized as highly effective involves scientific mentoring within research groups. Scientific mentoring is a set of collaborative relationships that is grounded in the principles of scientific inquiry. A prominent feature of a healthy research culture is its group orientation. Group goals, achievements and interests in research activities take precedence over the individual goals, achievements and interests. Research groups are important because they are engines of scientific progress and they create an environment in which scientific mentoring can flourish.

The traditional way of advising thesis students in research is formal, one-on-one, and short term. On the other hand, research advising in a research group setting is informal and collaborative, and enables students to integrate into a research culture on a continuous and productive basis. Given the right environment, a student researcher is mentored by the research supervisor and together they cooperate towards advancing knowledge.

Mentoring partnerships and research groups have helped catalyse the generation of new knowledge, understanding of many natural phenomena, and the development of new products and services useful to society. Our understanding of the universe, for example, has been advanced by two pillars of modern astronomy namely Tycho Brahe (mentor) and his assistant Johannes Kepler (mentee).

Research groups have well-defined goals and structures that facilitate progress and the continuity of research. A track record of scientific excellence has been developed in top learning institutions that are notably organized into research groups. For example, the Cavendish Laboratory of the University of Cambridge in the United Kingdom, currently composed of 15 research groups, has produced 29 Nobel laureates in physics, chemistry and medicine. Another example is the Max Planck Society in Germany, currently composed of 80 institutes and research groups, which have 32 Nobel laureates in the natural sciences, life sciences, social sciences, and the arts and humanities.

In the different constituent universities (CUs) of UP, there are currently a number of units that support the formation of research groups. UP Diliman has 37 research, creative and extension work units dedicated to student research laboratories. The UP Manila National Institutes of Health has 17 study groups within its research institutes and clusters. UP Los Baños has 16 research and training centers in agriculture, environment and biotechnology. UP Visayas has 3 aquaculture research stations. UP Baguio has the Cordillera Studies Center. In the absence of more exhaustive and refined classifications, the estimated number of research groups in the UP System is 74. Despite the strong support given by the University to the research groups, they are still few compared with other universities abroad, and initiatives are required to increase their number.

The formation of research groups in all departments and institutes in the University is crucial because research groups are at the core of implementing research and because scientific mentoring and counselling are the basis for the sustained growth and improvement of research through generations of faculty and students.

3.1 CONCEPT OF MENTORING

“Mentor” in ancient Greek referred to “a trusted caretaker” and “a tutor of children.” In the late 17th century, this definition of mentor has evolved to its current meaning of “a wise and trusted adviser.” Mentoring basically involves a mentor providing support and encouragement to a mentee and, as a result, the mentee gains the confidence to move forward independently.

Intellectual life in the University thrives on the vibrant exchanges not only between faculty members but also between faculty members and students. A faculty mentor provides a unique prospective of the academic life in the University, broadening the student’s intellectual horizons.

The mentor provides support by sharing knowledge and experience to the mentee. The mentor listens and offers sage advice to the mentee but still allows the mentee to make his own decisions.

The mentor also acts as a sounding board for the mentee's new ideas. The mentoring process helps the mentee become more efficient by avoiding unnecessary mistakes in the pursuit of set objectives.

Mutual respect and trust, and an investment in time for discussion and consultation are key to successful mentoring. Mentoring is a personal relationship where both the mentor and mentee value each other's abilities and dedication. Successful mentoring usually spans a few years and is achieved through regular face-to-face interactions.

The relationship is confidential: information that is exchanged may be disclosed outside only with the agreement of both parties. The mentor critiques the work of the mentee, yet the mentor always provides encouragement and maintains a positive attitude towards the mentee.

At an early stage, the relationship may be fractious and difficult. Both mentor and mentee should strive to accommodate each other and commit together to achieve clearly defined goals. Some relationships will flourish *ab initio*, others after a fractious beginning, while others will not work. Both parties should work for the success of the relationship, but should agree to terminate it if things do not work out.

GENERAL TYPES AND MODES OF MENTORING

There are different types of mentoring depending on the mentor's knowledge of the mentee's professional and personal circumstances. Four possible scenarios identify the general types of mentoring:

- 1) mentor knows the mentee professionally and personally (e.g., a family member),
- 2) professionally but not personally (e.g., a former boss),
- 3) not professionally but personally (e.g., a longtime friend), and
- 4) not professionally and not personally (e.g., an online coach).

Mentoring in business usually involves the four mentoring types to maximize the learning for the mentee. Mentoring in research which is aimed to advance knowledge, on the other hand, mainly involves types 1 and 2 where the mentor knows the mentee professionally and to a certain degree also knows the mentee personally in terms of work ethics, attitude, grit.

The three basic modes of mentoring are one-on-one, peer and group. The most suitable mode or combination of modes of mentoring depends on the nature of work or activity or the field of study.

One-on-one mentoring is a relationship between two people, one of whom has more knowledge than the other. An example is a voice coach mentoring an aspiring singer. If one member holds power over the other and knowledge is transferred mainly in one direction, the relationship tends to be hierarchical.

Peer mentoring implies that the mentor and mentee have comparable or almost equal knowledge of a subject. However, a peer may have specialised knowledge that the other lacks, and can act as mentor with respect to that knowledge; equally, the mentor may lack knowledge that the mentee has, so they could switch roles with respect to that knowledge. An example is the mentoring between a senior resident physician and a junior resident physician. Virtually co-equal in terms of power, the peers engage in an informal and horizontal mentoring relationship because the transfer of knowledge is within nearly the same level of expertise or age.

In group mentoring, there are other adults as well as peers of the same level of expertise or age group providing guidance as a collective body and on an individual basis. An example is the mentoring done in a basketball team with a coach, an assistant coach, a manager, veteran and rookie players. Group mentoring also facilitates one-on-one and peer modes of mentoring. The relationships are fluid, with a pool of members with relevant specialised skills and experience who can be accessed readily until the relevant knowledge has been absorbed by the mentee. The mentor can be simultaneously a mentee in another relationship.

TRADITIONAL MENTORING IN RESEARCH

Mentoring in research such as the mentoring of a PhD student is traditionally formal and hierarchical because ideas mainly flow from the supervisor to the student. However, as discussed in Chapter 2, research is not linear but a cyclic process that builds on ideas and inspirations coming from various sources. Thus, in research there is a need for a special type of mentoring: an informal collaborative mentoring and one that encourages constant challenging of ideas.

3.2 SCIENTIFIC MENTORING

A research scientist demonstrates scientific mentoring by: (1) supervising students doing thesis research work, (2) providing critical comments and sustained interaction with budding researchers, (3) sharing good practices, techniques and lessons that can be passed on to other researchers; and (4) carrying out various initiatives that nurture and support the novice researchers.

A hierarchical mentoring relationship is formal, inflexible and typified by the formal learning process. Most research, however, happens in an informal horizontal mentoring relationship that is typified in the post-formal learning process. The transition from the hierarchical to the horizontal is at times rather slow, and should be accelerated. Scientific mentoring involves activities that accelerate the transition from the formal to the informal collaborative mentoring.

Scientific mentoring is collaborative because it encourages the mentor and mentee to learn something together. It facilitates cooperative learning among researchers – beginner and seasoned alike helping and being helped by fellow researchers – as they work together in the pursuit of new knowledge. Scientific mentoring likewise facilitates the young researcher's transition from a student to a professional researcher, encouraging him or her to stay on and contribute to the field as a member of a larger scientific community.

BENEFITS OF SCIENTIFIC MENTORING ON THE RESEARCH CYCLE

The various activities of the research process, when carried out collaboratively by the mentor and mentee demonstrate the benefits of scientific mentoring mainly to increase the quantity and quality of the research output.

In defining a research problem and probing ideas towards finding a solution to the problem, the mentor and mentee discuss related literature and may perform together a series of small experiments. This helps generate a sense of shared responsibility and motivational bonds between them.

In the conduct of experiments, the probability of a successful outcome is increased when they design and carry out the experiments together. In practice the mentor and mentee may do the first few experiments jointly. Then the mentor may be available to discuss the results and deal with problems of the first experimental trials in order to improve subsequent experiments. This facilitates intimate sharing of techniques and common experiencing of experimental eureka moments during the experimental stage of the research.

The continuous exchange of ideas between the mentor and mentee leads to sound interpretations of the results. This helps ensure that the significant results obtained are properly put in context during the writing of a research report.

IDEAL SCIENTIFIC MENTOR

Some of the special qualities of an ideal scientific mentor include being a role model, presenting fresh perspectives on the research topic, providing feedback and encouragement, and having a keen eye for research problems that are publishable.

The ideal scientific mentor serves as a role model for the mentee. She has an impressive track record in her field, is passionate about research, and uses her experience to put in context and develop ideas. The ideal mentor attempts to describe a research topic and relevant principles using different illuminating viewpoints. This often overcomes some stumbling blocks for the mentee and leads to interesting directions for future research.

The ideal mentor provides feedback and encouragement during challenging stages of the research. She also provides affirmation of the mentee's increasing capabilities and points to the next challenges to be met.

The ideal mentor helps develop in the mentee a keen sense for identifying research problems that are worth investigating and reporting. This is developed through constant updating on the state of the art.

These characteristics of an ideal scientific mentor help promote the mentee's self-respect, respect for scientific peers, and helps develop the mentee's passion and ability to think critically and creatively, pushing the envelope.

LIMITATIONS OF ONE-ON-ONE MENTORING ON THE DEVELOPMENT OF SCIENCE

Ensuring the development of science requires optimizing the conditions that lead to that process such as establishing research programs and building a pool of scientific mentors.

One-on-one scientific mentoring involves a limited interaction between the mentor and mentee as they work on a specific research problem. The limited exchange of scientific ideas slows down the progress of establishing research programs.

One-on-one mentoring can also produce new mentors but at a rather slow rate. The slow production of new scientific mentors sets a limit to the research capacity and growth of a department or institute.

Well-defined research programs and multi-level interactions for the training of future scientific mentors are facilitated by research groups. In what follows, it will be shown that the research groups can accelerate the establishment of scientific research programs and increase the number of scientific mentors.

3.4 RESEARCH GROUPS

A research group is dedicated to solving various challenges towards the advancement of the field of study. It helps create an environment in which researchers can collaborate on a continuing and productive basis. The vibrant spirit of collaboration fostered among the group members leads to better research strategies in support of the adage "The whole is greater than the sum of its parts."

Research groups also provide a constant source of competent scientific mentors. Facilitating the different modes of mentoring, the research group inherently promotes a culture of mentoring and serves as a fertile training ground for the next generation of scientific mentors. Consequently, a research group becomes self-propelling engine for producing new mentors, new researchers and new knowledge.

CORE VALUES

Research groups have the following guiding principles dictating their behaviour and actions:

- a) Innovation in research and scholarly work
- b) Research manpower development based on promoting intellectual honesty, ethics, academic freedom, collegiality and mentoring
- c) International cooperation and academic exchange
- d) Social responsibility

Research groups pursue and implement the principles above, respectively, by:

- a) Contributing to scientific knowledge in a particular field
- b) Creating training programs to build a pool of experts and scientific mentors
- c) Establishing collaborations with other research groups (local and foreign)
- d) Providing extension services and public service

Research sub-culture

Within a global research culture that cuts across all research groups in any discipline, there are also sub-cultures identified with the various research groups. For a particular research group, the members create their own research sub-culture, i.e., behavioral patterns and assumptions developed in the conduct of scientific studies over the years which have been passed through generations.

Knowledge of the prevailing culture in the research group allows both novice and established researchers to become sensitive to one another and to maximize the benefits of being part of the group.

For the novice researchers, recognition of the elements of this research sub-culture allows them to acclimatize seamlessly in the group, i.e., they learn how to think, act, and feel under the mentorship of established researchers of the group.

For the established researchers and administrators, knowledge of these research sub-cultures and practices that work could provide impetus towards the development of more holistic and sustainable research programs.

ORGANIZATION

A research group is a professional organization composed of researchers within a department or institute that carry out research in a particular field of study. The following describes the group members and their critical roles in achieving the desired research environment.

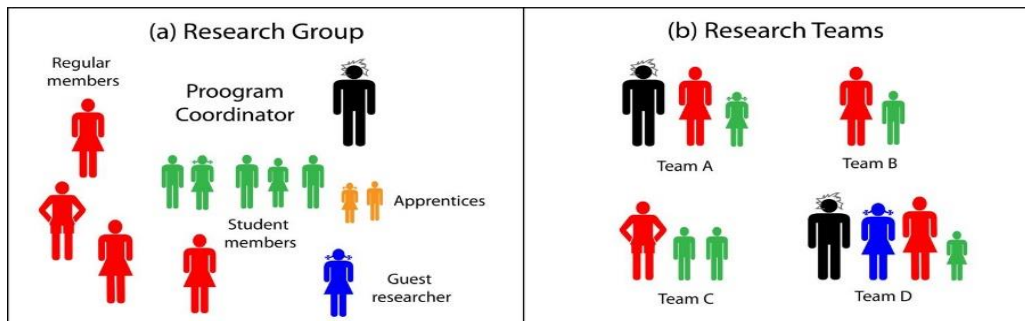


Figure 1. Members of a model research group and research teams

Group members

Figure 1(a) depicts the members of a model research group. The group is built around a program coordinator who is the group leader. Regular members, student members and guest researchers surround the program coordinator.

Regular members are the resident experts of the group (PhDs, MDs, professors, research scientists, engineers and postdoc fellows). Each regular member brings to the group a set of expertise in several specialized topics within the research program. The regular members constitute the executive council or the policy-making body of the group.

Outside the research group model, the cost of just bringing experts together to collaborate is very high. Within the research group model, the experts working as a cohesive unit are collaborating on a sustained basis at a minimum cost. Also, the regular members constitute a critical mass providing a nurturing environment for the student members of the group.

Student members are the postgraduate (MS and PhD) and undergraduate students who are working on these topics that are related to the activities of the research group. By helping the group experts in different tasks like writing codes and reports, purchasing and procurement, etc. the students help increase the agility of the experts to do the other important things like defending proposals and networking.

To ensure the efficient supply and turnover of students, the research group welcomes student apprentices as applicants who undergo immersion training in the group.

Guest researchers could be adjunct or visiting researchers. Adjunct researchers are affiliated with other institutions who are invited to join the group for a collaborative study. Visiting researchers are usually faculty members on sabbatical leave from other institutions who stay with the group for a limited period to learn new techniques and perform a series of experiments with other researchers in the group; or in general, to collaborate on a new project with the group.

Research teams

To work on specific problems and topics that generally fall within the main theme of the research group, the research group is divided into smaller and more focused research teams.

Figure 1(b) depicts several research teams formed within the group (e.g., Teams A to D). A senior regular group member usually leads each team. The number of team members varies according to the demands of the specific research problem.

To cover a wider breadth within a research topic and ensure the continuity of research and the passing on of best practices, a team should include student members of different batches (i.e., academic status) whenever possible.

During team meetings, the research discussions are more in-depth and rigorous than in the group meetings. Members are expected not only to give research updates, but also to defend, analyze, and critique the ideas of others as well as their own.

In big research groups, several teams that are supervised by the same senior member comprise what is called a research cluster.

APPRENTICESHIP

The research group apprenticeship program is developed to recruit and train qualified and enthusiastic students to become young researchers. It ensures a continuous flow of young researchers into postgraduate school and the teaching faculty.

Mechanics of the apprenticeship program

The research group forms a training directorate consisting of an advanced graduate student as chair and student representatives from the research teams to oversee the following activities:

a) Call for applications and interview

Applicants submit a letter of intent, résumé, transcript and recommendation letters from current and previous supervisors. Where applications exceed the slots available, students are ranked based on grades in pertinent subjects, previous research experience and the results of an oral interview. If not selected for apprenticeship in the desired research group, students may appeal the decision or apply to another research group.

b) Rotation in the different research teams

The research apprenticeship program gives the apprentices an overview of the on-going research projects and activities of the research group. The apprentices are divided into small groups which move around other teams every one or two weeks. During their stint in each team, the apprentices perform simple experiments where they are expected to submit a written report and give an oral presentation to the members of the team.

c) Mini research project and performance evaluation

The apprentices conduct an investigative study, starting midway of the program, about a specific research problem that they themselves develop and implement. As a culminating activity and basis for performance evaluation, an oral presentation based on the investigative study is presented by the apprentices to the whole research group. Based on positive recommendations of the training directorate, the executive council accepts the successful apprentices as new student members of the group.

New student members and invitation to join a research team

New student members are asked to submit their letter of intent with a ranked listing of topics of interest. The regular members of the group then deliberate on the applicants' performance, preferences and match them with the needs and demands of the research teams.

The new student members are then invited to join a particular research team. This process facilitates the matching of the interests of the students and the research thrusts of the whole group.

POLICY-MAKING AND DAY-TO-DAY OPERATIONS

The research group, through its executive council, formulates policies and regulations for its members. The executive council is chaired by the program coordinator who also serves as the group's CEO.

Special committees (IT, web team, socials, library, membership and recruitment, etc.) are also formed within the organization to facilitate the day-to-day operations of the research group.

Some research groups hire a research assistant whose salary comes from research projects, grants or institutional allocations. Aside from duties related to the specific project, the research assistant facilitates group meetings and purchases office supplies.

Group facilities

The research group is usually hosted in a department or college, or in a private or government research institution. The research facility includes seminar rooms, physical laboratories, web connectivity and a members' lounge and library.

Some research groups help operate, maintain and upgrade common facilities and testing centers for the institute, college or CU.

Group activities

Regular group meetings are held weekly to discuss the highlights of on-going research work and organizational activities. During the meetings, a member gives a short seminar (usually 10 to 12 minutes) about a recently published paper from top journals that may be related to an on-going research.

As a by-product of the regular seminar presentations, research communication skills are honed and confidence in public speaking is developed among the members of the research group.

A research group also hosts public lectures, has exchange programs with other groups, holds summer immersion programs for high school and college students, and conducts trainings and workshops for clients from the industry. A research group also holds regular scientific retreats, and organizes team-building and recreational activities for its members.

LAB CONDUCT AND ETIQUETTE

General conduct

- a) Members of a research group should conduct themselves professionally and collegially.

- b) The openness and the sharing of ideas among group members embody the expression “There are no secrets within the Group”.
- c) As in any organization, group members sometimes are expected to make small sacrifices – “Take one for the Group”.

Respect for time and open communication lines

- a) Group meetings start on time. The prescribed duration of presentation during seminars must be followed.
- b) Research meetings should be scheduled in advance. Barging in into a lab room for a lengthy unannounced discussion is discouraged.
- c) The announcement of seminar and the abstract of a presentation should be posted or emailed a few days before the event.
- d) Responding to email and text messages should be done promptly.

Confidentiality and social media

- a) All matters pertaining to the research group, by default, should be kept confidential until the whole group or concerned members decide to release the information. An example would be a research manuscript draft for possible submission to a journal. The corresponding author should never submit the manuscript until all co-authors have confirmed that the submission can proceed.
- b) All announcements, news postings and pictures, prior to release (in print, TV, radio, email, public websites and social media), should be cleared first with the whole group or concerned members.
- c) On-going researches are neither posted nor discussed in public websites and social media.

Safety, no borrowing, and restricted access

- a) On culture of safety. Members should always review information and procedures about safety issues: protective equipment and clothing, safe handling of equipment, safe design of facilities, hazard assessment, waste disposal and emergency response protocols. If necessary, dress code in conducting experiments should be followed for safety reasons, e.g., lab gown, safety goggles, etc.
- b) On borrowing equipment. As much as possible, there should be no borrowing of equipment and supplies assigned to specific laboratory setups. Equipment logbooks for documentation and tracking should be maintained.
- c) On restricted access to the labs. Non-members, including unofficial and personal visitors, are not allowed access to the research facility.

Transition between degrees and changing supervisors

- a) Continuing student members (i.e., those in transition between degrees from BS to MS, MS to PhD), need to re-apply with a written research plan. With a clear research plan, positive endorsement from supervisor, and upon a similar matching process, the student will be invited to join a research team.
- b) Changing supervisors in the middle of an academic program or on-going research is discouraged. It is unethical for a professor to secretly or tacitly invite a student-mentee of

another professor to work with him on a new topic. Supervisors should talk among themselves first about a possible new advising setup before the student is involved.

c) Building a scientific career, a young researcher will have opportunities to be working with different groups and mentors throughout the various stages of his or her career. The diaspora of researchers to other local and foreign labs is part of the dynamics of the bigger scientific community.

Research plans and travel opportunities should be discussed first with current supervisor with openness and before applications are submitted.

Handling and avoiding conflicts

a) Conflicts and possible misconduct are handled by select neutral members of the group, with confidentiality, transparency and objectivity.

b) Resolutions and policies should be codified and discussed with participation of new members.

c) In case of potential media attention or legal questions, the matter should be referred to appropriate bodies.

FORMATION OF A NEW RESEARCH GROUP

Research groups are established as independent research units in a department or institute. The research group leaders are appointed by the department chair or institute director for a three-year period.

The formation of new research groups is also an opportunity for young productive PhD holders to lead research and advance their research careers.

The following section presents the roles of the researchers and the department in the formation of new research groups, and the forms of support that the college/CU can provide for the research groups. As part of university life, the retirement of a professor may have an impact on the research program and the status of a research group. This section also presents some guidelines for closing down a research group.

Role of researchers

Researchers who wish to form a new research group should present to the department, one year in advance, a proposal to introduce and lead a research program.

The proposal should include the rationale, research goals, objectives, planned activities, documentations of on-going and proposed projects, personnel recruitment and facility requirements. The proposal should also include both standards of success and failure.

A research program is primarily defined by the interests and expertise of the researchers and should be aligned with the departmental research thrusts. The program depends also on the needs and demands of the industry, society, and the funding agencies.

Recruiting group personnel involves inviting collaborators and graduate students interested in the research projects. The group facility may initially be a small meeting room and a laboratory which may be requested from the department.

Role of the department /institute

The department/institute supports the formation of research groups based on the proposed program that is aligned with the department/institute's research thrusts and the distribution of personnel expertise.

The department/institute provides a venue for the planned research group for a fixed period, which is renewable. Before the prescribed periods end, the department/institute evaluates the research group based on prevailing agreed performance metrics.

Role of the college/CU

The college/CU provides specialized support to all the research groups for them to function efficiently. The following common service capabilities should be developed and established to cover all areas that critically complement the research group's activities:

- 1) Creation of a support staff with a full-time statistician to assist researchers in analysing and interpreting quantitative information;
- 2) Creation of ethical research review board with ethical oversight over research involving humans and animals;
- 3) Creation of a pool of science editors and communicators to assist in manuscript writing;
- 4) Creation of a support staff for international mobility to assist researchers in foreign travels and visa arrangements for visiting scholars;
- 5) Creation of a dedicated legal team for project contract negotiations;
- 6) Creation of a mentoring support staff with full-time scientific mentors who will develop programs and promote research group mentoring;
- 7) Development of a procurement system for research equipment, supplies and services; and,
- 8) Establishment of facilities with reliable high-speed Internet for specialized audio-visual tele-conferencing for enhanced international collaborations.

The college/CU supports the research group's exchange programs and recruitment of top scientists, both local and international. Through an official appointment/secondment, scientists from other departments of the University or government agencies possessing specialized skills and interests can carry out research with the group. Through memoranda of agreement and logistical support, researchers from a company or other universities can stay with the group to carry out research and vice versa.

PERFORMANCE METRICS OF A RESEARCH GROUP

The performance of a research group is evaluated every three years by a departmental or institutional review board. The main criteria for evaluation are innovation and impact.

The metrics used are publications, patents, research projects/grants, postgraduate student graduation rate, manpower development and extension work and public service. The review board includes both internal and external reviewers. Based on the performance review, the research group can be supported, closed or merged with other groups.

Number of publications and patents

Publication in a high quality international peer-reviewed journal is the most effective way of disseminating new scientific discoveries. In the ideal scenario, all completed researches and

theses are formatted and submitted for publications in high quality international peer-reviewed journals. While the aggregate number of publications is a good measure of the research output by the research group, it becomes a performance metric only when it is based on certain standards. If UP considers that the number of faculty PhDs is an appropriate standard, it can adopt the metric: aggregate number of high quality international peer-reviewed publications in a year divided by the number of faculty PhDs; the target level of that metric is set at 2.

A patent is a form of intellectual property where exclusive rights are awarded to an inventor for an invention. It precludes other people from using or commercializing an invention without permission from the inventor. As a metric of success, the target level is 1 patent per faculty PhD per year.

Additional related metrics include the aggregate number of citations of publications of the group in a year, scientific and honorific awards received by its members, and number of appointment as chair or member in international scientific program committees and as editor in a high quality international peer-reviewed journal.

Number of research projects and grants

An increase in the number of research projects and grants means more and better equipment, software and analytical tools that can be used for further investigations. As a metric of success, the target level is one project or grant per faculty PhD member per year.

Manpower development

Manpower development can be measured in terms of the number of PhD students graduated. As a metric, the target level is one PhD graduate per faculty PhD per year. As an intermediate metric, an increasing number of PhD graduates being accepted for postdoctoral research abroad indicates the high quality of PhD graduates. Researchers who trained with a research group are considered more prepared to face academic pursuits and advanced research work.

Extension work and public service

Extension work of the research group is the application of the technical expertise of its members geared towards helping constituents external to the University. The specific extension activities are programmed and aligned with the extension work agenda of the department or institute. These include trainings, analytical testing services, public and private consultancy work, policy papers for the government or manuals and primers for students, specialized communities and the general public.

Extension activities aimed directly to benefit the general public like participation in programs influencing the national policies constitute the group's public service.

Extension activities also provide a dynamic link for finding research partners from the industry. The research group addresses some of the technical needs of their industry partners. The consultancy with industry partners usually results in new ideas and directions for more collaborative research.

A memorandum of agreement is normally executed between the institute or the CU and the research partner. Two to three memoranda of agreement per group per year should be the target.

Closing down a research program/group and preparing for retirement

A research program may be closed when a research professor retires or when the department changes its research priorities. Consequently, the group that embodies the research program or the group that fails its metric will need to be closed.

If the research program is still a departmental priority and a professor retires or discontinues service without immediate replacement, there will be a transition period until either a new research professor applicant is hired or, in some cases, the research lab is transformed into a teaching or extension service lab.

Closing down a research group involves careful coordination (with appropriate offices) of the research staff, funds, equipment, and developed protocols.

Every research professor should prepare for her retirement. Two to three years before compulsory retirement, no new research proposals should be submitted or endorsed. Ongoing projects should be terminated properly and in a timely manner. Lab apprenticeship should be gradually phased out.

The following is a checklist of tasks for closing down a research group:

- a) Transfer of inventories (equipment, chemicals, animals, etc.) and memorandum receipts to other investigators or institutions
- b) Endorsement of the remaining student members of the group to other faculty
- c) Closing and endorsement of research fund accounts, grants and contracts with funding agencies
- d) Clearing of office and lab spaces, returning of all keys and access cards, closing of email and website accounts
- e) Waste disposal, equipment decontamination, and endorsements of safety and ethical protocols

Concluding, the chapter has set out the apologia for mentoring and has shown how it can be a catalyst to UP producing research commensurate with its potential. Faculty, administrators and students should join hands in this and work to ensure that mentoring is endemic throughout the UP system. This will help ensure that UP plays its part, as the country's flagship university, in fostering a culture of research and leading the Filipino society towards a culture that seeks not only to absorb knowledge but also to create it.

ABOUT THE AUTHOR

Dr. Percival Almoró is a professor at the National Institute of Physics (NIP), UP Diliman. He obtained his PhD Physics at the NIP (2004) and carried out postdoctoral fellowships at the Institute of Applied Optics, Universität Stuttgart, Germany (2005–2006), Risø National Research Laboratory, Denmark (2007–2009) and the Center of Optical Research and Education, University of Utsunomiya, Japan (2014). He researched on holograms and the theory of coherent wavefront reconstruction. He is currently a topical editor of the Applied Optics journal of the Optical Society of America and NIP Deputy Director for Facilities and Resources.

REFERENCES

UP Diliman Faculty Manual, pp. 20–21 (2005)

Allan M. Johnson, *Charting a Course for a Successful Research Career*, Elsevier, pp. 26–28 (2011)

University of Cambridge. *The History of the Cavendish*. Available at <http://www.phy.cam.ac.uk/history>

----- . *The Cavendish Laboratory Research Groups*. Available at http://www-outreach.phy.cam.ac.uk/camphys/laboratory/laboratory14_1.htm

Max Planck Society. *Facts and Figures*. Available at <http://www.mpg.de/max-planck-research-groups>

UP Office of the Vice Chancellor for Research and Development, compilation. *Research, Creative Work and Extension Units in the University of the Philippines Diliman: A preliminary inventory*. 2013.

UP Manila Research Manual, 2011.

UPLB Research Manual: *Guidelines and Procedures Governing Research and Its Related Activities*, 2008.

UP Visayas Research Stations. Available at <http://www.upv.edu.ph/index.php/research-researchstations>

UP Baguio Cordillera Studies Center. Available at <http://cordillerastudies.upb.edu.ph/>

MIT Faculty Newsletter, March–April 2013. Available at <http://web.mit.edu/fnl/volume/254/fnl254.pdf>

Versatile Instrumentation System for Science Education and Research. Available at <http://www.paase.org/visser.html>

ESSAY

**THE SCIENTIFIC METHOD:
WHEN SCIENCE IS DONE WELL**

Elsie C. Jimenez, PhD

THE SCIENTIFIC METHOD: AN OVERVIEW

The scientific method is the process by which science is done. It is the process for studying nature's phenomena in order to correct, validate or integrate earlier knowledge, or gain new knowledge. Science develops from established knowledge so it continually increases our understanding of the universe.

The scientific method is a thought-provoking process; it entails vision, creativity, intellect and intuition. The different steps of the scientific method described here are typical of the natural sciences. The techniques pertain mainly to the experimental sciences, such as biology, chemistry and physics. However, the process of formulating scientific inquiry, making hypothesis, deducing prediction, doing experiment, analyzing results and sharing knowledge through publication are similar to those in other disciplines. Briefly, the basic steps of the scientific method are: (1) scientific inquiry, (2) hypothesis, (3) prediction, (4) experiment, (5) analysis and (6) publication.

Scientific inquiry is the formulation of a question usually based on observations. The inquiry may be definite, such as: "What causes red tide?" or indefinite, such as: "How can I invent a drug that can cure Alzheimer's disease?" The objective of a scientific inquiry is to obtain knowledge that can be proven by experiment. This step involves analyzing experiences and examining earlier studies of other researchers. If the answer has been established, other scientific inquiry based on present knowledge can be defined.

Hypothesis is the theoretical description of a phenomenon, or the correlation of a set of phenomena, that explains the characteristics of a component of the universe. It can be a mathematical model or a general statement that a phenomenon has a distinct feature and an underlying explanation.

Prediction involves reasoning or logical inference from the hypothesis. It can be a simple statement or a statistical probability. The researcher may have an intuition that can motivate him or her to search for proof that will support or negate the idea. Good reasoning increases the probability that the prediction is valid.

Experiment is testing to determine whether the prediction is correct or not. The experiment should unequivocally address the prediction based on the scientific inquiry. Normally, suitable experimental controls are used to minimize bias. The experiment is usually designed in a manner that minimizes errors. Quantification is complemented with estimate of uncertainty by doing repeated measurements. It is necessary to do the experiment several times to ascertain reproducibility also by other researchers.

Analysis is explaining and verifying the result of an experiment. A statistical analysis may be needed if an experiment is repeated several times. If the result has low confidence level, other predictions can be experimented. Relevant results previously obtained by other researchers are often integrated in the analysis.

Publication of the work in a reputable scientific journal, either in print or online, should be the ultimate aspiration of a researcher. A reputable scientific journal employs peer review in which the editor submits the manuscript to fellow researchers who are well-known in the field. Peer review involves evaluation of the work by experts who give their comments, often anonymously to allow them to give an objective assessment. Peer reviewers expect papers to conform to good scientific method. They may recommend publication with minor revisions or major revisions with additional experiment, submission to another journal, or rejection. The peer review serves to ensure that published papers meet rigorous criteria and to keep the scientific literature free from unsystematic work with evident errors. Although peer review may certify the soundness of the experimental methods, it may not necessarily confirm the correctness of the results. Novelty, originality, innovation, significance and interest are usually expected of a paper to be worthy of publication. If the manuscript qualifies in peer review, it is published in peer-reviewed scientific journal. The quality of the scientific journal usually implies the quality of the work.

It is possible to adjust the scientific method, which may require the researcher to go back to an earlier step. Failure to devise a correct hypothesis or infer a valid prediction that can be experimented may necessitate redefinition of the scientific inquiry. Failure to get good results may require a re-examination of the experimental method or prediction. As the steps improve, the scientific method becomes more useful in generating new knowledge.

Scientific knowledge is cognizance of a phenomenon learned through the use of the scientific method. When the scientific knowledge has been established and widely accepted, it becomes difficult to develop a new hypothesis.

RESEARCH COLLABORATION

The scientific method is often employed by a group of researchers. Research collaboration is a defining element of a research group. Methods must be developed to safeguard the integrity of the scientific method within this setting. It must be noted that research collaborators are jointly responsible for the authenticity and veracity of the work done by each group member. One can start the research and go through the process at any step. A researcher can assume

the scientific inquiry and devise the hypothesis or accept the hypothesis and deduce the prediction. Other researchers in the group can perform the experiment and do the analysis.

A researcher should record accurately and share the data so that these are available for use by other researchers. If the original researcher declines to share data, a request can be made to the journal editor, publisher, or research funding agency. It is a usual practice by other researchers to replicate an experiment, especially if the experiment is useful in their study. Researchers who use the same conditions should be able to reproduce the results. This process allows the reliability of the results to be established. Sometimes researchers share laboratory materials that are difficult to acquire. Sharing of data and materials can lead to research collaboration extending to different disciplines.

THE SCIENTIFIC METHOD BEHIND AN OUTSTANDING WORK IN SCIENCE

The basic steps of the scientific method can be illustrated in the elucidation of the molecular structure of deoxyribonucleic acid (DNA). The discoveries regarding the DNA structure and its importance in information transfer in a living material were the culmination of the work done by various scientists who jointly laid the groundwork for the DNA model. In 1944, the DNA was identified as the carrier of genetic information. Later, studies of the DNA of various species showed that it was composed of nucleotides, the structures and properties of which were then defined. A mathematical theory of helix transform was developed; this was used by Watson and Crick as a basis for their prediction that the DNA would have a helical structure. Using X-ray diffraction data obtained from studies of DNA crystals, they constructed a double helix model of the DNA that showed two complementary strands that could unzip for replication and transfer of genetic information. This discovery became the basis for numerous DNA studies in biochemistry, molecular evolution, molecular genetics, molecular taxonomy and other related fields.

DEVELOPMENT OF THE RESEARCH CYCLE

The research cycle is a process that goes on when a scientific inquiry is made while a study is being done. Such inquiry can begin another research cycle. An illustration of the research cycle that has persisted for several decades is the *Conus* (cone snail) research.

In the 1970s, scientists started to study cone snails that use their harpoons to inject venom into prey, such as fish, worms or mollusks. They purified cone snail venom to study how it functions. An undergraduate student who injected venom fractions into the brain of mice showed that each fraction caused the mice to behave differently, indicating that the venom could have different bioactive constituents. Numerous toxins named conotoxins have been identified, each having a remarkable diversity and being a specific neurotoxin targeted to a receptor or ion channel in the central nervous system. As such, the conotoxins help in our understanding of brain functions and in the development of potential drugs for brain disorders. Research on conotoxins has motivated the commercial production of an analgesic that is identical to toxin that a cone snail species produces.

The initial research on conotoxins was started about 40 years ago by Dr. Olivera with his colleagues. Since then, the Olivera Lab has been home to significant collaborative research. Now, many laboratories worldwide have embarked on conotoxin research to understand further the molecular targets and their roles in neurotransmission, or to investigate medical applications. The discovery of multiple toxins in cone snails became the basis for a continuing

research cycle involving numerous studies in biochemistry, molecular biology, medicinal chemistry, neuroscience and other allied disciplines.

During the research cycle at the Olivera Lab, I made the serendipitous discovery of a cone snail peptide that was not part of the PhD thesis proposal. I had purified an unusual peptide, and instead of being discouraged, I sought the help of a collaborator who predicted the occurrence of D-amino acid. I pursued the characterization and found the rare amino acid, D-tryptophan, in the first known D-amino acid-containing cone snail peptide named contryphan. Two years after the publication of contryphan, a foreign biotechnology company started to manufacture this peptide as a biochemical.

SCIENCE AND SERENDIPITY

Many scientific discoveries were stumbled upon by serendipity or chance instead of having been pursued intentionally. As a saying that is attributed to Louis Pasteur goes: "Chance favors only the prepared mind." The researcher must always be ready to harness chance and make a discovery. The chance discovery usually starts when one finds an "error" in the experiment. The researcher tries to sort out what seems to be an experimental error, thinks of an explanation and re-examines the scientific method. It is eventually resolved when the error is logical and consistent enough to be considered as sheer coincidence. At this time, the assistance of research collaborator can be sought. Discoveries by serendipity include Fleming's discovery of penicillin and Volta's discovery of the battery and electric current when he pursued Galvani's work on "animal electricity".

The essence of serendipity may be expanded to cover the discovery resulting from an experiment done on the side, that is not initially planned, but that otherwise appears to be worth pursuing as the research progresses. This would call for open-mindedness and support of thesis committees, research supervisors and technical committees of funding agencies in allowing deviations from thesis/research proposals that lead to important discoveries by chance, whenever students or researchers pursue such projects.

PUBLICATION OF RESEARCH OUTPUTS IN ISI JOURNALS

Research funds are regularly available in UP, as well as from external sources such as DOST and CHED. Faculty members and university researchers who avail of these funds should have their works published in ISI journals, even if the funding agencies do not require such outputs.

Faculty members and REPS who have not been initiated to scientific paper writing may undergo training. Each UP constituent unit (CU) may request/assign published faculty members in the CU to assist in the pre-submission review of articles, whenever it is necessary.

DOING SCIENCE WELL WITH MINIMAL RESOURCES

Doing good science may not need big funding. Researchers whose work is limited by meager laboratory resources can study the behaviors of living and non-living things. With in-depth observation and analysis, the work can give rise to ISI publications.

"Self-organized queuing and scale-free behavior in real escape panic" by the team of Dr. Saloma of UP Diliman was published in the Proceedings of the National Academy of Sciences of the USA. The authors described the behavior of panicking groups of mice and how their action was affected by the design of the space in which they were placed. The dynamic features of escape behavior earlier predicted mathematically were observed for a critical

sampling interval as the mice experienced panic while they escaped from the place they were detained. This work is useful in planning effective strategies to mitigate disaster. Similarly, it may be worthwhile looking into some mathematical models that can be tested in the laboratory using simple and inexpensive materials.

“Blackawton bees” by eight- to ten-year-old primary school students with their mentor, Lotto, was published in *Biology Letters*. The students made the scientific inquiry, did the experiments, recorded and analyzed the results. They observed that bees can use both color and location to recall where to find the nectar-producing flowers. “Behavioural ecology: bees associate warmth with floral colour” was earlier published in *Nature* by the team of Dyer but the Blackawton students were not aware of this study because they did not do a review of literature and instead based their scientific inquiry mainly on observations. These two studies have important applications in pollination. Similar studies of phenomena concerning the behaviors of many living things around may be done in undergraduate theses.

“Diet Coke and Mentos: what is really behind this physical reaction?” by Coffey was published in the *American Journal of Physics*. The work that Coffey did with a group of undergraduate physics students showed significant aspects in fluid dynamics, surface science and thermodynamics. The process involved in the explosion produced by mixing Diet Coke and Mentos is due to bubble-seeding. Bubble-seeding is based on the same principle that explains the making of artificial rain by cloud-seeding method. As the rough surface of the Mentos candy affected the degree of the explosion that occurred when the candy was mixed with Diet Coke, it is interesting to know whether the quality of environmental pollutants acting as seed crystals, primarily and directly affects the amount of rainfall or the “explosiveness” of typhoon. Studies of physical phenomena may be correlated with natural occurrences.

One can do science well by improvisation. Dr. Balangcod of UP Baguio has been exploring the Cordillera in search of indigenous and herbal plants. She is into ethnobotany, uncovering the traditional healing practice of the Cordillera people. In the experiments, she had to improvise an instrument for drying plants, using old kitchen utensils. With junior faculty members as collaborators, she has led the publication of their research outputs in ISI journals.

INITIATING STUDENTS IN PUBLICATION

The initial experience in publication usually results from graduate work that includes special projects and theses. Some faculty members have guided their students in the publication of thesis outputs in ISI journals. Dr. Serrano of UP Visayas has several ISI publications within a three-year period from the outputs of thesis students. This practice must be sustained and emulated by other faculty members.

Special projects and theses should be written in the form of publishable manuscripts. Graduate students must be required to have publications or have their papers accepted for publication prior to graduation. A master’s thesis should lead to at least one ISI publication and a PhD thesis should result in at least two ISI publications.

Undergraduate students must also be guided to write their theses in the form of publishable manuscripts. Good undergraduate theses may be selected for submission to ISI journals.

MAXIMIZING OPPORTUNITIES IN FOREIGN RESEARCH FELLOWSHIPS

Some research schemes are very helpful especially for colleges without degree programs and without provisions for adequate research laboratory space and facilities. There

are available foreign fellowships, including the Fulbright Program, TWAS–UNESCO Associateship Programme and other fellowships offered by foreign academic institutions, which provide opportunities for collaborative research with foreign institutions. Fellowships should be taken primarily as opportunity to publish, rather than for “tourism.” Research collaboration should give rise to ISI publications. If the research visit becomes successful, the program may open a continuing collaboration between the research fellow and the host professor. The UP administration must be supportive of faculty members and university researchers who want to avail of such fellowships.

I had availed of opportunities that graduate study and research fellowships could offer, leading to several ISI publications and long-term collaboration with the host professor abroad. The collaboration benefited the research fellow’s institution through library and laboratory materials that were donated by the host professor for teaching and extension work. It benefited, too, the research fellow with in-depth learning that, in turn, has been imparted to thesis students, junior faculty and research assistants.

CONCLUDING REMARKS

In UP, very few members of the faculty as well as of the research, extension and professional staff (REPS) publish in ISI journals as shown by extremely low numbers of International Publication Awards granted and UP Scientists recognized every year (ref. OVPAA). The major constraints in doing research in UP are associated with funding and the formation of research groups. Research that needs costly equipment is constrained by insufficient funds. Funding agencies require collaborative work but there may not be available qualified researchers to constitute research groups. As exemplified, research with minimal funding can as well give rise to ISI publications. Graduate theses allow the formation of research groups, while foreign research fellowships provide the fellows the opportunity to work with research groups and possibly foster a continuing collaboration; with proper motivation, these can lead to numerous ISI publications.

As discussed here, there are ways to augment publication. Obviously, the UP science faculty and REPS have vision, creativity, intellect and intuition. If they complement these qualities with initiative and sustained hard work, they can publish in ISI journals. When the research culminates in a prestigious publication and/or an important invention – that undoubtedly is when science is done well.

THE AUTHOR

Dr. Elsie Jimenez has a BS in Chemistry, MS in Biochemistry and PhD in Molecular Biology and Biotechnology. She is a professor emeritus at the University of the Philippines and a former UP Scientist.

SUGGESTED READINGS

Avery OT et al. Studies on the chemical nature of the substance inducing transformation of pneumococcal types. Induction of transformation by a desoxyribonucleic acid fraction isolated from *Pneumococcus* type III. *J Exp Med* 79:137–58; 1944.

Balangcod TD et al. Phytochemical screening and antibacterial activity of selected medicinal plants of Bayabas, Sablan, Benguet Province, Cordillera Administrative Region, Luzon, Philippines . *Indian J Traditional Knowledge* 11:580; 2012.

Blackawton PS et al. Blackawton bees. *Biol Lett* 7:168; 2011.

Chargaff E et al. Composition of the deoxypentose nucleic acids of four genera of sea-urchin. *J Biol Chem* 195:155; 1952.

Cochran W et al. The structure of synthetic polypeptides. I. The transform of atoms on a helix. *Acta Cryst* 5:581; 1952.

Coffey TS. Diet Coke and Mentos: what is really behind this physical reaction? *Am J Phys* 76:551; 2008.

Dyer AG et al. Behavioural ecology: bees associate warmth with floral colour. *Nature* 442:525; 2006.

Franklin RE & Gosling RG. Molecular configuration in sodium thymonucleate. *Nature* 171:740; 1953.

Jimenez EC et al. Contryphan is a D-tryptophan-containing Conus peptide. *J Biol Chem* 271:28002; 1996.

Olivera BM. QnAs with Baldomero M. Olivera. Interview by Beth Azar. *Proc Natl Acad Sci U.S.A.* 109:13470; 2012.

Saloma C et al. Self-organized queuing and scale-free behavior in real escape panic. *Proc Natl Acad Sci U.S.A.* 100:11947; 2003.

Watson JD & Crick FH. Molecular structure of nucleic acids, a structure for deoxyribose nucleic acid . *Nature* 171:737; 1953.

ESSAY

**PIONEERING THE DEVELOPMENT OF
DNA FORENSICS IN THE PHILIPPINES****Maria Corazon A. De Ungria, PhD****ESTABLISHMENT OF THE UPD-NSRI DNA ANALYSIS LABORATORY**

2016 marks the 20th anniversary of the DNA Analysis Laboratory of the Natural Sciences Research Institute at the University of the Philippines Diliman (UPD-NSRI-DAL). On 16 May 1996, UP President Dr. Emil Q. Javier signed a memorandum of agreement (MOA) with Philippine Vice President Joseph E. Estrada who was then the chair of the Presidential Anti-Crime Commission (PACC), formally creating a laboratory that would pioneer the entry of DNA forensics into the Philippines. Dr. Saturnina C. Halos actively worked towards the creation of UPD-NSRI-DAL and became its first head. She was a full-time researcher holding a University Researcher V position at NSRI at that time but subsequently accepted a faculty position at the Institute of Molecular Biology and Biotechnology (UPD-MBB). After the transfer, Dr. Halos relinquished the task of overseeing the daily operations of the laboratory to the most senior researcher of the team while continuing to oversee the overall management of the laboratory. The UPD-NSRI-DAL suffered birth pangs during the first few years because of limited finances, huge workload of the five junior staff members, a majority of whom were studying part time, and the instability brought about by the successive resignations of several persons who were appointed to head the laboratory after Dr. Halos. This was the situation I was faced with when I was appointed to be the fifth laboratory head in February 1999. This essay narrates the challenges that the DNA team faced in the early years after my appointment and the means we used to hurdle these obstacles in order to strive for excellence to fulfill our mandate and put into life the motto 'science at the service of society'.

THE FIRST YEARS

Prior to my appointment as head of UPD–NSRI–DAL in 1999, I had spent eleven years of my life (1988–1998) in Sydney, Australia studying for my Bachelor of Science in Biology, undertaking an Honors year and proceeding to do my PhD, without having to do a Master of Science degree. After finally submitting my PhD dissertation on 8 December 1998, I returned to the Philippines to look for a job so that I could take care of my sick parents. Without any definite job prospects in view, I happened to meet Dr. Halos by chance while I was in UP and she offered me the job as head of UPD–NSRI–DAL. Without knowing it at that time, my decision to accept the job offer would change my life and open up a new and exciting chapter in my professional career. The tasks of leading five junior researchers (some of whom had been in the laboratory from the very start) responding to the queries of key government and university officials about forensics and managing a new laboratory without prior formal training in laboratory management, appeared to be very daunting. It was “sink or swim” time for me.

The annual operating budget of the laboratory was then very small – too small to buy even one tube of *AmpliTag* Gold, a vital enzyme in the Polymerase Chain Reaction, the key step in DNA profiling. As part of the MOA between UP and PACC, the government had allocated P20 million pesos for the establishment and initial operations of the laboratory. However, only P8 million pesos was actually released for laboratory renovations and purchase of equipment. After this initial funding was used up, we worked hard during the major part of 1999 for the release of the remaining P12 million pesos from the Department of Budget Management. We even requested for meetings with President Estrada, since he was a signatory to the MOA. I was not familiar with how budgets were released to the University and all our efforts led to nowhere. By the end of my first year in office and with the prevailing political situation, I decided to focus more on obtaining financing through research grants.

The absence of a senior researcher who had funding for research projects further aggravated the situation. At this time, I was the only one who had a PhD and who was eligible to apply for research grants. Having been away for eleven years, I was not familiar with research applications and funding agencies in the Philippines. I was overwhelmed with challenges of writing research grants, of defending these proposals, of accepting the long delays in the whole process of application, and of understanding the complexities of government procurement and fund management for a project. Moreover, because of the novelty of the field of DNA forensics – which was a crossbreed between basic sciences and health research – it was not clear to which DOST agency I should submit my research proposals. I then turned to the junior staff who provided as much support as it could. The young researchers knew how to work hard, having had to juggle their work and studies for a number of years. The challenge was to weave a story from all the information that was given to me and to determine the research direction for the entire team.

To increase our chances of success, I also actively submitted research proposals to UP, the European Union (EU), the World Bank, the British Embassy and the Third World Academy of Science. Notably, the proposal that was submitted to EU did not follow the standard format of a research project. The proposal entitled “Research, Training and Extension Services in Forensic DNA Analysis in the Philippines” received funding through the Democracy and Human Rights in Asia line item budget of EU for the years 2001 to 2004. In the proposal, I presented the issues concerning wrongful convictions, the implementation of the Death Penalty Law and the importance of using DNA tests in preventing the execution of innocent persons. I argued that more robust and sensitive procedures are needed to analyze biological samples that had been stored for many years. Moreover, I proposed to perform DNA tests in

cases already decided by the Supreme Court, wherein there was a chance of wrongful conviction. The EU grant, worth over P18 million pesos and covering a period of three years, gave a certain level of financial stability to a laboratory that was at that time struggling to survive.

In the early years, I had to be the main proponent in most of the projects because of the requirement for a postgraduate degree by many funding agencies. Because this was limiting the research capabilities of the laboratory, I had to encourage the junior staff to actively apply for scholarships to enable them to pursue their postgraduate degrees abroad, and to attend international training programs and conferences. I made sure that the UPD-NSRI-DAL team realized the importance of excellent training and hard work in order for us to carry out cutting-edge research in the Philippines. I saw to it that the junior staff submitted well-written applications to recognized funding institutions. And this time, our efforts paid off with our team being able to get training grants/scholarships from various agencies of DOST and UP, the Carl Duisberg Program of the German government (five grants), the Royal Society of London (one grant), the British Chevening scholarship program in the UK (one grant), the Erasmus Mundus Program of the EU (two grants), the Max Planck Institute of Evolutionary Anthropology (one grant), the North Carolina State University (four grants), the University of North Texas Health Science Center (two grants) and the University of Arizona in the US (one grant).

Aside from pure research work, the laboratory also opted to accept requests for genetic tests from government agencies as well as private individuals as part of its extension service. The original visionaries namely Dr. Halos and Dr. Elma C. Llaguno who set up the laboratory already included this type of work in the master plan. However, without an allocated budget from the government, we could not provide the services for free but had to require interested parties to pay. Payments made for cases included a certain proportion dedicated for research thus providing the much needed funding for the laboratory during the early years. Moreover, involvement in a case added a social dimension to the work we were doing inside the laboratory: we learned up close how the use of the technology affected the lives of real persons.

In those early years, I learned the value of teamwork, commitment to science and true leadership that must be founded on service and leadership by example. For new graduates like myself who had been entrusted to lead a team soon after finishing their studies and without prior formal training in leadership and management, I appreciated the mentorship I received from many persons – former laboratory heads, institute directors, university and campus officials – who generously provided their time, support and advice.

LIFE-LONG PASSION FOR SCIENCE: ENGAGING IN RESEARCH WITH A HEART

Since its initial discovery in 1985 in the UK, forensic DNA technology has been used in numerous countries to assist in resolving disputed parentage and kinship cases, in disaster victim identification and in criminal investigations. However, before this technology can be used in the Philippines, there was an urgent need to first validate molecular procedures in handling biological samples that may be used as DNA evidence in court and in establishing a reference population database for statistical interpretation of matching DNA profiles.

Validation of molecular procedures for handling biological samples

To enhance the laboratory's ability to generate DNA profiles from different biological samples, our team validated molecular procedures for extracting DNA from samples that were

commonly submitted for analysis. The warm and humid Philippine climate contributes to DNA loss and degradation in biological samples when these are not properly collected, handled and stored prior to genetic testing¹. Because of the limitations of money, personnel and time, we identified the relevant biological samples which should be studied first. My passion for reading provided sufficient information in the ranking of biological samples, according to the value of DNA evidence derived from each sample, the relative likelihood of successful DNA recovery, and the nature of the case. Lessons learned from case consultations also aided in formulating relevant experimental designs. Laboratory validations could only use non-evidentiary samples that were obtained from simulating actual case conditions, and not samples collected from victims or crime scenes. The team focused on validating procedures for handling bone^{2,3} and teeth samples normally recovered from abandoned crime scenes and disaster sites; and for handling body fluid samples such as blood⁴, saliva⁵ and semen⁶. To date, we have validated and published these procedures in reputable forensic science journals. The next challenge is to engage relevant stakeholders such as law enforcement, health officials and policy-makers to take the necessary steps towards integrating DNA testing in routine investigations.

As I look back to the 16 years of leading the UPD-NSRI-DAL team in various initiatives, I am convinced that scientists must learn to share the results of academic research with those who are directly affected by the technology as well as to the general public. Effective scientific communication involves not only the mind but also the heart which enables us to share common aspirations and good human values, amidst the challenges of speaking different languages/dialects and attaining different levels of education. Only by engaging the public can we gain the people's trust in the good science that we have devoted our lives to do, for the service of others.

Expanding the Philippine reference database

Once funds became available, I reviewed the status of the Philippine population database and concluded that there was an urgent need to expand it. Early research published by UPD-NSRI-DAL made use of four to nine DNA markers^{7,8,9}. This work was time-consuming because only single-reaction assays were available at that time. However, the introduction of multiple-

¹Calacal, G. C. and M. C. A. De Ungria (2005). "Fungal DNA challenge in human STR typing of bone samples." Journal of Forensic Sciences 50(6): 1394-1401.

²Calacal, G. C., *et al.* (2005). "Identification of exhumed remains of fire tragedy victims using conventional methods and autosomal/Y-STR DNA profiling." American Journal of Forensic Medicine and Pathology 26(3): 285-291.

³Calacal, G. C., *et al.* (2015). "Comparing different post-mortem human samples as DNA sources for downstream genotyping and identification." Forensic Science International: Genetics 19: 212-220.

⁴Perdigon, H. B., *et al.* (2004). "Evaluation and in-house validation of five DNA extraction methods for PCR-based STR analysis of bloodstained denims." Science Diliman 16(1): 37-48.

⁵Salvador, J. M. and M. C. A. De Ungria (2003). "Isolation of DNA from saliva of betel quid chewers using treated cards." Journal of Forensic Sciences 48(4): 794-797.

⁶Delfin, F. C., *et al.* (2005). "Y-STR analysis for detection and objective confirmation of child sexual abuse." International Journal of Legal Medicine 119(3): 158-163.

⁷Halos, S.C., *et al.* (1998). "Allele frequency distributions of the polymorphic STR loci HumVWA, HumFES, HumF13A01 and the VNTR D1S80 in a Filipino population from Metro Manila." International Journal of Legal Medicine 111: 224-226.

⁸Halos, S.C., *et al.* (1999). "Philippine population database at nine microsatellite loci for forensic and paternity applications." Forensic Science International 101: 27-32.

⁹Tabbada, K. A., *et al.* (2002). "Allele frequencies of eight short tandem repeat loci in three Visayas regional populations of the Philippines." Journal of Forensic Sciences 47(6): 1397-1398.

reaction assays to the laboratory in 2005 markedly increased the amount of genetic information that could be obtained per sample at any given time. Since then, the Philippine population database has expanded to include more autosomal^{10,11,12,13}, Y-chromosomal^{14,15}, X-chromosomal¹⁶ and mitochondrial¹⁷ DNA markers. The availability of autosomal and lineage DNA markers enabled the laboratory to conduct different types of genetic tests¹⁸ based on the availability of DNA samples and the nature of the investigation.

Database expansion also involved the collection of biological samples, usually blood or saliva, from different Filipino regional populations and indigenous communities^{19,20}. This work gave me ample opportunities to travel within the Philippines and learn about the diversity and richness of Philippine culture. Regardless of the difficulties in traveling to the field site, I appreciated the openness and kindness of the people who extended their assistance and shared whatever they had with the research team. I am forever grateful to those families who welcomed us into their homes. Likewise, there were many opportunities to listen to the village elders who had a lifetime of stories to share. Because free and prior consent of the community and the individual are needed prior to any collection, I had to find creative ways to effectively communicate the science to the people. In this type of engagement, I learned the value of trust. Many persons agreed to participate in our project, even if they had not completely comprehended the science, because we had been able to share common values and aspirations with the community. I came to appreciate that scientific research need not be limited to a mere compilation of scientific discoveries that are published in reputable academic journals. Instead, rigorous scientific research should be a means to discover new knowledge that would make life better for all.

Analysis of genetic data obtained from a limited number of Philippine groups has already shown that indigenous communities, particularly those in geographically isolated locations, exhibited greater genetic diversity compared to samples that were collected from

¹⁰De Ungria, M.C.A., *et al.* (2005). "Allele frequencies of 19 STR loci in a Philippine population generated using AmpFISTR multiplex and ALF singleplex systems." Forensic Science International 152(2-3): 281-284.

¹¹Maiquilla, S.M.B., *et al.* (2011). "Expansion of the Philippine Autosomal Short Tandem Repeat Population Database for DNA-based Paternity Testing." Philippine Journal of Science 140(1): 1-6.

¹²Salvador, J.M., *et al.* (2007). "Allele frequencies for two pentanucleotide STR loci Penta D and Penta E in a Philippine population." Legal Medicine (Tokyo) 9(5): 282-283.

¹³Rodriguez, J. J. R. B., *et al.* (2015). "Allele frequencies of 23 Autosomal Short Tandem Repeat Loci in the Philippine Population." Legal Medicine 17(4): 295-297.

¹⁴Lessig, R., *et al.* (2003). "Asian online Y-STR Haplotype Reference Database." Legal Medicine (Tokyo) 5 Suppl 1: S160-163.

¹⁵Salvador, J. M., *et al.* (2008). "Population data of 10 Y-chromosomal STR Loci in Cebu province, Central Visayas (Philippines)." Journal of Forensic Sciences 53(1): 256-258.

¹⁶Tabbada, K. A., *et al.* (2005). "Development of a pentaplex X-chromosomal short tandem repeat typing system and population genetic studies." Forensic Science International 154(2-3): 173-180.

¹⁷Tabbada, K. A., *et al.* (2010). "Philippine mitochondrial DNA diversity: A populated viaduct between Taiwan and Indonesia?" Molecular Biology and Evolution 27(1): 21-31.

¹⁸De Ungria, M. C. A., *et al.* (2008). "Overview of Forensic Services by the UP-NSRI DNA Analysis Laboratory." Acta Medica Philippina 42(2): 34-38.

¹⁹Delfin, F., *et al.* (2011). "The Y-chromosome landscape of the Philippines: extensive heterogeneity and varying genetic affinities of Negrito and non-Negrito groups." European Journal of Human Genetics 19(2): 224-230.

²⁰Delfin, F., *et al.* (2014). "Complete mtDNA genomes of Filipino ethnolinguistic groups: a melting pot of recent and ancient lineages in the Asia-Pacific region." European Journal of Human Genetics 22(2): 228-237.

cities across different political regions. Hence, our team is presently working towards the inclusion of all Philippine groups – regional and those belonging to indigenous communities – in the Philippine population database. We envisioned this database, inclusive of all Filipinos, as a better tool for statistical evaluation of forensic DNA evidence. Moreover, datamining the information that would be generated can be used to better understand the genetic variation across all Philippine groups. Like in other countries, population genetic studies such as what we had started and would continue to pursue, are expected to contribute to health research in the field of pharmacogenetics and personalized medicine.

In-depth analysis of genetic data would also help us understand the genetic history of different Filipino groups – including our genetic relationships among ourselves and other people in the Asia-Pacific region. To date, the National Commission on Indigenous Peoples (NCIP) has partnered with universities and non-governmental organizations in documenting and assisting indigenous groups to preserve their own languages, music, dances and culture. Given the information that can now be mined from genetic data, we hope to contribute to these projects and work with NCIP in protecting the cultural heritage of all Filipino groups.

EXTENSION WORK: PLACING SCIENCE AT THE SERVICE OF PHILIPPINE SOCIETY

Because DNA forensics is a relatively new science in the Philippines, there is much work that needs to be done. Unfortunately, there is a dearth of forensic practitioners especially those in DNA forensics. The Philippine government does not allocate sufficient budget for forensics. Time and again, law enforcement personnel had to stop processing samples due to delays in the procurement of chemicals and reagents for analysis. In fact, the UPD-NSRI-DAL received funding from the national budget only twice in its 20-year history: in 1996 through Philippine Vice President Estrada and in 2009 through Congressman Lorenzo Tañada III. Much of our extension work was funded by those who had requested for DNA tests and by generous donors.

Assisting Philippine courts

DNA-based filiation testing is usually requested to support claims for child support, inheritance, immigration and for peace in the family²¹. Genetic testing had become the procedure of choice over blood typing because of the increased level of polymorphism and the lower susceptibility of DNA molecules to degradation compared to proteins²². At present, we use 20 autosomal DNA markers for conventional parentage cases^{23,24}, and the DNA evidence that we have generated, is now being used in increasing numbers to support or argue against parentage in Philippine courts^{25,26}. Initially, the strength of DNA tests rested primarily on its power to exclude the wrong person alleged to be a parent of the child. However, the rapid

²¹De Ungria, M. C. A., *et al.* (2002). "Evaluating DNA tests of motherless cases using a Philippine genetic database." *Transfusion* 42(7): 954-957.

²²De Ungria, M. C. A., *et al.* (2002). "Resolving ten cases of disputed parentage using a Philippine genetic database." *Science Diliman* 14(1): 8-16.

²³Maiquilla, S. M. B., *et al.* (2011). "Expansion of the Philippine Autosomal Short Tandem Repeat Population Database for DNA-based Paternity Testing." *Philippine Journal of Science* 140(1): 1-6.

²⁴Rodriguez, J. J. R. B., *et al.* (2015). "Allele frequencies of 23 Autosomal Short Tandem Repeat Loci in the Philippine Population." *Legal Medicine* 17(4): 295-297.

²⁵De Ungria, M. C. A., *et al.* (2001). "DNA evidence in Philippine courts: a case report." *Philippine Law Gazette* 13(3): 46-49.

²⁶De Ungria, M. C. A. (2005). "DNA Evidence in Paternity Cases." *Philippine Law Journal* 80(2): 1-11.

development of DNA technology also increased its power to identify real parents, thus providing objective evidence for a fair and swift resolution of disputed parentage issues. In fact, many cases that we have handled resulted in parties agreeing to settle out-of-court, thereby reducing the number of cases filed in Philippine family courts²⁷.

The Philippine Supreme Court has recognized our contribution to the lower courts as well as our contribution towards accelerating the swift administration of justice^{28,29,30}. Once DNA test results establishing filiation are submitted to court, the burden of proof to present evidence to dispute the DNA results shifts from the child and his/her guardian to the alleged parent. This represents a significant change in the mindset of the family courts that previously took years to evaluate an allegation of relationship between a child and a purported parent. Every time I am subpoenaed to appear in court, my goal in the case is to work with the team in ensuring that we submit a very clear DNA report accompanied by a well-prepared expert testimony. In doing so, we believe that we are helping the court gain a very good appreciation of the value of the DNA evidence presented in the shortest time possible.

And finally in October 2007, the Supreme Court promulgated the Rule on DNA Evidence³¹ which provided guidelines for the use of DNA evidence in Philippine courts. The rule did not only provide guidance to trial court judges regarding the admissibility, relevance and probative value of DNA evidence, but it also opened up the possibility of post-conviction DNA testing to re-open cases which had long been final and executory to determine whether an accused may have been wrongfully convicted. I was invited to provide technical support during the drafting of the rule, drawing from our experiences in handling cases through the years. I realized then the value of being part of an educational institution that is known to uphold academic excellence. Our laboratory was recognized not only because of what we had done in the past but also because we are part of the University of the Philippines, the premier state university and now the only national university, that promotes the generation of knowledge aimed at improving the lives of all Filipinos.

Expanding the number of forensic scientists through education

Through the years, I have seen the increasing interest of the public in forensic sciences. However, there is a dearth of forensic practitioners in the Philippines because the science, including DNA forensics, had not been integrated in routine investigations. Hence there is no clear scientific career path for many potential researchers, and if not sufficiently guided, aspiring junior scientists may opt to pursue other careers.

When I participate in activities involving young people, I have felt their yearning to know more about forensic science, and its use to make the world a better place. Clearly, a forensic science course that could open career paths for young researchers is needed. Hence, I have teamed up with Dr. Ian C. Fontanilla of the Institute of Biology (UPD-IB) in running the Forensic Biology Seminar Series or Biology 397 during the second semester of each academic year starting in 2012. I envisioned this seminar series as a good platform for postgraduate students to explore the possible applications of their field in forensics. Notably, the seminar

²⁷De Ungria, M. C. A., *et al.* (2008). "Overview of Forensic Services by the UP-NSRI DNA Analysis Laboratory." *Acta Medica Philippina* 42(2): 34-38.

²⁸Edgardo and Bienvenida Tijing vs. Court of Appeals and Angelita Diamante (General Record Number 125901)

²⁹Rosendo Herrera vs. Rosendo Alba (General Record Number 148220)

³⁰People vs. Joel Yatar (General Record Number 150224)

³¹Supreme Court of the Philippines (2007). Rule on DNA Evidence. Manila, Supreme Court of the Philippines: 1-19.

series covers a broad range of topics such as forensic genetics, forensic pathology, forensic microbiology, crime scene investigations, forensic chemistry and wildlife forensics. In the seminar series, we invite forensic practitioners, including the DNA scientists of UPD-NSRI-DAL to share their expertise with the students. This initiative also aims to facilitate student exchange programs with partner universities that offer formal forensic science degree programs and subsequently produce a forensic science stream in the Master of Science degree offered by UPD-IB. In this course, we work to highlight the importance of a multidisciplinary approach in forensic science research as well as in actual casework. We hope that in offering forensic science courses with forensic practitioners that can act as 'mentors' to young researchers and scientists, we would be able to expand the base of forensic practitioners engaged in different disciplines. This vision is consistent with what I have experienced during the early years: young researchers need mentors to help them find their own scientific path, which I hope will be towards achieving academic excellence for the service of the Filipino people.

FINAL REMARKS

Almost 20 years from the date of its establishment, and 16 years since I was entrusted to lead the laboratory, I look back at the challenges which we overcame in order to achieve what we have now. The challenges continue to exist – insufficient funding, lack of personnel items, need for more infrastructure, delays in product procurement, huge administrative requirements for projects and lack of formal training in forensic science for young researchers. However, amidst these challenges, the laboratory survived because of the contributions of the entire team of UPD-NSRI-DAL. I would like to particularly mention some of the university researchers of the laboratory – Gayvelline C. Calacal, Miriam M. Dalet, Frederick C. Delfin, Minerva S. Sagum and Jazelyn M. Salvador – who joined the laboratory during the early years and who stayed on until now, accepting the uncertainties of the profession but relentlessly committed to the science. I would also like to acknowledge, Atty. Jose M. Jose, who generously provided excellent legal advice to the many projects which our research team pursued through the years. And we not only survived but we also flourished as researchers and as individuals because by overcoming the odds, we realized the value of effective communication with people of all walks of life. I learned that the people's appreciation of scientific knowledge lies heavily on the capacity of the team to share common aspirations and core values, and of having a service-oriented view towards academic excellence. To the present day, we strive to live up to the vision statement that we formulated during those crucial early years and that we continually make real in our daily work- 'putting science at the service of society'.

As a final word, I, together with Dr. Halos and the UPD-NSRI-DAL team, continue to appeal to the government to recognize the urgency of incorporating DNA as evidence in criminal investigations. Despite the many technological developments and continuing research in the field, the benefits of forensic DNA testing to our justice system will not be fully realized for as long as there is no law that mandates routine collection, storage, processing, and interpretation of biological evidence. With the absence of an established system for routine medical examination and collection of samples from victims followed by DNA testing, victims continue to suffer as many of the perpetrators remain at large, and those wrongfully accused and convicted unjustly face years of incarceration for crimes they did not commit. As researchers, we have worked to push the science forward. We are now looking at taking the product of long days and nights in the laboratory to the next level, by advocating the maximum use of scientific research, particular DNA forensic science, for the good of all.

THE AUTHOR

Dr. Maria Corazon Abogado De Ungria finished her Bachelor of Science with Honors in Biology degree at Macquarie University in Sydney, Australia, and subsequently her Doctor of Philosophy degree in Microbiology at the University of New South Wales also in Sydney, Australia. In 2011, she was appointed Director of the Program on Forensic and Ethnicity of the Philippine Genome Center. In 2013, Dr. De Ungria was named Scientist 2 by the Department of Science and Technology and Civil Service Commission in the two agencies' Scientific Career System for full-time researchers. She currently heads the DNA Analysis Laboratory of the Natural Sciences Research Institute, University of the Philippines Diliman.

CHAPTER

4

RESEARCH DISSEMINATION

Clarissa C. David, PhD

Research is conceived and executed with the end-goal of contributing to the academic field as well as to society through industry or government. Often, the research outputs not only have theoretical and methodological importance but also practical importance. Thus, it is essential that research, whether basic or applied, be communicated to a broader audience to realize its real-world impact.

There are different kinds of research in a variety of areas of scholarship conducted in the University. These include social scientific research, basic scientific research, policy research, research in the arts and humanities, and applied research. Each of these areas has its own spheres of impact on policy, industry, practice, individual behaviors, programmatic interventions and other scholarship. Each one of them also impacts on the way the academe does research; for instance, in methodological work.

University research is typically disseminated to two broad categories of audience: peers and the public. Dissemination to colleagues in a field of study is done by means of conferences, lectures and publication in journals and books. These are formats to which researchers are used and hence requires no special changes in the language or style of communicating since they are speaking with other researchers who speak the same language or who work on similar things.

The University supports the dissemination of its research through a variety of programs, including the publication of journals, publicity and the provision of grants to allow faculty members to present their work in conferences. It also has information offices in

different units that actively disseminate research work of the faculty through more popular forms such as bulletins, websites and newsletters.

4.1 RESEARCH COMMUNICATION

HOLDING FORMAL AND INFORMAL TALKS

The first step in communicating research outputs is presentation in formal and informal seminars, talks and roundtable discussions. Depending on who is in attendance, these can be highly technical presentations to peers, colleagues and students in your field or they can be popular or simplified reports of findings to stakeholders or users of the research.

Research that is presented in talks can be incomplete and can even still be at the theorizing stage. Some colleges organize small brownbag talks where faculty and students can hear about ongoing works, initial findings or drafts of papers, and where participants are able to provide feedback to the author. It is often during these talks when authors find important ideas, papers or collaborators that help improve their final papers.

PREPARING POPULAR ARTICLES FOR MULTIMEDIA AND THE INTERNET

Communicating research to stakeholders is challenging for many researchers. While not all research can be or should be shared with stakeholders, most can be shared and should be shared through popular forms like radio programs, television shows, internet-based videos or newspapers. In such cases, researchers should be able to tell the story of the research and its implications in a way that the public would understand and enjoy.

In order to create a broader audience for research, it is important that researchers make themselves available to stakeholders for talks, presentations, media appearances and interviews.

Succinct presentations of research findings, which aid in communicating complex ideas, are valuable in communicating the findings as relevant and compelling to the target audience. These are often delivered multiple times to different categories of stakeholders and therefore worth the investment in time and effort if the messages are effectively delivered. The University through its constituent units provides support to faculty members in the form of training programs, hosting of instructional materials, technical advice for communication and publicity of research products.

4.2 INTEGRATING RESEARCH INTO TEACHING

Faculty members who engage in research improve as teachers and mentors because they are able to speak directly from experience and are able to better understand the research of others who do similar work in their disciplines. Incorporating faculty research into teaching is important in strengthening Philippine-based instructional curricula and syllabi in that it provides contextually relevant work.

When teaching assignments do not fully match their research areas, faculty members are encouraged to cite and discuss works done by other UP researchers in areas that are relevant to the classes they are teaching. This can be planned and coordinated at the level of the college or department in crafting and revising syllabi for courses that are core to the program and are taught by different faculty members. Instructional materials and learning aids

(e.g., slideshows, exercises and readings) can be developed using instructional grants and awards available from the System offices and constituent units. The University provides archiving and hosting services so that materials can be readily made available to the UP community at large.

4.3

PARTICIPATING IN RESEARCH SYMPOSIA AND LECTURE SERIES, PRESENTING AT CONFERENCES, AND NETWORKING

A research work that is still in progress benefits from dissemination and discussion in small group settings such as seminars. On the other hand, completed research that is ready for peer review and technical comment is disseminated through larger venues like lectures, conference presentations, and invited talks from other academic institutions. Colleagues who work in the same area of research and thus are able to comment on the substance and technical quality of the work attend these gatherings.

While not always the case, researchers present their research at conferences, solicit comments from colleagues at the presentation or during the review process, and revise their papers before submitting to journals for publication consideration. Conferences and other invited talks where the audience is in the same area or discipline are venues to gather suggestions for improving the paper, thereby increasing the chances of journal publication. It is also in these conferences that professional networks are built and maintained. These networks are important for many reasons: being updated on developments in the field of research you are working in, finding collaborators who can help generate greater productivity, being visible to the larger academic community, and sowing the seeds of future collaboration, among others.

The University supports the dissemination of research through conferences and other similar gatherings by providing travel grants so that faculty members can present their work at critical conferences in other countries. Grants are available in different amounts from campuses and colleges; multiple grants can be obtained to cover the cost of travel, particularly to international destinations.

4.4

SUBMITTING PAPERS FOR PUBLICATION

Academic basic and applied research is usually destined for publication in academic outlets such as journals, book chapters and whole books. UP supports the publication of research in peer-reviewed journals and books through a system of awards and grants for contributions of its faculty to the larger body of knowledge in their fields. New faculty members who join the tenure-track ranks of the University are enjoined to plan for a career that includes productive research and publication of work in academic peer-reviewed publications. The granting of tenure is based on the potential for future research productivity. Tenured faculty are enjoined to publish throughout their career.

JOURNALS LISTED IN ISI AND SCOPUS

UP places more value on research published in ISI- and SCOPUS-listed journals, especially those that are considered top journals. It also encourages publication of books and book chapters from reputable academic presses outside of the Philippines. This is reflected in the incentive systems in place throughout the university system for tenure, promotion and grants.

The global reach of the University's research based on the reputation of its faculty is determined in large part by the regular presence of its publications in journals that enjoy a wide international readership and that have been cited by many in their fields. ISI- and SCOPUS-listed journals are some of the most widely read and highly respected journals in their disciplines. The premium placed on international publications is based on the rationale that published work has greater impact if it appears in widely read journals. Papers that appear in listed journals are reviewed by leading scholars, whose endorsement is a mark of the papers' quality and importance.

UNIVERSITY AND NATIONAL JOURNALS

Publishing in national journals is likewise encouraged and recognized in the incentive systems of the University. National journals have a hierarchy such that some journals tend to enjoy wider readership because the papers that appear in them are of higher quality. CHED and some UP constituent units have started listing national journals by using much the same criteria as ISI and SCOPUS to assess quality.

Word of caution

Faculty members and researchers are advised to exercise due diligence when accepting invitations to publish in journals, to serve on editorial boards or to participate in conferences, in order to avoid predatory journals, publishers and conference organizers and to prevent their proliferation and perpetration.

Wikipedia defines predatory open access publishing as "an exploitative open-access publishing business model that involves charging publication fees to authors without providing the editorial and publishing services associated with legitimate journals, whether open access or not."

Faculty members and researchers should always check the legitimacy of the journals to which they intend to send the results of their research work. The master lists of ISI- and Scopus-listed journals may be accessed through these links:

Thomson Reuters journals: <http://ip-science.thomsonreuters.com/mjl/>

Scopus-listed journals: <http://www.elsevier.com/solutions/scopus/content>

THE AUTHOR

Dr. Clarissa David is a professor at the UP Diliman College of Mass Communication where she teaches graduate and undergraduate level classes in quantitative research methods, communication theory, public opinion and political communication. She received her MA and PhD in Communication from the Annenberg School of Communication at the University of Pennsylvania.

CHAPTER

5

RESEARCH ETHICS

Elmer Estacio, PhD
Renato B. Manaloto, LIB, MA

Researchers of the University must value and strive for excellence in their respective fields. They must also give equal value to duties such as guarding the reputation of science and abiding by ethical standards pertaining to research.

Ethics refers to the study of what is the right and wrong in behavior. Ethics also refers to an insight or a set of principles that guides a person to act rightly.

It is important to apply ethics in research so that a researcher can be guided in deciding what to do when faced with a moral problem at work or while carrying out research. Furthermore, research ethics reinforces what the University wishes to impart to its students, members, researches and employees, namely, honor, integrity and excellence. Research ethics sets out values and responsibilities, helps fortify the identity of the university, nurtures collegiality in the university and inspires trust from the public.

5.1 TYPES OF RESEARCH

There are two types of research according to the subjects involved.

RESEARCH INVOLVING NON-HUMANS

Research in the theoretical sciences like pure physics or mathematics does not involve human subjects since it deals with abstract features or strives to articulate general laws. While it does not involve humans, the knowledge it generates affects humans. Research involving animals such as in biomedical or behavioral research is included in this type.

RESEARCH INVOLVING HUMANS

This kind of research involves interaction with humans. Using data from humans, it may provide reliable conclusions. It includes activities that indirectly involve humans like their remains or documents or their participation in surveys, interviews or focus group discussions.

5.2 ETHICS FOR RESEARCH

Research is an ethical activity since it involves life, individuals and societies. It refers to the moral dimensions of the conduct of research.

RESEARCHERS AS PROFESSIONAL

In the beginning when there were no specific codes of ethics, rules or regulations governing the conduct of research, researchers rarely considered research an ethical activity.

To achieve their goals, researchers would rely on their knowledge and practical abilities through which they could demonstrate "character traits" or dispositions to do good.

At times, researchers were expected to carry out policies, principles or guidelines, which their institutions adopted in conducting research. Other times, they relied on professional ethical codes, which were standards and principles set by members of the specific professions to which they belong.

But character traits or dispositions to do well could not be found even from just among many researchers. Professionalism, as dictated by the codes of the specific professions or disciplines researchers belong to, led to paternalism. While the ethical codes guided the practice of professions, they could serve only as general guidelines. Thus, when applied to research, these professional codes were found insufficient. The guidelines and policies of the research institutions were not any more helpful than their articulation of the motives of these institutions, which usually collided or competed with the goals of research.

Researchers and ethical issues

Researchers may be influenced by manifold interests as to why and how they should conduct research. These issues require value judgments that cannot be derived from the science of research.

Ambition

Some researchers do research to pursue scholarly interests. They want to make brilliant discoveries in or original contributions to their field. Some do research to advance their career or raise their prestige.

Publication

Some researchers are influenced by their particular interests in publication. They rush into research projects due to pressure to publish.

Tenure

In some cases, researchers are motivated to conduct research to obtain a permanent or tenured academic or company position.

Economic or financial interests

Some researchers may find their work within public accountability. However, when research depends on funding from the private sector, the obligations to the public are affected. Research tends to suffer when researchers "serve as consultants to private companies whose products they are studying, join advisory boards, become resource speakers, enter into patent and royalty arrangements and agree to be the listed authors of articles ghost written by private companies."

RESEARCHERS AS ETHICAL

Researchers are expected not only to excel in the scientific method but also in the ethical conduct of research. That is, their understanding of the ethical concerns in research and being able to meet them are as important as performing the research.

Research integrity

In return for the privilege and trust given to them, researchers should be required to inculcate in themselves integrity that involves "a relentless clarity about themselves" and their activity.

Truth

Researchers should be concerned with the pursuit of truth, either objectively observable or socially constructed. They should commit to do their best to arrive at the truth by avoiding, among other things, fabricating, falsifying or misrepresenting data.

Reproducibility

Researchers are expected to perform the same research many times before they are satisfied with the results.

Accuracy

Without accuracy, research is rendered unreliable. Such research can significantly harm not only human or animal subjects, but also the public in general.

Animal care and welfare

Researchers are expected to observe animal care and welfare and ensure that animals are used only when necessary.

Protection of human subjects

Researchers have the responsibility to protect the individuals who participate in research and to secure their rights and interests.

Autonomy, beneficence and justice

Researchers should protect the privacy of human subjects and keep the confidentiality of their information. They must comply with existing and applicable intellectual property policies and laws. They must give credit to the contribution of everyone involved in the research.

Responsible authorship and publication

If researchers have conflicts of interest, they must explain, acknowledge or disclose these in their publications. They should avoid falsifying, fabricating, misrepresenting and plagiarizing data.

Public trust and accountability

Researchers must not breach the specific trust held in them by all other research stakeholders including the public. Their commitments to research integrity, the protection of human subjects, and the promotion of animal care and welfare must always underlie their actions and decisions.

5.3

RESEARCH MISCONDUCT

Research misconduct is defined as “the violation of the standard codes of scholarly conduct and ethical behavior in professional scientific research”. It has three elements:

1. Fabrication – making up data or results
2. Falsification – manipulating research materials, equipment or processes or changing or omitting data or results such that the research is not accurately represented in the research record
3. Plagiarism – the appropriation of another person’s ideas, processes, results or words without giving appropriate credit or without proper permission.

The definition can also extend to include particular acts or instances as described in the following section.

ACTS THAT QUALIFY AS RESEARCH MISCONDUCT

Instances of misconduct by the researcher

- a) Failure to appropriately confer authorship in scientific publications
- b) Ghostwriting or the case where someone makes a substantial contribution to the research and is neither given the credit nor mentioned in the publication
- c) Apportioning credit in a publication on those that have not made significant contributions to the research
- d) Engaging human subjects in an experiment without their informed consent to the said experiment
- e) Violation of existing animal rights as stipulated in Republic Act No. 8485
- f) Withholding from publication of significant results because they are against personal or funder’s interests

- g) Falsification and fabrication of data
- h) Failure to report misconduct
- i) Copying a work word for word, in whole or in part, without permission and acknowledgment of the original source
- j) Plagiarism

Note: The mentor should always advise the researcher against any unethical action.

Instances of misconduct by the reviewer

- a) Abuse of confidentiality in peer review
- b) Biased, competitive and harmful actions during the review process
- c) Abuse of position by discussing the paper with the author
- d) Accepting an invitation to review a paper with the intention to advance one's interest, i.e., preventing a similar work to be published before one's own
- e) Delaying the review process to advantage oneself.

PRACTICES THAT ARE DISCOURAGED IN UP

The following are some practices that, although generally not illegal, are discouraged to maintain harmony within the UP community.

- a) Leaving a research group to join a different research supervisor or group without first officially and clearly severing ties with the former group. If under a contract, the researcher is accountable to the terms of the contract.
- b) Unethical recruitment practices by the research supervisor (e.g., the use of blackmail) as recruitment leverage
- c) Abuse of confidentiality in peer review. This is of special concern since the UP scientific community is very small and research proposals or technical manuscripts submitted for peer review do not circulate far.

5.4

COMPLAINTS OR ISSUES THAT MIGHT INVOLVE RESEARCH MISCONDUCT

When a member of the University becomes aware of an act of misconduct, the person has the responsibility to report alleged misconduct to any member of the investigative committee for research misconduct. (Please refer to the student manual regarding the investigation process on allegations of research misconduct.)

In case of alleged misconduct in published results, the investigative body may contact the publisher to inform it of the matter and of the results of the investigation.

The investigative committee and the procedure shall protect both the complainant and the accused until a decision is made. The information shall be shared only with relevant parties.

No complainant shall publish or discuss publicly allegations and complaints against any researcher concerning his or her research misconduct.

After a final decision is made, the investigative committee has the prerogative to report to the public their work in dealing with the research misconduct.

5.5 STRENGTHENING ETHICAL RESEARCH IN UP

In order to excel in research, UP should establish a culture of excellence not only in the science of research but also its ethics. It behooves UP to adopt a systems approach based on international and local guidelines, rules, and best practices. This approach should observe and promote research integrity, human subject's protection and animal subject's welfare. To achieve/accomplish this goal, UP must take the following measures:

1. Regular ethics training

Researchers should be given educational programs that foster awareness of proper research conduct. The programs shall integrate ethics into the entire research process: selecting research problems designing research, gathering, documenting, analyzing data and publishing results.

Research integrity should be emphasized. Values like truthfulness and authenticity in all stages of research, equal distribution of burdens and benefits, recognition of the contribution of others (assistants, colleagues and co-researchers), fairness in data sharing and proper authorship and publication should be promoted.

2. Ethically sound research

Researchers must be provided with knowledge necessary to carry out their obligations to conduct a sound research. They should be trained to adhere to a research framework consistent with both science and ethics. For instance, the EIDR program requires all proponents to fill out a section in the capsule/full proposal regarding permits (Fig. 1).

Certifications required
<input type="checkbox"/> Ethics review for use of human samples, animal testing, etc.
<input type="checkbox"/> Permits for bioprospecting activities and sample collection
<input type="checkbox"/> Institutional biosafety certificates, PNRI certificates, etc.
<input type="checkbox"/> Others: _____

Figure 1. Section in the EIDR form that lists down the certifications that had to be attached to the proposal

3. Safety monitoring throughout the conduct of research

A safety monitoring system should be in place to ensure that research is conducted scientifically and ethically, and deviations from research may be minimized.

4. Responsible authorship and publication

Researchers should avoid falsifying, fabricating and misrepresenting data. They should also prevent suppressing negative research results.

5. Quality improvement and compliance

Existing guidelines, standards and requirements should always be observed to assure quality

research.

6. Mindfulness of the relations and dynamics among various stakeholders

There should be a system that creates profound awareness of the specific functions of the various stakeholders in research and the relations and dynamics among them.

RESEARCH SUBJECTS

In any research, the protection of both human and non-human subjects should be the paramount consideration. The rights, interests, and welfare of human subjects should be promoted. The welfare of animal subjects must be considered. There should be a pain management system that complies with international and local guidelines or regulations for research involving the use of animals.

SPONSORS

They share the responsibility of ensuring that those employed in the research have the necessary knowledge and skills. It must ensure that commercial profit is not the primary motivation in initiating and funding research.

RESEARCH ETHICS COMMITTEE

It is responsible for ensuring the protection of rights and the safety and well-being of human and animal subjects. They must make certain that the research complies with scientific as well as ethical requirements.

EDITORS AND PUBLISHERS

The introduction of new knowledge, technology, theory or method by reporting and publishing research findings may affect public safety and health. Thus, findings must be intensely scrutinized before they are published.

Editors and publishers are obligated to observe and promote systematic and rigorous ethical standards in writing, submitting to a journal, peer reviewing and publishing research findings. They must see to it that findings comply with scientific and ethical requirements: research involving humans or animals have obtained clearance from ethics committees; the privacy of human subjects and confidentiality of their information are observed; and all those who contributed to the conduct and writing of research are acknowledged.

REGULATORY AGENCIES

They are responsible for overseeing research not only during but also after the study has been conducted. They are also responsible for determining whether data and research design match. This is essential for evaluation as well as for the approval of outputs (e.g., biological devices, technological gadgets and treatment methods). They are responsible for determining as well the safety of the products to be introduced to the public.

5.7 BENEFITS OF ETHICAL RESEARCH

It is in the best interests of UP as a research institution and its individual researchers to actively conduct and promote ethical research. Other than protecting subjects and promoting their welfare, ethical research also has other benefits.

1. Research goals are promoted such as knowledge, truth and accuracy. Fabricating, falsifying or misrepresenting data can be avoided. Thus, the health and safety of the research subjects and the general public may be assured.
2. Collaboration among researchers is encouraged. Values such as accountability, mutual respect, trust and fairness are observed. Proper authorship, copyright and patenting policies and confidentiality rules encourage collaboration.
3. Other values are promoted such as social responsibility, respect for human rights, compliance with law, and safety awareness.
4. Public accountability of research is ensured. Conflict of interest, exploitation of human subjects, misuse of animals, disregard of animal care and welfare and other forms of misconduct may be prevented.
5. Public participation and support for research is built. When the ground rules for ethical research are in place, the public will be encouraged to participate in the research process by enlisting themselves as subjects, being advocates for subjects or even funding the research.

THE AUTHORS

Dr. Elmer Estacio received his BS, MS and PhD in Physics at the National Institute of Physics, University of the Philippines Diliman. He joined Osaka University as a postdoctoral fellow in 2005 before transferring to the University of Fukui as an assistant professor in 2010. In 2012, he returned to UP Diliman under the DOST Balik Scientist Program and the Balik UP PhD Grant. Dr. Estacio has since spearheaded a modest terahertz photonics laboratory at the NIP, UP Diliman.

Atty. Renato Manaloto obtained his BA and MA in Philosophy and his LL.B from the University of the Philippines in Diliman. He was an International Fellow in Bioethics and Research Ethics Administration, a program implemented jointly by the Western International Review Board, the World Health Organization and the University of Washington. An assistant professor of philosophy in UP Diliman, he specializes in ethics especially in health research.

REFERENCES

S.J. Grenz, D. Guretzki, C.F. Nordling, *Pocket Dictionary of Theological Terms*, InterVarsity Press, (1999)

P. Strahlendorf, "Professional Ethics," in the Proceedings of the 2004 ASSE Professional Development Conference, American Society of Safety Engineers (2004)

On being a scientist: a guide to responsible conduct in research, 3rd ed./Committee on Science, Engineering, and Public Policy (National Academics Press, U. S. A. 2009)

Wikipedia. *Scientific Misconduct*. Available at http://en.wikipedia.org/wiki/Scientific_misconduct

Committee on Publication Ethics. Guide. Available at <http://publicationethics.org/about/guide/authors>

Douglas Barnett and Fred M. Heath, eds., *The Research Library in the 21st Century* (New York: Routledge, 2010), 66–86

J. H. Byeon, "A systems approach to entropy change in political systems" *Systems Research and Behavioral Science*, 22 (May/June 2005): 223–231

Rescher Nicholas, *Complexity: A Philosophical Overview (Science and Technology Studies)* (New Jersey: Transaction Publishers, 1998), 219

Robyn M. Gillies, ed., *Pedagogy: New Developments in the Learning Sciences (Education in a Competitive and Globalizing World) (Information Technology (Starting Science))* (Nova Science Pub Inc., 2012)

D. Smith, "The changing idea of a university," in *The Idea of a University*, eds. D. Smith and A. K. Langslow, 148–174 (London: Jessica Kingsley, 1999)

Paul Temple, ed., *Universities in the Knowledge Economy: Higher education organisation and global change* (London: Routledge, 2011)

Judith Sutz, "The role of universities in knowledge production," *SciDev Net*, April 1, 2005, <http://www.scidev.net/en/policy-briefs/the-role-of-universities-in-knowl> (Accessed 6/20/2013)

Roger Geiger, *Knowledge and Money: Research Universities and the Paradox of the Marketplace* (USA: Stanford University Press, 2004)

Christine Grady, "Ethical Principles in Clinical Research," in *Principles and Practice of Clinical Research. Second Edition*, eds., John I. Gallin and Frederick P. Ognibene, 15–16 (USA: Elsevier Inc., 2007)

Part A, *Ethical Principles and Guidelines for the Protection of Human Subjects of Research*, also known as "Belmont Report," April 18, 1979

T. Lewens, "Distinguishing treatment from research: a functional Approach," *J Med Ethics* 32 (2006):424–429. doi: 10.1136/jme.2005.013078

Dennis Patterson, "Recent and Future Concepts of Law: From Conceptual Analysis to a Practice Theory of Law," in *On Philosophy in American Law*, ed., Francis J. Mootz III, 230 (England: Cambridge University Press, 2011)

E.L. Erde, " Professionalism vs. medical ethics in the current era: A battle of giants?" in *The Development of Bioethics in the United States*, eds., J.R. Garrett, F. Jotterand, and D.C. Ralston, 179–206 (Dordrecht: Springer, 2013), 185

Analysis to a Practice Theory of Law," in *On Philosophy in American Law*, ed., Francis J. Mootz III, 230 (England: Cambridge University Press, 2011)

Rebecca L. Walker & Philip J. Ivanhoe, *Working Virtue: Virtue Ethics and Contemporary Moral Problems* (Oxford: Oxford Univ. Press, 2007)

Laurence B. McCullough, "The Role of an Ideology of Anti-Paternalism in the Development of American Bioethics", in the *Development of Bioethics in the United States* (Philosophy and Medicine 115), eds., Jeremy R. Garrett, Fabrice Jotter and D. Christopher Ralston , 207–19, (Springer, 2013)

Carl Elliott, "Making a Killing--Marketing Exercises", Alliance for Human Research Protection, <http://www.ahrp.org/cms/content/view/720/70/> (Accessed 08/08/13)

Leon R. Kass, "The New Biology: What Price Relieving Ma's Estate? *Science* 174 (1971) :779–790

Judith Swazey, Melissa Anderson, and Karen Louis, "Ethical Problems in Academic Research," *American Scientist*, November–December 1993.

A. Brew, *The nature of research: Inquiry in academic contexts* (London: Routledge Falmer, 2001).

M. Angell, 'Is Academic Medicine for Sale?' *New England Journal of Medicine*, 342/20 (2000): 1516–18.

M. Weber, "The academic freedom of the universities," in *Max Weber On Universities: The power of the state and the dignity of the academic calling in Imperial Germany*, ed., E. Shils, 21 (Chicago: University of Chicago Press, 1973)

Bruce Macklane, *Researching with Integrity* (New York: Routledge, 2009)

R .Kolar, "Animal experimentation" *Sci Eng Ethics*.12:1 (2006 Jan):111–22

Wikipedia, the free encyclopedia, "Nazi human experimentation", in http://en.wikipedia.org/wiki/Nazi_experiments (Accessed 08/08/13)

Naomi Baumslag, *Murderous Medicine: Nazi Doctors, Human Experimentation, and Typhus* (Westport: Praeger, 2005)

Wikipedia, the free encyclopedia, "Unit 731," in http://en.wikipedia.org/wiki/Unit_731. (Accessed 7/9/2013)

H. K. Beecher , "Ethics and Clinical Research", *New England Journal of Medicine* 274 (1966): 1354–60

Anne Sayre, *Rosalind Franklin and DNA* (New York: W.W. Norton & Co., 2000)

James Crick, Francis Watson, and Rosalind Franklin," in <http://www.sdsc.edu/ScienceWomen/franklin.html> (Accessed 08/08/13)

S. Milgram, *Obedience to authority: An experimental view* (Harpercollins, 1974)

Jerry M. Burger, "Replicating Milgram: Would people still obey today?" *American Psychologist* 64:1 (Jan 2009): 1–11

Philip Zimbardo, *The Lucifer Effect: Understanding How Good People Turn Evil* (Random House Publishing Group, 2007)

Kurt Eichenwald and Gina Kolata , "A Doctor's Drug Studies Turn Into Fraud" *Science. The New York Times On The Web*, May 17, 1999, archives,<http://partners.nytimes.com/library/national/science/health/051799drug-tri>. (Accessed 7/9/2013)

Sheryl Gay Stolberg, "The Biotech Death of Jesse Gelsinger," *The New York Times*, November 28, 1999

Linda A. Johnson, "Scientific fraud found at Bell Labs: Star researcher fired for falsifying data," *Seattlepi*, September 25, 2002, <http://www.seattlepi.com/business/article/Scientific-fraud-found-at-Bell-Labs-1096933.php> (accessed 08/09/13)

Mark Lewis, "Ambrose Problems Date Back To PhD Thesis," *Forbes*, May 10, 2002, <http://www.forbes.com/2002/05/10/0510ambrose.html> (accessed 8/7/2013)

L. Zhang., P. Lopez , T. He, W. Yu, & D.D. Ho, "Retraction of an interpretation (Letter)," *Science* (2004) 303, 417–572

Doug Payne, "Researcher's faked data leads to lifetime ban on US grants" *The Scientist*, April 11, 2005, <http://www.the-scientist.com/?articles.view/articleNo/16382/title/Researcher-s-faked-data-leads-to-lifetime-ban-on-US-grants/> (Accessed 08/09/13)

Wikipedia, the free encyclopedia "Hwang Woo-suk," in https://en.wikipedia.org/wiki/Hwang_Woo-suk (Accessed 7/11/2013)

Michael A. Budkie, "An Audit of the 2005 National Institutes of Health Funding of Animal Experimentation: Articles Concerning World Laboratory Anima Liberation Week," <http://www.all-creatures.org/wlalw/articles-rep-anex2006-sum.html>7/6/2013 (Accessed 08/08/13)

T.B. Schnaider, "Ethics and Research," *Acta Cir Bras* 23:1 (2008 Jan-Feb):107–11. <http://www.ncbi.nlm.nih.gov/pubmed/18278401> (Accessed 7/11/2013)

"Trials of War Criminals before the Nuremberg Military Tribunals," *Control Council Law 10:2: 181–182* (Washington, D.C.: U.S. Government Printing Office, 1949)

John I. Gallin "A Historical Perspective on Clinical Research," in *Principles and Practice of Clinical Research. Second Edition*, eds., John I. Gallin and Frederick P. Ognibene ,16 (USA: Elsevier Inc., 2007)

H. K. Beecher, "Ethics and Clinical Research", *New England Journal of Medicine* 274 (1966): 1354–60

David Perlman, "Ethics in Clinical Research: A History of Human Subject Protections and Practical Implementation of Ethical Standards ,"*SoCRA SOURCE* (May, 2004) : 37–41

Introduction, International Conference On Harmonisation of Technical Requirements For Registration Of Pharmaceuticals For Human Use Guideline For Good Clinical Practice E6(R1)

National Ethical Guidelines for Health Research 2011. Philippine National Health Research System. Prepared by the Philippine Health Research Ethics Board Ad Hoc Committee for the Revision of the Ethical Guidelines

International Guiding Principles for Biomedical Research Involving Animals (1985)

A Newman and R Jones," Authorship of research papers: ethical and professional issues for short-term researchers" *J Med Ethics* 32 (2006)::420–423. doi: 10.1136/jme.2005.012757

Guidelines for Ethical Conduct in the Care and Use of Nonhuman Animals in Research," *American Psychological Association*.<http://www.apa.org/science/leadership/care.guidelines.aspx>

Australian Anthropological Society Code of Ethics. Available at http://www.aas.asn.au/docs/AAS_Code_of_Ethics.pdf

Kenneth A. Strike, Melissa S. Anderson, Randall Curren, Tyll van Geel, Ivor Pritchard, and Emily Robertson, *Ethical Standards of the American Educational Research Association: Cases and Commentary* (Rowman & Littlefield, 2002)

"Developing anthropological ethics in the ASA." Available at <http://www.theasa.org/ethics/position.shtml>

Ethical Guidelines to Publication of Chemical Research. Available at <http://pubs.acs.org/page/policy/ethics/index.htm>

Code of Ethics, The American Society for Clinical Laboratory Science. Available at <http://www.ascls.org/about-us/code-of-ethics>

Code of Ethics of the American Anthropological Association (approved February 2009)

Code of Ethics (Adopted May 2009). *International Association for Dental Research* (IADR) Available at <http://www.iadr.com/i4a/pages/index.cfm?pageid=3870> (Accessed 08/09/13)

Association of Social Anthropologists of the UK and the Commonwealth (ASA) Ethical Guidelines for good research . Available at [practicehttp://www.theasa.org/downloads/](http://www.theasa.org/downloads/)

Chris Graf, Elizabeth Wager, Alyson Bowman, Suzan Fiack, Diane Scott-Lichter, & Andrew Robinson, "Best Practice Guidelines on Publication Ethics," *International Journal of Clinical Practice*, 61: Suppl. 152 (2007): 1–26

C. Radzikowski, "Protection of animal research subjects," *Sci Eng Ethics* 12:1 (2006 Jan) :103–10.

Daniel M. Albert, Thomas J. Liesegang, & Andrew P. Schachat, "Meeting our Ethical Obligations in Medical Publishing: Responsibilities of Editors, Authors, and Readers," *Arch Ophthalmol* 123:5 (2005):684–686. doi:10.1001/archophth.123.5.684

David B. Resnik, "What is Ethics in Research & Why is it important?" *National Institute of Environmental Health Sciences*, May 1, 2011, <http://www.niehs.nih.gov/research/resources/bioethics/whatis> . Lifted from A. Shamoo and D. Resnik, *Responsible Conduct of Research*, 2nd ed. (New York: Oxford University Press, 2009)

Judith B. Gordon, Robert J. Levine, Carolyn M. Mazure, Philip E. Rubin, Barry R. Schaller, John L. Young, "Social Contexts Influence Ethical Considerations of Research" *AM J BIOETH* 11:5 (2011): 24–30

ESSAY

**PUBLISH, DON'T PERISH:
ON RESEARCH AND PUBLICATION**

José Florencio F. Lapeña, Jr., MD

"RESEARCH, NO MATTER HOW 'GOOD', IS INCOMPLETE, UNTIL IT HAS BEEN PUBLISHED."²

In my opinion, writing a paper "that will show research is alive and well in UP," and that will "suggest how best it can be developed so UP research becomes internationally competitive" is barking up the wrong tree. I do not mean to downplay the importance of developing a "research culture" and moving UP "toward excellence in research." Our beloved UP has more than its fair share of research opportunities and researchers in various disciplines, arts and sciences. However, "the proof of the pudding is (indeed) in the eating," and universities and research institutions are recognized not so much for what goes on within the hallowed halls of academia, but for what are made public outside those walls. Indeed, "publishing" means to make something public.³ And though we may not lack in research, we certainly lag in publication.

I would therefore not be amiss in rephrasing my essay to address the need for UP and its constituents to publish, in electronic or hard copy, in print or other media, including the social media. Because of the disciplines I represent, much of my reflections will deal with writing – but by no means do I mean to limit publication to that of the written word. Why write and publish?

"START WHERE YOU ARE: TAKING YOUR PLACE IN THE HISTORY OF SCHOLARSHIP"²

"Similar to others who write (historians and poets), scientists and those involved in research need to write...to leave behind a documented legacy of their accomplishments."² Whatever we

discover or unearth in the laboratory, clinic or in the field; whether from samples, specimens, subjects, patients or participants; utilizing theoretical or applied instruments, materials and methods; simply “did not happen” unless it is documented and disseminated. In Filipino, “*kung hindi nakasulat, hindi nangyari.*” How often do we hear comments like “*naisip ko na iyan*” or “*na-presenta ko na iyan*” or even “*sinulat ko na iyan*” at a scientific meeting when a speaker presents a study. The sad fact of the matter is that many of these colleagues may indeed have had similar thoughts, or delivered previous oral presentations, or even written reports. But because none of these had been properly published, they remain inaccessible to subsequent scholars, and are therefore neither cited nor acknowledged.

“While ‘doing’ the research is important, ‘writing’ about why and how it was done, what was found, and what it means is far more important as it serves as a permanent record of scientific work that has been completed and accepted by peers.”² And writing and publishing are an entirely different ballgame from researching alone. Publication, or “making ideas public,” allows “scholars (to) provide each other with the opportunity to build on each other’s contributions, create dialogue (sometimes heated) with one another and join the documented and ongoing history of their field.”³ It is by participating in this “documented and ongoing history” of whatever field we may be in, that we and our university gain international recognition and become internationally competitive.

Taking your place in the history of scholarship starts where you are, as an author. Publication involves communication between the author and his or her audience via the written article.⁴ Unlike public speakers or performing artists who establish rapport and gain real-time audience feedback, the author’s interaction with the audience is limited by the written and published work. Hence, “a successful researcher is usually a good communicator who has the ability to maximize the transmission of research findings to his or her chosen audience.”²

Beginning with a foray into poetry and essay writing contests in elementary school, I got hooked on research with my first term paper on Aleksandr Solzhenitsyn. I penciled notes on index cards using the card catalogue, periodicals index and vertical file, and wrote all my term papers and theses with an old Remington portable typewriter with carbon paper and onion skin copies, using the Campbell and Turabian referencing styles. Coping with superscripts and footnotes then was an adventure in itself, and after the initial challenges of unsaved WordStar documents in the power-outage prone early days of personal computers in the Philippines, writing today has become a breeze. I am fascinated no end with today’s technology, much of which I not even pretend to understand – for instance, how do wireless signals avoid getting “tangled” in cyberspace? Be that as it may, my subsequent journey bears testimony to the many advantages of writing and publication.

SETTING THE STAGE: ADVANTAGES OF WRITING AND PUBLICATION

A few may write “for the pleasure derived from the creative activity of writing and intellectual sharing, and the desire to advance knowledge and benefit mankind” and for these individuals, “writing may act as a channel for expressing the joy of scientific discovery, and may even be regarded as a leisurely pursuit.”² An historical article on Jose Rizal⁵ that I researched for a year and a half before the occasion of his 150th anniversary and a review article on the evolution of indirect laryngoscopy⁶ that I researched for two years are personal examples of these. I am a staunch advocate of case reports, despite their disfavor with most journals that pursue impact factors. Indeed, medical writing began when physicians and surgeons would share experiences of treatment successes and failures with other healers, in order for them to adapt or avoid the therapy. A large part of scholarly medical writing today – from the single case report to the randomized controlled trial and systematic review – continues this altruistic tradition, and

bestows inherent advantages, not the least of which is achieving real impact (and not just impact factor). But there are also career, professional, institutional and practical advantages that can be gained from writing and publication.⁷

As far as career benefits are concerned, "getting published in prestigious, scholarly journals may have the most direct bearing on your appointment, promotion, tenure and advancement within your institution, organization and discipline."³ The "up or out" situation faced by many young to mid-career academics would have been easily avoided by publishing early. Moreover, publications are the primary basis for promotion and advancement in the academe. In this regard, the spate of predatory journals and publishers that prey on novice authors capitalizes on this need, and it is important to know what and where to publish.

Professional benefits are just as important. For graduate and postgraduate students and younger faculty, "having published articles in reputable international journals are a great help when applying for positions in foreign institutions, and when applying for competitive overseas fellowships."² As the editor of a specialty scholarly journal, I receive numerous urgent requests from postgraduate residents and young diplomats (unaware of the long editing and peer review process) to publish research they undertook in training, in fulfillment of publication requirements for overseas positions or fellowships for which they are applying. Had they realized this earlier, they would have been much better prepared. For more established faculty members, "gaining recognition as experts in a particular field at regional and international levels leads to invitations to lecture at scientific meetings and refresher courses, and appointments as consultants to external agencies, expert panels and advisory boards, reviewer and editorial boards."² Much of my local and international travels are direct offshoots of previous research works, lectures and publications. These generate further research and publication opportunities in turn, as track records in research and publication are considered in "applications for, extension of, and further research funding."² Closer to home, publication "increases (the) depth of knowledge in a particular subject that complements and hones clinical (practical) skills, and enables better teaching of students, clinical trainees and postgraduates."² Indeed, a true professor must have something to profess, and a well-published professor can certainly profess what he or she does more authoritatively.

Because of institutional benefits, it is in the best interests of the university to encourage scholarly writing, as "publication in peer-reviewed journals is arguably the most important means to achieve international recognition for an individual, department, hospital, and university."² Various international survey and ranking systems place a premium on such publications, explaining why Philippine academic institutions lag behind their counterparts in Asia and the rest of the world. It is also in the best interests of the Philippines that its scientists, artists and scholars publish, as "the author's country, and even the region, may also derive benefit from published work, particularly if it is on a topic of major importance."² At least in the medical field, Filipino publications have made their mark, albeit sparsely. Our UP College of Medicine and National Health Sciences journal *Acta Medica Philippina* is the source of material indelibly inscribed in the world medical map, and we eagerly anticipate its re-indexing in MEDLINE and future inclusion in Current Contents.

The scientific and artistic productivity systems of the University are a step in the right direction, but if the system is to inspire others to follow their footsteps, UP Scientists and Artists should not simply be recognized in private ceremonies every three years or so. Together with university professors and professors emeriti, UP Scientists and Artists should be accorded due public recognition at official academic functions such as commencement exercises, if but for the recognition they reciprocally bring to the university. For instance, the parallel award of "University Fellow" at De La Salle University includes a distinctive academic garb and positions of honor in their academic functions, in addition to other incentives. The

scientific and artistic productivity systems should be utilized to *inform* others of what has *transpired*, in order to *inspire* them to *transform* others in turn.

Of course, the practical benefits gained from engaging in the research and publication process cannot be overlooked. The “inherent training gained during the process of manuscript preparation,” the “discipline of performing a thorough literature search, collating and analyzing data and drafting and repeatedly revising the manuscript”² during the editing and review process, provide undeniable practical benefits to the author. Researchers who have published are much better positioned to evaluate scholarly publications, having themselves experienced the writing, editing and review process. In this era of “information overload,” the published researcher can more effectively evaluate and utilize available evidence, and this translates to better teaching and service. The published researcher can also “pay it forward,” by reviewing, and eventually editing other papers for publication. Institutional technical and ethical review boards would be more effective, empowering and supportive if they were composed of published researchers.

STEPPING IN THE SCHOLARLY STREAM: PREPARING AND SUBMITTING THE MANUSCRIPT

A good manuscript “is potentially publishable, able to communicate a clear and useful message to the readers of a particular journal, and should also be exciting and have an impact on (clinical) practice.”⁸ It is not magically conjured out of the research process. Producing a bad manuscript will only delay or prevent the publication of what may otherwise have been good scientific material. Preparing a manuscript for submission involves organizing the material into an appropriate scientific format, writing clearly, concisely and simply, and knowing where and how to submit the manuscript.⁸

The usual scientific format for original articles can be remembered by the acronym IMRAD, which stands for Introduction, Methods, Results and Discussion. The details of what constitutes each of these may have minor variations among journals, and are best learned by reading scholarly literature. Moreover, different types of scientific articles have different formats, and it is important to write an article according to the accepted format for its article type.⁹ Indeed, “if you want to write well, read good writing.”⁴ It also helps to participate in writing workshops to hone writing and manuscript preparation skills. Such workshops are regularly conducted by the Philippine Council for Health Research and Development of the Department of Science and Technology in cooperation with the Philippine Association of Medical Journal Editors Asia-Pacific Association of Medical Journal Editors. The latter also conducts medical writing and review workshops in the Asia-Pacific region. To date, we have held local workshops in Cebu, Davao, Baguio, Bacolod, Iloilo, Laoag, Tagaytay, Cagayan de Oro, General Santos, Pasay and Manila, and international workshops in Singapore, Malaysia, Thailand, Brunei, Vietnam, Cambodia, Mongolia, Nepal, India, Korea and Japan for medical doctors, nurses, health professionals and other health science researchers. We are happy to organize writing and review workshops for interested parties, and have done so for various institutions, learned societies and government agencies.

SEEKING INSPIRATION: FIND A MENTOR AND FRIEND

Finally, find a mentor and friend “who can guide you through the tricky waters” of writing and publishing research.³ “Deliberately cultivate professional relationships with people who spark your creativity and intellectual curiosity” while maintaining “peer-to-peer relationships” to “keep you on balance, work out ideas, and provide

mutual support.”³ Starting with your present department, college or institute, and organization(s), network further at meetings, conferences and symposia. It would be helpful if the University institutionalized a Faculty Mentoring Program whereby the junior faculty benefits from being mentored by the senior faculty. Pilot mentoring workshops in UP Manila have resulted in faculty members getting published and obtaining permanency and tenure. Such a program could also be expanded such that the faculty–faculty mentoring relationship in turn links with a faculty–student mentoring process. Such formal and informal mentoring models can be experienced by participating in mentoring workshops similar to those that are regularly conducted for the UP College of Medicine and other colleges and units of UP Manila. We shared this concept to members of the faculty during the 2015 UP Systemwide Academic Leadership Conference in Tagaytay and the subsequent UP Los Baños Academic Leadership Conference in Olongapo.

Such a faculty mentoring program should give reciprocal substance to the academic ranks of the faculty, where professors are encouraged to involve associate and assistant professors and instructors in research, writing and publication, and where instructors, assistant and associate professors are assigned to collaborate with professors. University Artists and Scientists should likewise be tapped to inspire other faculty to produce and publish their output, assuming that faculty members are assigned to work with University Artists and Scientists. Such a support system should prioritize the assignment of research associates and assistants to productive faculty, so that the latter can be freed to pursue its research and publication activities without worrying about finding collaborators and assistants. This, together with streamlined institutional research and review processes (with board members acting as mentors instead of tormentors), may enhance the overall scientific and artistic productivity of the faculty and University.

THE AUTHOR

Dr. Lapeña is a professor of otorhinolaryngology and an attending otolaryngologist, former vice chancellor and University Scientist III. He holds BA Honors (Philosophy and Letters) and MA Social Sciences (Sociology) degrees from De La Salle University and an MD from the University of the Philippines. He is the editor-in-chief of the Philippine Journal of Otolaryngology Head and Neck Surgery; president of the Philippine Association of Medical Journal Editors; president of the Asia Pacific Association of Medical Journal Editors and director-nominee of the World Association of Medical Journal Editors. He sits on the editorial boards of and reviews for 10 international journals.

REFERENCES

1. Another version of this essay had been published: Lapeña JF. Publish, Don't Perish: Research and Publication for Otolaryngologists. *Philipp J Otolaryngol Head Neck Surg* 2014 Jul-Dec; 29(2):4–6. This version is published with permission.
2. Peh WCG, Ng KH. Effective medical writing (Pointers to getting your article published): Why Write? *Singapore Med J* 2008; 49(6):443.

3. Publish, Not Perish: The Art and Craft of Publishing in Scholarly Journals. University of Colorado 2006. Available from <http://www.publishnotperish.org> [cited May 25, 2013].
4. Clearihan L. Writing for Publication. Monash University, Melbourne. Available from: <http://www.phcris.org.au/conference/2005/workshops/clearihan.pdf> [cited May 25, 2013].
5. Lapeña JF. José Protacio Rizal (1861–1896): physician and Philippine national hero. *Medicine in Stamps Series. Singapore Med J.* 2011 Jun; 52(6):390–393.
6. Lapeña JF. Mirrors and Reflections: The Evolution of Indirect Laryngoscopy. *Ann Saudi Med* 2013 Mar–Apr; 33(2): 177–181. DOI: 10.5144/0256–4947.2013.177
7. Peh WCG. Scientific writing and publishing: its importance to radiologists. *Biomed Imaging Interv J* 2007;3(3):e55 doi: 10.2349/bij.3.3.e55
8. Peh WCG, Ng KH. Effective medical writing (Pointers to getting your article published): Preparing the Manuscript for Submission. *Singapore Med J* 2009; 50(8): 759–762.
9. Lapeña JF, Peh WCG. "Overview Of The Various Types Of Scientific Articles" in Shoja MM, Tubbs RS, D'Antoni AV, Loukas M (editors), *A Guide to the Scientific Academic Career: Conducting Research and Writing Good Papers*. Hoboken, NJ: John Wiley & Sons. Spring, 2016 (Forthcoming).

CHAPTER

6

GRANTS, AWARDS AND INCENTIVES

Compiled by Francis N.C., PhD

The OVPAA has several funding opportunities for research and faculty development. Listed here are current OVPAA funding programs and incentives that are available to members of the UP System. These programs are divided into three groups. The first group includes grants that are earmarked for funding research and creative work as well as the costs of disseminating and promoting the results of research. The second group is composed of programs that are aimed at strengthening the faculty profile of the University by providing compensation packages for visiting researchers and recruitment packages for new faculty researchers. The last group consists of some awards and incentive programs available to outstanding researchers. More information on these UP System research grants may be found on the OVPAA webpage: <http://ovpaa.up.edu.ph>. In addition to the programs listed here, each constituent university can fund projects that are in line with its own research thrust. The Office of the Vice Chancellor for Academic Affairs, Office of the Vice Chancellor for Research and Development, and the Office of the Vice Chancellor for Research and Extension can provide CU-specific information on funding opportunities available to their researchers.

6.1 RESEARCH AND DEVELOPMENT PROGRAMS

There are currently three OVPAA programs for research and development. These programs are led by the flagship Emerging Interdisciplinary Research (EIDR) Program, which is awarded to promising research groups working across disciplines. The Enhanced Creative Work and

Research Grant (ECWRG) provides additional financial support to faculty and research personnel who do publishable research and quality creative work. The Research Dissemination Grant (RDG) provides support to faculty members who are invited to present their research outputs at international conferences.

Proposals submitted to these programs are subject to external expert review. A primary criteria in the evaluation of proposals is investigator or researcher competence. The track record of the proponent in completing the proposed project or creative work shall be examined by the screening committee of the UP System. Faculty and researchers who have not established themselves in terms of publications, exhibitions, performances or published creative work shall not qualify for the grants.

EMERGING INTERDISCIPLINARY RESEARCH PROGRAM

Approximately P80 million per year from 2012 to 2016 is set aside for the EIDR program (1272nd BOR meeting 25 Aug. 2011). The types of proposals solicited by the EIDR program fall under two categories:

- a) Interdisciplinary research programs for P10M per year
- b) Single or dual project proposals for P2M per year

These projects will be funded for a maximum of four years, in two phases of two years each.

Objectives

The EIDR program aims to:

- a) Enable UP researchers to produce high-quality publications and other academic output quickly and regularly.
- b) Lay the groundwork to establish a research culture in UP through mentoring.
- c) Promote interdisciplinary and intercampus research interaction and activity..
- d) Support the creation of value networks from basic to applied research to produce discoveries and innovations that can be developed and packaged into useful and marketable products and services that contribute to our growth and development as a UP community and as a nation. These developments involve integrated teams of (a) the natural, engineering and computational scientists, (b) business economics, management and development experts, and (c) arts, culture and lifestyle creators.

Eligibility

Eligible proponents and co-proponents must be PhD degree holders (or doctoral level equivalent) who are employed by UP as faculty, research faculty or researchers. They should also declare conflicts of interest.

Research priorities

The interdisciplinary research programs and projects to be funded are for public and private good. They must:

- a) Address pressing problems and provide opportunities for growth and development in UP communities and campuses, and in Philippine society as a whole. Examples are projects that aim for the attainment of the Millennium Development Goals.
- b) Develop unique Philippine resources that represent a competitive advantage regionally or globally.
- c) Have clear technology transfer and commercialization potential that could reap benefits for UP researchers and UP.
- d) Fall under the priorities identified by the Center for Integrative Development Studies.
- e) Foster "One UP" or "inter-CU" cooperation and development.

Research areas

These innovative projects may also generate new fundamental knowledge on natural phenomena and find useful applications that benefit human society and nature in the following general areas:

- a) Health, disease and wellness
- b) Agriculture, aquaculture, livestock, food and nutrition
- c) Environment, climate and energy
- d) Biodiversity, conservation and drug discovery
- e) Genomics, other "-omics" and biotechnology
- f) Information and communication technology, engineering, nanotechnology and instrumentation
- g) Computational modeling, complex systems and systems biology
- h) Culture, history, literature, arts and architecture
- i) Technology-enhanced art and functional design
- j) National identity, global orientation and tourism
- k) Psychology, sociology and economics
- l) Entrepreneurship and business development

Evaluation criteria

Investigator competence (35 percent)

- a) The principal investigator, co-investigators, collaborators and other researchers are qualified to carry out the project.
- b) New or early stage investigators have appropriate experience and training in the field of the proposed study.
- c) The investigators have an ongoing track record of publications and other academic output that have advanced their fields.
- d) For interdisciplinary programs, the investigators have complementary and integrated expertise, and a research leadership, governance and organizational structure appropriate to the program.

Innovation and intellectual merit (20 percent)

- a) New theoretical concepts, approaches, methodologies, instrumentation and interventions are used to challenge and seek a shift in current knowledge and practice.

- b) The overall strategy, methodology and analyses used to accomplish the specific aims of the project are well-reasoned and appropriate.

Significance and broad impact (20 percent)

- a) Basic scientific knowledge, technological concepts and capabilities, management practices, cultural, social, political and economic systems are greatly improved.
- b) Important problems or critical barriers to progress are addressed.
- c) Methods, technologies, services, treatments and practices that drive a field or market segment are changed by completion of the project.

Feasibility of completion in four years (25 percent)

- a) The scientific environment where the work will be performed in general is likely to contribute to the success of the project.
- b) The institutional support, equipment and other physical resources available to the investigators are adequate for the proposed project.
- c) The project will benefit from unique features of the scientific environment, e.g., access to certain natural resources, subject populations and collaborative arrangements.
- d) The project is likely to be completed within the prescribed period.

Strategies and best practices

Some strategies or best practices to establish research culture, improve research output and research-based education are:

- a) Establishing time-bound research process and electronic communications
- b) Soliciting proposals in two stages: capsule concept proposal and full proposal
- c) Undertaking competent external review of proposals and research results with proper nondisclosure agreements
- d) Providing sustained funding support (Phase 1: two years; Phase 2: two years)
- e) Requiring competent research manpower (e.g., proponents, postdoctoral fellows, Balik PhD researchers and professors) with research track records to carry out research and serve as consultants
- f) Providing funds for supplies, repair, maintenance and rental of equipment and fees for analytical services
- g) Encouraging international collaborations and providing opportunities for training and thesis work of MS and PhD students under a sandwich program
- h) Providing research training on proposal and paper writing, and ethics (i.e., research integrity)
- i) Planning and managing research operations efficiently and developing business or feasibility plans
- j) Holding regular research meetings and inviting resource persons and experts to give seminars
- k) Preparing for regular site visits by managers and reviewers
- l) Completing the preliminary data that was made the basis of the proposal and producing results early in the program
- m) Producing quality international peer-reviewed publications, patents and other academic output

- n) Holding regular public symposia to present research grant awards and research results
- o) Preparing popular articles and education materials for general education, and advanced undergraduate and graduate courses from the research results
- p) Seeking external funding and collaboration to augment UP seed funding and expand the research.

ENHANCED CREATIVE WORK AND RESEARCH GRANT

The Enhanced Creative Work and Research Grant (formerly the Creative Work and Research Grant) aims to encourage faculty and REPS to undertake research that will lead to publications, exhibitions, performances of creative work or other significant output such as patents, new software and advanced technologies (1137th BOR meeting 25 Nov. 1999). To ensure the quality of output, work resulting from the grant shall be refereed prior to the full release of the grant.

Eligibility

- a) Regular, full-time faculty members with the rank of assistant professor and higher, and REPS with the rank of University Researcher I and higher, may apply for the grant provided they meet the qualifications.
- b) The track record of applicants in completing creative/research projects (whether UP-funded or not) shall be examined by the screening committees of the CU and the System. Faculty and REPS with poor track record shall not qualify for the grant.
- c) Applicants may apply individually or as a group. In the case of a group, the total amount of the grant shall be prorated according to the rank of the applicants and the proportion of work to be done by each.
- d) In highly exceptional cases, instructors and REPS with the rank lower than University Researcher I may be considered for the grant.

Scope

The grant shall support research or creative projects in any field (basic and applied), such as literary work, scientific research, artistic work, invention, software, and so on, provided the proposed project is within the discipline or field of the applicant. For example, an application to write poetry shall not be entertained if proposed by faculty outside this field.

The grant shall be for one and a half years and, in rare cases, may be extended up to six months at most. The request for extension, however, must be justified, including the submission of work thus far completed. No additional amount shall be provided for the extension.

Contract rate

The contract rates are stipulated below; amounts vary according to the rank as faculty or REPS. Total grant amounts are subject to withholding taxes ranging from 20 to 32 percent depending on the grantee's base salary.

Faculty rank	Grant amount (in peso)
Instructor 4-7	450,000
Assistant Professor 1-7	500,000
Associate Professor 1-7	550,000
Professor 1-6	600,000
Professor 7-12	650,000
REPS rank	Grant amount (in peso)
University Researcher 1	450,000
University Researcher 2-3	500,000
University Researcher 4	550,000

Requirements

- a) Applicants shall submit an application containing their research proposal.
- b) Their project must be one that can be completed in 12 months.
- c) A budget need not be submitted; the applicant may use the contract fee for whatever research purpose he/she deems necessary.

The recommending CU shall ascertain the applicant's track record in completing research and other projects.

Procedure

- a) Applications shall be sent to the CU screening committee for research grants and creative work. The committee shall forward its recommendations to the VPAA who shall refer the recommendations to the System committee.
- b) The System committee shall rank the CU proposals according to their content and contribution to knowledge while taking into account the applicant's credentials and track record. The committee may refer promising proposals back to the proponents for revision.
- c) The VPAA shall review the recommendations of the System committee and send them to the President for appropriate action.
- d) Approval of the recommendations shall come from the UP President and the total number of grants approved will depend on the availability of funds.
- e) The VPAA shall notify successful applicants and advise them to make arrangements with the OVPAA for the contract and release of funds.
- f) The VPAA shall likewise inform proponents whose proposals were not accepted and suggest improvements for future applications.

Release of funds

The grant shall be awarded in the form of a research contract indicating the purpose, expected output, and intellectual property rights of the parties involved. Fifty percent of the grant shall be paid upon signing of the contract, and the balance upon submission of the manuscript or output in acceptable form.

Obligations of grantees

Grantees shall:

- a) Continue to perform their regular functions as faculty or REPS during the grant period. In no case shall the faculty be given overload pay for the research. Should the recipient resign before completing the project, he/she shall automatically lose the grant and return the unused amount.
- b) Submit a midterm report to the chancellor six months after the award commences and the final output (manuscript, invention, artistic work) in acceptable form to the VPAA within two months after the grant ends.

In no case shall the grant be reviewed or an application from the same grantee be entertained for any other grant under the Creative and Research Scholarship Program until the final result is submitted to the VPAA.

Grantees who fail to comply with the terms of the grant and those whose grants are terminated for cause during the project period shall return the full amount received. Payments to the University shall be made in full in case of resignation or retirement, and through salary deductions in other cases. Grantees shall also be subject to other sanctions prescribed by pertinent University rules. Furthermore, they shall be disqualified from all University grants.

Review of output

Grant results shall be reviewed by referees selected by the VPAA. If the referees find the output acceptable, the VPAA shall release the balance of the grant. If the referees suggest substantial revision, however, or raise serious doubts about the quality of the work, the VPAA shall pass on the comments to the grantee and withhold the balance of the grant until the necessary revisions are made.

Intellectual property rights

The UP Press shall have first option on the manuscript should the author wish to publish it. Should the result of the project be published or publicly presented or exhibited, the University shall be acknowledged as the source of the grant. University provisions on intellectual property rights shall likewise be implemented.

RESEARCH DISSEMINATION GRANT

The UP Research Dissemination Grant is awarded to outstanding faculty members who receive invitations or gain acceptance to present their research papers in prestigious international conferences (1275th BOR meeting 24 Nov. 2011). With the grant, faculty members are encouraged to conduct and publicize high-quality research that would make the University more visible in the international research community. Participation in international conferences would also expose our faculty to cutting-edge research and could provide opportunities to forge collaborations with leading researchers in the world.

Call for applications

The call for applications is quarterly. The deadlines for submission of applications are: February 15, May 15, August 15 and November 15 of every year.

Amount of the grant

The amount of the grant is fixed per applicant and based on the location of the international conference: P25,000 for East Asia and Pacific Islands, and P45,000 for North and South America, Europe, Russia, Africa, Middle East and Australia.

Eligibility

The grant is intended as an additional support for all faculty members who will give oral or poster presentations at international conferences. For instructors and assistant professors, the paper for oral or poster presentation should be related to a completed or ongoing research with publishable results. For associate and full professors, the paper for oral or poster presentation should include results recently published in an ISI-listed journal.

Application forms

The application form may be found on the OVPAA webpage at <http://ovpaa.up.edu.ph>. The completed form must include the following as attachments:

- a) Official invitation or acceptance letter from the conference organizers which indicates the title of the invited lecture or accepted paper
- b) Official information about the conference
- c) Abstract of the paper (For associate and full professors, this must include the citation of the ISI-indexed publication to be presented at the conference.)

Applications must be submitted to the following email address: upsystem.rdg@gmail.com.

Notification of grant

Notification of results of the application is three weeks after submission of the complete application documents. Notification of the grant will be sent to the applicant by email. The grant is first come, first serve every quarter. Unused funds remaining at the end of the quarter will be made available in the next quarter.

Disbursement of funds

The award will be formalized with the signing of original documents by OVPAA and the grantee. The grantee is advised to prepare to advance funds for the conference in case the grant from the University is not made available in time for his/her departure (particularly in cases where the conference date is close to the date of grant notification and processing).

Report

The grantee is required to submit a concise report (form available on the OVPAA website) after the conference and include the following:

- a) Write-up about the conference
- b) Photocopy of the cover of the conference book, conference program and abstract of the presented paper
- c) Feedback on paper presented
- d) Future directions of research presented
- e) Potential foreign collaborators
- f) other important contacts and insights
- g) Photos of the conference
- h) Short write-up of one's participation (to feature/publicize the grantee's participation in the conference)

The report should be emailed to upsystem.rdg@gmail.com within one month after the conference, with a copy furnished to the OVCRD or OVCRE of the constituent university.

6.2 FACULTY DEVELOPMENT PROGRAMS

There are currently two OVPAA programs intended for faculty development within the UP System. The Visiting Professor Program supports visiting researchers and scholars to strengthen the external ties of our researchers, while the Balik PhD Recruitment Program is designed to attract young and talented PhD graduates to join the University faculty.

VISITING PROFESSOR PROGRAM

The UP Visiting Professor Program (VPP) was established to increase the number of PhD and MS mentors in UP (1275th BOR meeting 24 Nov. 2011; 1282nd BOR meeting 20 Sep. 2012). The VPP aims to identify Filipinos and foreign nationals outside UP who are recognized experts in their fields of specialization and recruit them to become visiting professors of UP, to collaborate in projects to produce high quality research publications and other innovative and creative output, to mentor and produce PhD and MS graduates in or for UP in the short-to-medium term.

Eligibility

Expert Filipinos and foreign nationals from the following groups are eligible to apply to the VPP:

- a) Currently affiliated with or retired from foreign or leading Philippine universities and other academic institutions
- b) Currently employed or retired expert consultants from foreign and local industries, government agencies and private foundations
- c) Foreign and local collaborators and consultants who are already involved in UP, local and foreign-funded research and creative work of our faculty, researchers and creative artists

Matching

A counterpart UP faculty researcher/artist will be identified or matched as the collaborator of the UP visiting professor, e.g., the PhD or postdoctoral supervisor or sensei of the UP faculty.

Workplan

A workplan must be created to build and support the research/creative work collaboration and the research/creative work group consisting of the visiting professor, the UP faculty researcher/artist and their graduate students.

Support

The VPP will support the UP Visiting Professor for one to two months; and in exceptional cases, with strong justification, for a minimum of three weeks or a maximum of one year, providing the round trip airfare and a reasonable living allowance.

Appointment

The VPP will provide an official appointment as a UP visiting professor so that he/she becomes part of UP's academic roster and contributes to the international ranking of UP.

- a) All degree-granting units are encouraged to host Visiting professors.
- b) All non-degree-granting units are encouraged to partner with graduate degree-granting units in hosting visiting professors.
- c) All academic units of UP which lack expertise at the PhD level to implement their strategic plans are strongly encouraged to invite visiting professors.

Application timeline

The VPP application process from the CU host unit to the OVPAA will be completed in approximately two months. The Academic Personnel Committee of each college should hold a meeting or referendum at least twice a semester to act on VPP applications. If the VPP application is not acted on in two months at the CU level, the VPP applicant and/or host faculty/researcher/artist/unit can appeal directly to the President through the VPAA, and the President in consultation with the concerned Chancellor can act on the application.

Roster

Visiting professors should be included in the roster of academic staff of the host unit. The appointment, activities and accomplishments of the Visiting Professor should be publicized at the unit, CU and System levels.

BALIK PHD RECRUITMENT PROGRAM

Under the UP Expanded Modernization Program, the Balik PhD (foreign-trained PhD) Faculty Recruitment Program was established to increase the number and improve the quality of the

UP faculty to avoid inbreeding (1275th BOR meeting 24 Nov. 2011; 1282nd BOR meeting 20 Sep. 2012). The Balik PhD program is part of UP's campaign to recruit Filipinos and foreign nationals with a PhD and/or postdoctoral training from leading foreign universities to become part of the UP faculty and contribute significantly, on a long-term basis, to mentoring PhD students and developing a culture of research, innovation, creativity and public service in UP. Balik PhD/postdoctoral fellows will each receive a startup grant for a research project (maximum P2.5M) and a relocation package (maximum P0.5M).

Eligibility

All foreign-trained Filipinos with a PhD or postdoctoral experience are encouraged to apply. It is strongly encouraged that those who are 55 years old or younger and can serve UP for at least 10 years apply to the Balik PhD Program.

Benefits and entitlements

- a) The OVPAA will provide a relocation package of P0.5M maximum as an incentive to the PhD recruit to cover economy airfare (based on the lowest of three quotes, from place of origin to the Philippines), transfer of personal effects and shipment of lab materials, and if necessary, provide a reasonable amount of advances for living expenses while the host unit arranges the salary and housing.
- b) A startup grant of P2.5M for research will be granted to the PhD recruit.
- c) The airfare will be reimbursed by the OVPAA to the PhD recruit after certain requirements (e.g., airfare ticket) have been submitted to the OVPAA by the CU.
- d) The funds that will be disbursed to the PhD recruit will be given to the CU. Monitoring and clearing will be done at the CU level. This can be given in staggered payments.

For the release of funds, the OVPAA will provide:

- a) A certification that the PhD recruit has been awarded the grant
- b) A copy of the research contract stipulating the details of the P2.5M start-up grant and P0.5M relocation package
- c) A copy of the notice of appointment issued by the CU.

Recruitment process

The recruitment is based on the academic and technical expertise needed by the CU. The applicant may consider applying in one or two UP campuses and browsing the websites of the various CUs of the UP System.

The application form may be downloaded from the OVPAA webpage. The application form with the CV, letter of intent, and capsule concept proposal (available from the OVPAA website) can be emailed to the head of the unit, dean, or chancellor of the CU (email addresses are found in their websites). A copy must be sent to the Office of the Vice President for Academic Affairs at phdrecruit.ovpaa.up@gmail.com.

The application will be reviewed and evaluated by the Academic Personnel Committee/Board (APC/APB) of the concerned CU. The APC/APB of the CU concerned may request additional documents that are deemed relevant to the applicant's field of expertise, e.g., plans for research mentoring and teaching, lecture materials (outline, notes, slides,

audiovisuals, reading references and other pedagogical tools), a video of the applicant lecturing on a topic of his/her expertise, copies of three most important publications, etc.

In the interim, the CU concerned will designate a contact person with whom the applicant is encouraged to continuously communicate about mutual concerns and interests through email, Skype, videoconferencing or other modes of technology-enhanced communication. Exploratory meetings (actual visit by the applicant) to define work and research engagement are encouraged during this period. The head of the unit, dean or chancellor of the CU will notify the applicant of the approval after the APC/APB has reviewed and evaluated the application.

Upon the recommendation of the application by the APCs/APBs to the head of the unit, dean, or chancellor of the concerned CU/CUs, an endorsement will be made by the chancellor to the OVPAA. The applicant will be asked to prepare a full proposal based on the approved capsule concept proposal incorporating the comments of the UP host unit and publishable in a period of approximately one year.

Approval of the ranks of professors and associate professors will be granted by the President and Board of Regents while the chancellor grants the approval of ranks of associate professors and below.

The applicant will be notified of the approval and final terms of reference for employment, rank, benefits, duties and responsibilities, and other plans will be discussed with the recruiting office. The applicant's documents will then be processed at the CU level. When all documents (application form, supporting information, research proposal, relocation expenses, faculty item, entitlements and tasks/duties/expectations) of the applicant have been completed at the CU level, the OVPAA will accept the CU's endorsement and provide the financial support to the PhD recruit. This will be a start-up grant not to exceed P2.5M for the research proposal and a relocation package not to exceed P0.5M. Breakdown of estimated expenses must be approved/endorsed by the chancellor of the concerned CU.

An employment contract for a faculty item rank will be signed with the CU concerned; work and research engagement starts. The OVPAA will sign the contract only for the start-up grant and relocation package.

The PhD recruit will be guided and monitored for long-term engagement with the CU concerned, e.g., permanent employment, tenure, etc.

Expectations, tasks and duties

- a) The applicant is encouraged to identify equipment, supplies, references and other materials from the former lab that may be brought home to UP.
- b) The applicant is encouraged to explore continued collaboration with the foreign lab and can make an agreement to apply for a grant for the collaboration after the applicant becomes a UP faculty member.
- c) The applicant is encouraged to produce as much output before leaving, which can contribute to a new high-quality (ISI-listed) publication within the first year in UP.
- d) The applicant is expected to carry out duties/responsibilities as a faculty and to conduct research and extension work.
- e) The applicant's research output must be published in an ISI-listed journal within a period of approximately one year.

Obligations of the host unit

- a) Ensure that a faculty item is available for the Balik PhD Recruit
- b) Facilitate arrangements to meet the Balik PhD Recruit at the airport and organize a welcome event for him/her
- c) Discuss with the PhD Recruit a work plan for the first year of employment, including the teaching load, research load, protected time for research, and other duties pertinent to the contract of employment
- d) Discuss the academic rank, salary and compensation; possible joint appointment at another unit of the PhD Recruit
- e) Discuss the components of the Balik PhD recruitment incentive package and other financial arrangements
- f) Facilitate the resettlement and immediate needs of the PhD recruit in the country
- g) The host unit is expected to underscore the expertise and potential contributions of the applicant in the process of recruitment and finally, acceptance to the University.

Contract

A contract will be made between the OVPAA and the Balik PhD recruit for the start-up grant and relocation package, and between the CU and the Balik PhD recruit for employment as a faculty member.

6.3

AWARDS AND INCENTIVES

The OVPAA bestows awards and incentives on productive researchers and members of the UP community.

INTERNATIONAL PUBLICATION AWARD

The International Publication Award (IPA) rewards UP authors for peer-reviewed scholarly publications.

Journal articles

IPA to UP authors

All faculty members and REPS of UP who are authors of an international peer-reviewed [Thomson Reuters-indexed (formerly ISI-indexed), SCI-, SSCI- and AHCI-indexed] publications will receive a pro-rated share of the IPA.

All project researchers and thesis students who work on UP projects and indicate UP as their affiliation in the publication, will also receive a pro-rated share of the IPA.

For an article published in an SCI-, SSCI- or AHCI-indexed journal with a current impact factor less than 2.0, each UP author will receive a pro-rated share of the IPA equal to P65,000 divided by the total number of authors (Memorandum No. OVPAA 2012-70, 1282nd BOR meeting, 20 Sep. 2012).

For an article published in an SCI-, SSCI- or AHCI-indexed journal with a current impact factor equal to or higher than 2.0, each UP author will receive a pro-rated share of the IPA equal to P80,000 divided by the total number of authors (Memorandum No. OVPAA 2012-70, 1282nd BOR meeting, 20 Sep. 2012).

IPA to UP units

A UP unit (department, institute, center, etc.) indicated as the affiliate institution of authors in an international publication will receive an IPA apart from the IPA for authors.

The IPA per publication for UP units is P15,000. Each UP affiliate unit will receive a pro-rated share of the IPA equal to P15,000 multiplied by the number of authors affiliated with the UP unit divided by the total number of authors.

IPA application process for authors

- a) Download the application forms from the OVPAA website.
- b) Accomplish the forms completely. Ensure that the OVPAA-IPA Form 4.1 is signed by the UP-employed and UP-affiliate authors and endorsed by the department chair or institute director.
- c) The department chair or institute director will email the accomplished form in Excel and PDF formats and the required attachments to ipa.ovpaa@up.edu.ph and ipa.ovpaa@gmail.com. For inter-CU collaborations, each department or institute should separately accomplish and submit the form (available from the OVPAA website).
- d) OVPAA will assign a tracking number to the emailed application for processing.
- e) OVPAA will inform the applicant/s through email if the submission has been approved. A certification of the IPA will be issued through email.
- f) The monetary award for UP-employed authors will be deposited directly to their payroll accounts.
- g) OVPAA will inform the UP-employed author through email when the award has been deposited to their accounts.

IPA application process for UP units

- a) Download the IPA contract.
- b) The department chair or institute director will accomplish the contract and submit a hard copy to the OVPAA for approval and signature of the VPAA.
- c) OVPAA will return the contract to the unit for notarization.
- d) The unit will submit one copy of the notarized contract to the OVPAA to start the processing of the monetary award.
- e) OVPAA will process the monetary award for the institution and for the UP-affiliated, non-UP employed authors.
- f) OVPAA will inform the unit through email if the monetary award for the institution and the UP-affiliated, non-UP employed authors is already available for release at the System Cash Office.
- g) The unit will get the monetary award for its institution and the UP affiliated, non-UP employed authors at the System Cash Office. The unit will be responsible for releasing the individual checks of the UP-affiliated, non-UP employed authors.
- h) The unit will be given until six months to release the monetary award to the UP-affiliated, non-UP employed authors. Failure to release the check after the six-month period will mean forfeiture of the Award and the cash will be reverted back to the IPA fund.

Public dissemination of UP's international publications

The authors are required to submit a popular article about the publication. The popular article will be featured on the OVPAA website and will be used as part of UP's accomplishments for public dissemination.

Books

Like the award for ISI-indexed journal articles, this award aims to reinforce scholarly publications by the faculty and REPS and strengthen the presence of the University in the global community of academic institutions.

Eligibility

Regular members of the faculty, including those on sabbatical and secondment to other agencies, regular REPS in active service, clinical faculty and emeritus professors are eligible for the award.

Scope of the award

Only books or chapters of books published by recognized international academic book publishers, prestigious university presses and other highly regarded international publishers (e.g., Macmillan, Random House, Blackwell, Routledge, Harcourt, Brace & Co., and Elsevier and Garland) shall be covered by the award.

Value of award

Sole authors of books or book chapters that meet the standards set in these guidelines shall receive an award of P55,000 per chapter and P110,000 for a book. These amounts may be raised from time to time.

In the case of co-authorship, the award shall be divided equally among the number of authors, local or foreign. Only UP authors eligible for the award shall receive it, provided the book or chapter is published while they are on active service or before their retirement or resignation from the University.

Requirements

- a) The author(s) of the chapter or book must clearly be identified as belonging to UP. If the chapter or book was produced while on sabbatical abroad or as a result of a joint project with foreign scholars, proper acknowledgement must be given to the foreign institution that accommodated the faculty or supported the project. The UP address/affiliation of the author(s) must nonetheless be indicated in the publication, either in a footnote, as a byline or in the book's author information.
- b) The chapter or book must fall within the discipline or related field of the author. For example, a work of poetry shall not be entertained if authored by faculty or REPS outside the field of creative writing, unless there is sufficient proof of prior recognition of the author as a serious practitioner in the field of creative writing as determined by the VPAA, upon consultation with known literary figures.
- c) The chapter must be a complete, solid piece of research or creative work. If one's work (e.g., poem) is included or cited in a chapter or book authored by another, the cited portion

shall not qualify for the award. In addition, certain articles (e.g., tribute/testimonial to a known figure, filler between chapters) shall not qualify. The VPAA shall evaluate all articles as to their eligibility upon consultation with experts in the field.

- d) Books or chapters of books published by international publishers must have gone through a rigid blind referee or review process. Evidence that the publication has undergone a review process, such as comments/communication from the reviewer(s) and/or editor, shall be submitted along with the required documents.
- e) Books published by foundations, government agencies, NGOs, professional societies, international commissions and non-academic bodies shall not qualify.
- f) To qualify, a recently updated book must contain new contributions to knowledge. Books published before the start of the award (1999) shall not qualify.
- g) Authors eligible for the award may receive it as often as they publish. However, a book or chapter may be awarded only once.
- h) An article for which an IPA was granted shall not qualify again for an IPA if it appears as a chapter in another book or in an ISI-indexed journal. However, if a chapter for which the author was awarded is subsequently developed by the author into a book published by a reputable international publisher, the author may be eligible for an IPA in the book category.

Procedure

- a) The author shall submit a copy of the book (to be returned to the author) or the book chapter to the VPAA for evaluation. Copyright pages, table of contents, prefaces, list of authors, evidence of identification of author(s) with UP and other pertinent pages shall accompany the copy of the book/chapter.
- b) Evidence that the publication has undergone a review process, such as comments/communication from the reviewer(s) and/or editor shall also be submitted. Additional information from the publisher regarding review policies and other relevant information that will assist the evaluation of the publication may also accompany the application for the award.
- c) The VPAA shall evaluate all applications for the award and, whenever necessary, consult specialists who can provide additional information on the reputation of the publisher and the quality of its publications.
- d) Should a publication for which a faculty or REPS was awarded later be withdrawn or retracted by the publisher owing to misrepresentation of data or authorship, plagiarism or some unethical act, the author(s) shall return the full amount of the award, without prejudice to the application of other University sanctions.

UP SCIENTIFIC PRODUCTIVITY SYSTEM

The UP Scientific Productivity System (SPS) aims to support the development of science and technology, and encourage and reward scientific productivity among UP faculty and research staff (1199th BOR meeting, 26 Aug. 2005). The title of UP Scientist I, II, or III is conferred on the qualifying scientist. He or she also receives a monetary award which amounts to P120,000, P144,000 and P180,000 annually for UP Scientist I, II, and III, respectively (1230th BOR meeting, 29 Feb. 2008).

Assignments to University Scientist ranks are based on the SPS Rating System that accounts for scientific productivity and international scientific recognition. For scientific productivity, points are awarded for book authorship and contributions, article publications in refereed journals, national editorial assignments and technological outputs such as patents

and peer-reviewed designs. For scientific recognition, points are awarded for international editorial assignments and board membership, peer review, citations, professional standings and international awards and invitations as keynote and plenary speakers based on the recognition of accomplishments.

Minimum qualifications for initial appointment

- a) The applicant must have a doctoral degree in a specific field of specialization or a medical degree and MS
- b) Prior to appointment, the applicant must have a record of consistent productive scholarship for a minimum of 5, 7 and 10 years for the rank of Scientist I, II and III, respectively.
- c) The applicant must attain a minimum number of points based on the SPS Rating System for scientific productivity (minimum 35 points for Scientist I, minimum 40 and maximum 50 points for Scientist II, and minimum 45 and maximum of 55 points for Scientist III).
- d) Additional points based on the SPS Rating System for scientific recognition is added to these scientific productivity points.
- e) In the last five years prior to application, the applicant must have a total number of points equal to 55 points for Scientist I, 75 points for Scientist II and 95 points for Scientist III.

Reappointment

Scientists shall be evaluated every three years. In the three years after the last appointment, the applicant must obtain the following number of points for scientific productivity and scientific recognition:

- a) For Scientist I, a minimum of 25 points in productivity and a total sum of 35 points
- b) For Scientist II, a minimum of 25 points and maximum of 30 points in productivity and a total sum of 45 points
- c) For Scientist III, a minimum of 25 points and maximum of 35 points in productivity and a total sum of 55 points

If a University Scientist does not meet the retention requirements, the following will apply: a slide down to a lower rank or removal from the UP Scientific Productivity System.

If a University Scientist is removed from the system because the minimum requirements are not met, the scientist may apply again at a later time but should meet the same requirements for initial appointment.

UP ARTS PRODUCTIVITY SYSTEM

The UP Arts Productivity System (APS) is aimed at encouraging outstanding productivity in the creative arts or in arts scholarship for national development. Deserving artists and arts scholars in the faculty and research staff will receive the rank of Artist I, II or III. This rank is conferred by the University as an award, which is called the UP Arts Productivity Award. The UP Artist rank carries with it a monetary award similar to the UP Scientific Productivity System, that is, P120,000, P144,000 and P180,000 annually for UP Artist I, II, and III, respectively. This program is funded by the UP Arts Productivity System Endowment Fund established by the Board of Regents.

The UP APS is awarded in eight different categories with its own qualifications and APS Rating System. The categories are: (a) film, (b) fine arts, (c) literature, (d) music and dance, (e) radio, television, and related media, (f) theater, (g) architecture, and (h) scholarly work. To be appointed UP Artist, the qualified applicant must accumulate a minimum number of points over a specified period. The implementing guidelines vary for each of these fields. Details may be found in the relevant forms and guidelines on the OVPAA website.

General principles

- a) The UP artist is an artist and/or an arts scholar.
- b) "Artistic productivity" is understood to mean the sustained production of works of art such as musical compositions, novels, performances, exhibits, etc., as well as the production of works of arts scholarship.
- c) The "arts" include, but are not limited to music, literature, visual arts and design, film and media arts, theatre, dance, architecture, and art criticism.
- d) "Artistic productivity" is measured in terms of: (a) publication, presentation, exhibition, performance, etc. of works of art; (b) national and international recognition (through awards, distinctions, etc.); (c) peer review (through critiques, citations, reviews, etc.); and (d) professional standing in the community, both national and international.
- e) Artistic and scholarly outputs may be monodisciplinary, multidisciplinary and cross-artistic disciplinary.
- f) Evaluation will be done by a committee of peers.

Nature of appointment

- a) Regular, full-time faculty members, research faculty and researchers (REPS) in active service, and regular part-time faculty members (occupying a regular item but teaching part time) who belong to the arts and humanities disciplines and meet the qualifications described in the relevant APS Rating System for evaluation of nominees may apply for appointment as UP Artist.
- b) Conferment of the title of UP Artist is temporary. It will be in the nature of an additional recognition in the form of a title and a monetary award.
- c) For the first appointment, the applicant's output for the last five years prior to application shall be considered for the evaluation of the application.
- d) The rank of faculty, faculty researcher or REPS shall remain the basic rank, on which retirement and other benefits will be based.

Admission into the system

- a) UP faculty members, faculty researchers or REPS shall be admitted into the system to the extent that they meet the minimum requirements indicated in the APS Rating System and subject to the availability of funds.
- b) Applicants to the Arts Productivity system must have at the minimum an MA degree or its equivalent.
- c) To earn the rank of UP Artist the applicant must earn a minimum number of rating points in accordance with the relevant APS Rating System. For Artist I, the applicant must earn

70 points. For Artist II, the applicant must earn 95 points. For Artist III, the applicant must earn 120 points.

d) Artists who are unable to gain admission into the system upon evaluation may apply again. Evaluation for re-admission into the system will be based on the accomplishments of the five years prior to application.

Evaluation

The Ad Hoc Arts Productivity System Committee will produce a list of possible members for the Council of Peers from which members of subcommittees and committees for each art in each CU will be drawn. These persons will be distinguished practitioners in the different arts who are also affiliated with UP, as faculty members (regular faculty members, lecturers, retired faculty members, professor emeriti) or alumni. This list will be submitted to the Vice President for Academic Affairs. Members of the council will be appointed by the UP President.

Applications will be submitted to the CU Subcommittee of Peers for the art to which the applicant believes himself/herself to belong. The subcommittees in each CU will evaluate the applications, assign the corresponding points for each application and recommend deserving applicants to the CU Committee of Peers. The CU Committee will review the recommendations of the subcommittees and recommend deserving applicants to the chancellor. Members of these subcommittees and committees will be appointed by the chancellor, drawing from the Council of Peers mentioned above.

The chancellor will forward these recommendations to the UP System Committee of Peers which will be chaired by the VPAA and will be composed of peers (artists) drawn from the Council of Peers mentioned above.

If any particular CU is unable to form such subcommittees or committee for whatever reason, it may endorse applications to UP Diliman, and these applications will be referred to the pertinent subcommittees or committees.

The UP System Committee will oversee the overall implementation of the APS, recommend to the President the UP Artists from the different CUs to receive the title and the corresponding award and regularly review the guidelines for implementation of the APS.

Final approval of conferment of the rank of UP Artist and the Arts Productivity Award shall come from the Board of Regents upon the recommendation of the President.

Reappointment

UP Artists shall be evaluated every three years for reappointment on the following basis:

- a) For reappointment to Artist 1, the applicant must earn 55 points.
- b) For reappointment to Artist 2, the applicant must earn 70 points.
- c) For reappointment to Artist 3, the applicant must earn 85 points.

The points for each artist rank must be earned following the same criteria and measures described in the relevant APS Rating System.

Artists who are unable to gain readmission into the system upon evaluation after the three-year period may apply again. Evaluation for readmission into the system will be based on the accomplishments of the three years prior to application.

CONCEPCION D. DADUFALZA AWARD FOR DISTINGUISHED ACHIEVEMENT

The UP Board of Regents established the award on 29 June 2000 in honor of a beloved former professor of the University, Professor Concepcion D. Dadufalza, on the occasion of her 50th year of teaching at the University of the Philippines. Funded by a graduate of the University who requests anonymity, the award aims to honor individuals of distinction, to keep alive the selfless vision and values of Professor Dadufalza. The award is given to an outstanding individual who has excelled in his or her craft, or who has contributed significantly to important causes in society.

Eligibility

Anyone who has been affiliated with UP as a student, faculty member, researcher or administrator can qualify as a recipient of the award.

Application or nomination

Individuals may apply directly for the award or may be nominated by other persons or groups. Each application or nomination should include:

- a) A curriculum vitae consisting of no more than five pages
- b) A signed statement by the applicant or nominee indicating willingness to abide by the rules and requirements of the award.

Testimonials, statements of authority, citations, awards or honors received which evaluate the worthiness of the applicant or the nominee may be attached.

All applications and nominations should be received by the Office of the Vice President for Academic Affairs on or before 15 February of every year. The awarding ceremony will be held in the third week of June.

Selection

A committee will be constituted by the Vice President for Academic Affairs and the Vice President for Public Affairs to select the awardee from among the applicants and nominees. The committee, if it desires, may schedule an interview with the applicants and nominees. The committee will announce its choice every 15th of April.

Lectures

The awardee will be asked to deliver a lecture related to the concept of distinguished achievement (what it means, what responsibilities it entails, why one should strive for it, etc.) to be held in UP every June, with Prof. Dadufalza's representative as special guest. The lectures will be compiled and published every five years, with the donor covering the expenses.

SHORT-TERM TRAINING IN A FOREIGN UNIVERSITY AND EXTERNSHIP IN INDUSTRY

Rationale

Short-term foreign training and externships in industry not only help the University form strong linkages with leading key industries but also help bridge the gap between "classroom

knowledge” and knowledge needed in actual practice. More industry- or market-driven research can thus be pursued in the university.

By interacting with industry and business professionals in the workplace, faculty members and researchers are able to:

- a) Update themselves on current trends and advances in the field
- b) Develop or upgrade their skills in curriculum development and pedagogy
- c) Develop or upgrade their technical and instrumentation skills
- d) Explore new useful applications of their fields
- e) Understand the actual needs of industry
- f) Broaden their perspectives by learning from the academic culture of foreign universities and from the efficiency and productivity of industries

As a result, they become better equipped to:

- a) Improve curriculum and teaching and learning in the classroom
- b) Enrich courses with new materials and activities, and share their own research and creative output
- c) Enrich their intercultural experience and share with students a more global or “glocal” perspective
- d) Conduct high-level research and creative work with foreign collaborators
- e) Initiate and conduct needs-based research projects
- f) Directly partner with industry for innovation
- g) Design a curriculum that is responsive to industry demands
- h) Eventually build their own business or enterprise.

Both local and international externships are supported. Considerable weight will be given to the impact or significance of the applicant’s research in advancing the goals of the unit or the department.

Voluntary mentoring

Those who obtain financial support from UP for externship will be encouraged to fill in for the next batch of colleagues who will also leave for externship. That batch will then do the same for the one next in line, and so on.

Another option is for the applicants to render overtime work as soon as they come back from the externship abroad. Before they leave for externship (or even as early as the application stage), the unit must already have a clear vision of what it expects from them upon returning to the University. It must also see to it that the program would benefit both the individuals and the unit of which they are part.

It might be necessary to first brief the applicants before leaving so that infringement on intellectual property rights by either party is avoided.

Eligibility

Support for externships is available to faculty members as well as research, extension and professional staff, including those who are enrolled in a master’s or PhD program.

- a) The applicant must be engaged in research or creative work that is significant to the unit or department.
- b) Master’s and PhD students must have completed the core coursework before they can participate in UP-supported externships.

c) The type of support would depend on the location of the externship but in general would cover transportation to and from the location of placement, daily allowance and, if applicable, visa fees, airfare and accommodation. For foreign externships, placements made in the ASEAN will be prioritized.

Application process

- a) Application for support can be filed at the OVPAA only upon the approval of the unit or supervising faculty member or thesis adviser and acceptance for externship in the industry.
- b) It is the responsibility of the applicants to find a placement on their own.
- c) Host company must provide a Letter of Acceptance and specify the expected duties and responsibilities of the applicant during the externship.
- d) The duration of the externship, which could last from a few weeks to six months, is subject to the approval of the unit/supervising faculty member/thesis adviser.

Terms and conditions

- a) The applicant and unit/supervising faculty member/thesis adviser must come up with a concrete action plan based on what is expected of the applicants after the externship. The plan must also specify the applicants' immediate output upon returning to the University.
- b) The applicant must be able to show in the application how he or she intends to continue the culture of mentoring and scholarship in the unit: by substituting for the next batch that will leave for externship, by working overtime, or through other similar ways.
- c) The unit/supervising faculty member/thesis adviser shall be responsible for coordinating with the applicant on the progress of the externship. Any issue or concern that may arise during placement shall be addressed directly to the unit/supervising faculty member/thesis adviser.
- d) The applicant must submit a brief written report on the experiences and important lessons gained from the externship and how such can be best applied to duties or responsibilities in the University.

6.4 PROJECT MONITORING

The Office of the Vice President for Academic Affairs is responsible for evaluating the proposals for funding under its various research program initiatives. The research initiatives are overseen by the Assistant Vice President for Academic Affairs (Research). The Assistant Vice President heads an ad hoc committee constituted specifically for the purpose of evaluating and monitoring grants under the Emerging Interdisciplinary Research, the Enhanced Creative Work and Research Grant and the foreign-trained Balik PhD research grant. The members of each committee are appointed by the UP President upon the recommendation of the Vice President for Academic Affairs. Those selected to serve in the committee are University Scientists/Artists, professor emeriti and university professors.

The proposals submitted for the various research grants undergo technical review by external experts and those which receive favorable reviews are recommended to the UP President for approval. The OVPAA prepares the research contracts and fund releases. Funds are released to the proponent's constituent university through funding check memos. Proponents are required to submit progress technical and financial reports as well as annual

and terminal technical and financial reports. The reports are evaluated by the assigned committee.

THE COMPILER

Dr. Francis Paraan has a B.S in Applied Physics and MS in Physics from the University of the Philippines Diliman. He received his PhD from the State University of New York at Stony Brook. He is an assistant professor at the National Institute of Physics, UP Diliman. His research centers on quantum information theory and parallel computing.

ESSAY

GAINING COMPETENCY IN SCIENCE RESEARCH**Joyce A. Ibane, PhD**

My journey as a scientist started in the small town of Daet, Camarines Norte where I grew up. Today I find myself at the Institute of Biology, University of the Philippines, Diliman (UPD) as a newly appointed faculty member. I came to realize that this journey taught me dispositions influenced by different people at different stages in my life, in different ways and at different places.

PASSION

Scientific research requires a lot of time and energy spent in the laboratory. Investigating a bacterium that completes one round of developmental cycle inside a human cell in 48 hours, for example, requires that I record data every 4 to 6 hours. This means that I must be prepared to work at the laboratory between 12:00 midnight and 5:00 am when most people are fast asleep. It is passion that keeps me awake in these wee hours of the morning. Passion for science is essential to be a good and happy scientist. When work is enjoyable, it ceases to feel like a chore.

I developed passion for science at a very young age. I believe that the major driving force behind this was inherent curiosity and the drive to satisfy it. I grew up in the late 70s without the luxury of television and computer games. To keep me occupied, I went out under the sun, walked on rice paddies to catch tadpoles, explored gardens to pick different flowers and leaves, and picked up dirt of different textures. I kept a tadpole in a bottle and watched it metamorphose. I monitored the speed by which a caterpillar ate the leaves of my mother's plants. I dissected a *Hibiscus* flower (commonly known in the Philippines as gumamela) and "discovered" that if I squeezed it hard, I would get a slimy extract. I sold these extracts to my playmate as "oil" for a handsome pay: a handful of guava leaves. I also molded different combinations of dirt into different shapes using bottle caps. I called them "a variety of

chocolates.” Our neighbor bought them for a dozen mango leaves. I smile whenever I remember these joys of curiosity and the rewards of discovery during my childhood years.

Passion for science can be discovered and nurtured at a very early age. When I was six, both my parents worked at the Mabini Colleges which my grandfather founded in 1924. My father ran the school as the director and my mother worked as a teacher. My parents allowed me to tag along with them to school where I was free to quietly roam around the small, gated campus. One day, I discovered the chemistry laboratory. Since then, I frequently spent time outside the room, watching students perform chemistry experiments. When I graduated from preparatory school, every student from our small town declared that he or she wanted to be a future doctor or a lawyer. When my turn came, I blurted out on the microphone that I wanted to be a chemist when I grew up. Everybody was shocked. After that, my father gifted me with a series of textbooks in mathematics and despite the fact that I didn’t show any difficulty in school, hired a math tutor for me for extra training. It was only later in life when I realized what my father did. Mathematics was an indispensable tool for a science researcher because observations in science have to be quantifiable, replicable and verifiable.

CREATIVITY

I cannot forget one of the class activities we had at the Philippine Science High School. Our teacher asked us to go out to the school field, look at the clouds and list all the different things that we could make out of the shapes of the clouds. After that, we were asked to write a story using all the words we had in our list. It was only when I was already writing my PhD dissertation when I realized how this exercise could have contributed to honing my creativity.

This exercise may not be directly connected to scientific research but it trained the mind to “connect the dots.” A scholarly work such as a dissertation requires the ability to see relationships between your own data and those of others. Acquiring the ability to see connections among what is known in your field of interest, what is known in other disciplines and the new body of knowledge generated from your own experiments is valuable to a science researcher.

This idea also influenced my practice as an educator. As a new faculty member at the Institute of Biology, I was assigned to teach a general biology course to science majors. In one of the textbooks I used, the scientific method was described as a process that starts with the identification and statement of a problem, followed by the formulation of a hypothesis. A hypothesis was defined as an educated guess. As a practicing science researcher, however, I could not restrain myself from informing my students that an educated guess is not merely pulled out of thin air, but is preceded by a careful research of what is currently known about the identified problem. A good science researcher is one who can formulate a hypothesis by weaving a logical tapestry of knowledge, using those which for many are disparate pieces of information. That is why I strongly advocate encouraging creativity among our young science students.

BEING METHODOLOGICAL

In UP Los Baños where I took my undergraduate studies, my capable biology and chemistry instructors trained me to neatly record in a laboratory notebook all data from every experiment. These notebooks were meticulously checked for accuracy and completeness, a practice that I have kept to this day. After each laboratory exercise in biology, we would write and submit a ‘scientific paper.’ It was a formal report of our findings which included the statement of the problem, background introduction (also called review of related literature),

hypothesis, results, conclusion and discussion. These scientific papers constituted a major requirement in all of my courses at the Institute of Biology. I was very fortunate that in all four years in college, I was obliged to exercise the scientific method repeatedly and conscientiously. I viewed it then as a tedious task; now I realize that it was an important training for which I will always be grateful.

DESIRE FOR KNOWLEDGE

My education from UP (first at the UPLB and subsequently at the National Institute of Molecular Biology in UP Diliman) also extensively required me to be knowledgeable across various disciplines, to appreciate the continuous acquisition of knowledge in order to keep up with new discoveries in science. As a PhD student and postdoctoral fellow in the United States, I spent most of my free hours in school reading scientific articles. My daily visits to the Pubmed and Google Scholar websites kept me abreast with new discoveries in the field of reproductive immunology and other disciplines. Through reading, I was able to formulate new hypotheses and propose new scientific concepts. After all, the skill of “connecting the dots” is useful only if the “dots” exist. It is critical that scientific literature is easily accessible to science researchers in an academic institution. Updating one’s knowledge by way of reading strengthens creativity.

Gaining these four dispositions is just the beginning for in the competitive world of science, competency requires more: tenacity, resilience, rigor and, above all, altruism which gives meaning to all of these.

TENACITY

Between 1998 and 2004, while pursuing my master’s studies at UPD, I also worked as a research assistant at the Marine Science Institute (MSI) and as a visiting researcher at the Research Institute for Tropical Medicine (RITM). During those years, importing a biological material to the Philippines proved to be stressful because it was very difficult to monitor where and when the biological shipment, which contained a very temperature-sensitive item, had arrived in the country. My mentor, a strong-willed woman, personally facilitated the search for the package at the airport and its retrieval from customs. However, while it has safely arrived at the MSI, we found out that the cancer cell-line that we obtained was contaminated with bacteria for unknown reasons. The thought of having to go through the process of importing again and finding ourselves in the same situation was daunting. From my mentor, I learned that I had to make every effort to make things work before giving up. I then injected the cancer cell-line in a laboratory mouse, which induced tumor formation and, in turn, sterilized the bacterial infection via the mouse immune response. I retrieved the tumor from the euthanized mouse next and used it to establish a primary culture of the cells that was originally imported. I recovered the cells successfully but more importantly established a tumor model that facilitated subsequent *in vivo* studies on cancer research at the Institute.

Failure is inevitable. For tenacious individuals, failure could be a rich source of knowledge, although luck is beneficial only to a prepared mind.

RESILIENCE

Tenacity is firmness; resilience is flexibility; and the delicate balance between these two seemingly opposite qualities makes an efficient science researcher. A researcher must not easily resign from a task. Modular experimental designs allowed me to adapt to the flow of

the pieces of data that I generate. Henceforth, I always reminded myself and my students that hypotheses are not meant to be proven but are meant to be tested. Tenacity guided me to be goal-oriented while resilience allowed me to be mindful of the circumstances around me and to adapt to these realities in order to achieve my goals.

RIGOR

The most important lesson I learned in the US as a postdoctoral fellow was rigor. For my postdoctoral project, I was fortunate to have worked with a very good scientist from whom I learned the skill of providing solid and multiple evidences for every observed biological phenomenon. This was reflected in the magnitude and quality of data that I generated from then on.

I developed keen logical sense and became meticulous in interpreting data, always mindful of the possible differences in the interpretation. This further sharpened my appreciation for the importance of mathematics in science research, as exemplified by the analytic rigor by which I interpreted the set of data I generated through immunofluorescence microscopy. The use of fluorescent images to localize proteins of interest was usually described by other researchers qualitatively. But in my postdoctoral project, my data was meticulously quantified and tested for amenability to algorithmic proof checking.

ALTRUISM

After nine years in the US, I temporarily left our happy home in New Orleans to come back to the Philippines in 2013. As a recent recruit of the UP Balik PhD program, I was deeply moved by the words of our National Scientist Dr. Gelia T. Castillo that were quoted in the book *Filipino Trailblazers in Science*. She said: "If it is rigor which makes research scientific, it is relevance which makes it humane. Relevance concerns value choices as to what is important for human welfare."

For my PhD in Microbiology and Immunology, I studied the female reproductive tract immunology and the biology of an infectious bacterium, *Chlamydia trachomatis*. Armed with high-quality scientific training and education from UP, in conjunction with the academic freedom and enormous resources that were provided by the Louisiana State University Health Sciences Center, I completed my graduate research with five first author articles, two secondary author articles and two book chapters.

I had a very rich scientific experience in *Chlamydia* research. I learned about the exquisite immunological mechanisms in the female reproductive tract. But it is my interest in cancer that prompted me to carefully examine the mechanisms by which the female genital tract can suppress immune responses at the fetal-maternal interface. Immune-suppression allows mothers to tolerate a fetus which is a non-self entity. I found interesting and relevant similarities between the immunological repertoire in the female genital tract and the tumor microenvironment that could be explored to better understand the mechanisms of tumor metastasis. From these seemingly disparate phenomena – pregnancy and cancer – I saw a connection. Both require factors that promote cell growth and both involve the induction of a microenvironment where the immune cells' ability to kill "foreign" cells are impaired. Creativity allowed me to see common themes in these two microenvironments.

I could have stayed within the comforts of the field of *Chlamydia* research, but I could not ignore the reality that every day people are dying of cancer. Almost everybody I know has a friend, sister, parent, in-law or neighbor who had died of cancer. As a returning scientist in UP, I hope to contribute to the growing efforts to alleviate the impact of this disease on

society. I would like to make early diagnoses of cancer recurrence more affordable and therapeutics more accessible. This may sound like an ambitious dream and I suppose it is. But I draw hope from my childhood aspiration of becoming a scientist: I know that with hard work and help from other people, our cherished dreams can come true.

TOWARD EXCELLENCE AND RELEVANCE IN RESEARCH

Part of the nurturing factors in science is the recognition and reward for a job done well. As a new faculty member of UP, I noticed that this component is already in place. In addition to this, I think that it is desirable to encourage the extension of the prevailing descriptive approaches to the sciences toward the development of challenging but equally rewarding explanatory approaches to scientific research.

One of the major differences between a skilled scientist in the Philippines and a skilled scientist in the United States is the speed by which they can acquire experimental tools. For the modularity of experimental designs to work, it is crucial that scientists in the Philippines are able to acquire the reagents they need as quickly as scientists in developed nations would. It will be very hard for us to compete globally if our productivity is impeded by the unreasonable length of time spent in waiting for reagents.

Passion, creativity, being methodical and desire for knowledge can be cultivated in the younger generation prior to entering tertiary school with the new K-12 educational program. Tenacity, resilience and rigor, however, require dedicated mentorship as they are products of experience. Therefore, I think that it will be very valuable to the cultivation of research excellence in research in UP if we develop a systematic mentoring program for all scientists at different stages of their careers.

Finally, as part of the UP system, we should continue to remind ourselves and our students what the Oblation stands for: the selfless offering of oneself for the country. In the midst of difficulties of being a science researcher in a developing country like the Philippines, it will be our collective sense of altruism that will be the major driving force in moving toward building the culture and infrastructure of excellence and relevance in scientific research.

THE AUTHOR

Dr. Joyce Ibana, BS Biology, major in Genetics (University of the Philippines, Los Banos), MS Molecular Biology and Biotechnology (University of the Philippines Diliman), PhD Microbiology and Immunology (Louisiana State University Health Sciences Center), is currently an associate professor at the Institute of Biology, UP Diliman. Prior to obtaining her PhD degree, she received a research fellowship at the Pitié-Salpêtrière Hospital in Paris, France for malaria research. She continued her research training at the Marine Science Institute and the Research Institute for Tropical Medicine. In 2004, she received her training in reproductive immunology and pathogenesis of infectious diseases as a Fulbright scholar.

REFERENCE

Crispin Maslog. *Filipino Trailblazers in Science* (2013), Evelyn Mae Tecson-Mendoza (ed). National Academy of Science and Technology, Philippines. Vibal Publishing House, Inc. Quezon City.

CHAPTER

7

INTELLECTUAL PROPERTY RIGHTS

Compiled by Francis N.C., PhD

Research and creative work carried out by the faculty, REPS and other staff of the University may result in intellectual property that could serve the public good as well as private interests. Asserting and protecting the intellectual property rights of UP researchers and creative artists are therefore critical components of the University's research mandate. The details of UP's policy on intellectual property rights given in this chapter were taken from the "Governing Principles and Policies on Intellectual Property Rights of the University of the Philippines" (or the UP IPR Policy) that was approved during the 1171st BOR Meeting 30 May 2003. In general, copyrights to intellectual property remain with their creator, except in the case of institutional or collaborative work, because the University is expected to generate copyrightable ideas and creative work. Patents for inventions, on the other hand, are generally presumed to belong to the University when these inventions are created with substantial use of University resources.

7.1**UP POLICY ON INTELLECTUAL PROPERTY RIGHTS**

The UP Intellectual Property Rights (IPR) Policy is bounded by the University's constitutional mandate to maintain the academic freedom of its faculty and of the university as a whole and the provisions of the Intellectual Property Code (RA No. 8293, 1997) and other laws pertaining to intellectual property rights such as the Plant Variety Protection Act. Operationally, the UP IPR Policy:

- a) Interprets the Intellectual Property Code in a manner that ensures and maintains the academic freedoms of both the faculty and the University
- b) Provides a more effective and efficient mechanism that will resolve conflicts between research collaborators
- c) Effectively documents and registers intellectual property rights
- d) Defines procedures for technology transfers, assignments, licensing and the like
- e) Clarifies the relationship of these rules to other related University policies such as those governing conflict of interests.

It is guided by the following general principles: (a) respect for academic freedom, (b) cognizance of the public good, and (c) sustaining a favorable environment for the University's research tradition. The UP IPR Policy aims to: (a) promote and support of the University's research function, which complements its mandate of instruction and enrichment and expansion of knowledge as an academic institution; (b) provide an institutional mechanism for recognition of research output and protection of IPR resources to propel and sustain further research; and (c) establish a protocol for resolving competing interests among various constituencies and markets.

The UP IPR applies to all faculty members, researchers, administrative personnel and students of the University of the Philippines as well as visiting researchers, faculty and students.

COPYRIGHTS

Copyright is the exclusive and legally secured right to the matter and form of literary, scholarly, scientific and artistic works resulting from intellectual creation, as provided for under the Intellectual Property Code of the Philippines (Chapter V, Sec. 177).

Copyright coverage

All literary, artistic and derivative works collectively referred to in the UP IPR Policy as "works" (as defined in Sections 172 and 173 of the Intellectual Property Code of the Philippines), including course materials for e-learning and distance education, regardless of format in which it was created or produced, shall be covered by the UP IPR Policy on Copyright. "Work" includes the "material object." The material object is the original physical form in which the creation/work is rendered.

The copyright is distinct from the other property rights over the material object. Consequently, the transfer or assignment of the copyright shall not necessarily constitute a transfer of the material object. Nor shall a transfer or assignment of the sole copy or of one or several copies of the work necessarily imply transfer or assignment of the copyright [Section 181 IP Code].

As a punitive measure, the University shall claim copyright of unauthorized works, created through substantial use of University resources such as libraries, research facilities, buildings, utilities, equipment, tools and apparatus, including services of its employees working within the scope of their activities not for University purposes but for the personal gain or advantage of the faculty, research staff or student involved.

Copyright owners

As a general principle under the UP IPR Policy, copyright of all works shall remain with the creator, except in cases of institutional or collaborative works. The University shall have exclusive ownership of copyright in case of institutional works. Institutional works include:

- a) Works that are supported by a specific allocation of University funds or other resources other than the usual salary and resources made available to every faculty, student or staff
- b) Works created at the direction and control of the University through its officials or designates for the purpose of a specific project or purpose
- c) Works whose authorship cannot be attributed to one or a discrete number of authors, despite the application of the processes prescribed in the UP IPR Policy
- d) Works whose authorship cannot be attributed to one or a discrete number of authors because it is the result of simultaneous or sequential contributions over time by multiple authors.

In cases of work resulting from the contribution of efforts coming from different persons, authorship (whether sole or collaborative) shall be determined as follows:

- a) By stipulation in the research contract
- b) By application of the rules for joint, primary and sole authorship as determined by a publication for which the work was intended
- c) Through alternative modes of dispute processing including mediation and arbitration to be facilitated by the Vice Chancellor for Academic Affairs if the work originated from the efforts of the faculty, research staff and students in a single constituent university or by the Vice President for Academic Affairs if otherwise. No dispute pertaining to authorship of any work shall be referred for legal action unless any one of these processes has been availed.

If the work is the result of collaborative efforts between the University, an outside entity and the creator(s), absent any contractual stipulation to the contrary, the copyright shall belong in joint ownership to the University, the creators and the outside entity.

Entitlements

A copyright owner is entitled to the following:

- a) Reproduction of the work or substantial portion of the work
- b) Dramatization, translation, adaptation, abridgment, arrangement or other transformation of the work
- c) The first public distribution of the original and each copy of the work by sale or other forms of transfer of ownership
- d) Rental of the original work or a copy of an audio-visual or cinematographic work, a work embodied in a sound recording, a computer program, a compilation of data and other materials or a musical work in graphic form, irrespective of the ownership of the original or the copy which is subject of the rental
- e) The public display of the original or a copy of the work
- f) Public performance of the work
- g) Other communication to the public of the work [Sections 177, 177.1-177.7 IP Code]

Waivers

In case of institutional works and works in joint ownership with the University, the University through its designated officials, may waive copyright in favor of the creator if:

- a) It would enhance the transfer of technology or improve the access of the works by the public in general.
- b) It does not violate any existing contractual obligation to third parties.

c) The participation of the University in the work is acknowledged by the creator in all publications of the work, whether local or international.

Also, in the event that the University fails or decides not to publish or exhibit a work within one year from its disclosure, its copyright is automatically waived in favor of the creator. The one-year period may also be waived by the University at the request of the creator if the work is to be published in a reputable international or local journal relevant to the academic discipline to which the work belongs. In all cases, the contribution of the University shall be duly acknowledged in all publications or exhibitions of the work.

PATENTS

A patent is an intellectual property right granted to an inventor by the government through its appropriate agency (Intellectual Property Office of the Philippines). This right gives the grantee the opportunity to exclude others from making, using or selling the invention for a limited period from the date of filing the application. This period of exclusivity is granted in exchange for the inventor's disclosure of the details of invention so that others may seek improvements or new uses. Thus, the inventor has monopoly control of the invention and the society also gains through further advancements that may be made on the technology (Chapter VIII, Sec. 71).

Patent coverage

All inventions which may be or may relate to a product, process or an improvement of any of the foregoing that is new, involves an inventive step, is industrially applicable, including utility models and industrial designs, referred to in the UP IPR Policy as "inventions" shall be covered by the rules on patent.

Patent ownership

As a general principle under the UP IPR Policy, the right to patent for all works created with substantial use of University resources shall belong to the University. Nevertheless, the sharing in revenues derived from the licensing or transfer of patents on the works of UP personnel shall be as in Section 0 Royalties, below. "Substantial use of university resources" is a matter that can be established on a case-to-case basis. For example, making a single local call through the University telephone system does not constitute substantial use of University resources.

Creators of commissioned inventions should disclose and assign the patent to these works to the University in accordance with the IPR Policy and the implementing guidelines which may be promulgated by the President of the University. Commissioned inventions are:

- a) Inventions that are supported by a specific allocation of University funds or use of other University resources.
- b) Inventions produced at the direction and control of the University in pursuit of a specific project or purpose regardless of the source of funding.
- c) Works whose inventorship, despite the application of processes provided in the UP IPR Policy, could not be attributed to one or a discrete number of inventors.
- d) Those that may be stipulated by contract as commissioned inventions. The University shall own all commissioned invention.

Regardless of the source of funding, patents to the following inventions shall be assigned to the University:

- a) Those conceived or first reduced to practice by employees, the faculty or students in the University in the performance of their duties
- b) Those created through substantial use of University resources such as libraries, research facilities, buildings, utilities, equipment, tools and apparatus, including the services of its employees, as well as visiting researchers and students, working within the scope of their employment.
- c) In the case of work resulting from the collaborative efforts of the University, an outside entity and the creator(s), involving substantial use of University resources, the patent may belong in joint ownership among the University, the creator(s) and the outside entity, only with the prior written consent of the University.

Identification of inventorship

The identification of inventorship – whether sole, primary or joint – shall be determined as follows:

- a) By contractual stipulation
- b) By application of the rules and standards of a publication primarily intended by the collaborative effort
- c) By alternative modes of dispute processing including mediation and arbitration to be facilitated by the Vice Chancellor for Academic Affairs if the persons contributing their efforts belong only to one constituent university or by the Vice President for Academic Affairs if otherwise. No dispute pertaining to inventorship of any work shall be referred for legal action unless any one of the preceding processes has been availed.

In the event that the funding for the research and creation of the invention is sourced by the University, wholly or partially, from outside entities, the University shall negotiate with the funding entity with respect to the ownership of the invention, patent rights and royalty sharing subject to confirmation by the Board of Regents. The agreement shall bind all parties including the inventors. In default of a negotiated agreement, all patents to inventions the research funds for which was sourced from or by the University shall be owned by the University.

Waivers

In the absence of existing contractual obligations to third parties, the University may release patent rights to inventors if:

- a) The University elects not to file a patent application and the inventor is prepared to do so. It shall be presumed that the University elects not to file a patent application if no application is filed one year after the disclosure of the invention or from the time that the University is reasonably presumed to have known of its existence.
- b) The waiver would facilitate the transfer of technology or its accessibility to the general public.
- c) The equity of the situation clearly indicates that such release should be given.

No waiver shall be given unless there is a written commitment by the inventor that no further development of the invention shall be made involving the financial support or resources of the University nor shall any waiver be made in violation of any contractual obligation of the University.

OTHER INTELLECTUAL PROPERTY RIGHTS

Trade and service marks

Trade and service marks are distinctive words or graphic symbols long associated with the University (e.g. Oblation, UP Seal, etc.) registered by the University with the Intellectual Property Office. The University shall own trade or service marks relating to goods or services distributed by the University. These include names and symbols used by the University in conjunction with its computer programs or University activities and events.

Proprietary information

Proprietary information which includes information arising from University work. These include processes which may fall under the concept of trade secrets.

Tangible research property

Tangible research property (TRP) or research results which are in tangible form (e.g., integrated circuit chips, computer software, biological organisms and engineering prototypes) and which cannot be the subject of any other kind of intellectual property protection are presumptively considered as owned by the University. All TRPs may not be used by outside parties without the consent of the University. In no case shall biological material in any form be the subject of patents or any form of acquisition.

Exceptions and public domain

Proprietary information such as proposed terms of research agreement and financial agreements shall be covered by existing rules relating to the constitutional duty of a state university to public disclosure.

Research information and processes used for academic purposes shall be presumptively considered as part of the public domain and shall not be considered as trade secrets, except when:

- a) Necessary in order to pursue an academic research project to its completion.
- b) The information is necessary in order to protect intellectual property rights of the University on an invention.
- c) Upon the determination of the President, circumstances are such that well-defined interests of the general public will be better protected by temporarily claiming legal protection of research processes as trade secrets.

COMMON PROVISIONS

Waivers and authorities

Except in cases of failure to publish or failure to file an application for a patent, all waivers of ownership of intellectual property rights shall be confirmed by the Board of Regents upon recommendation by the President of the University.

The President or the chancellors shall periodically report to the Board of Regents intellectual property rights owned by the University which have been impliedly or unintentionally waived immediately upon their discovery, in order that the Board of Regents may be guided in laying down appropriate policies to prevent similar mistakes, oversights and lapses in the future.

Royalties

In the absence of contractual stipulations to the contrary, royalties derived from institutional works, commissioned inventions, patents and other intellectual property of the University shall be shared by the University with the authors or inventor(s) as follows:

- a) One-third of the net income shall be given to the University
- b) One-third of the net income shall be given to the constituent unit from where the author or inventor(s) originated
- c) One-third of the net income shall be given to the author(s) or inventor(s).

This is without prejudice to such policies or arrangements that the constituent unit may have with respect to sharing its proportion of the net income with the department(s) or unit(s) from where the author(s) or inventor(s) originated.

Net income shall mean gross income less applicable taxes. All other expenses such as administrative costs, filing fees, costs relating to the production, distribution, advertising, maintenance and similar expenses of the work or invention shall be for the account of the University and shall be taken from its share in the royalty income.

Joint authors or inventors shall share equally in the royalties.

Research contracts

All contracts for research, regardless of source of funding, should provide the means for determination of authorship or inventorship in accordance with the UP IPR Policy. No allocation of research funds from the University shall be made in cases of works to be produced by collaborative efforts until and unless the provisions for ownership of copyright and ownership of resulting tangible materials including processes for settling disputes on ownership had been clearly provided in a contract.

Penalties

In addition to penalties which may arise from the violation of any other law or university policy or guideline, any persons found to have violated any of the provisions of these guidelines shall suffer the following penalties:

- a) Ineligibility from receiving research funds from the University or any of its affiliated foundations for a period not to exceed five years
- b) Automatic removal of research load credits and ineligibility to receive these benefits for a period not to exceed five years

- c) Disqualification and/or removal from any university administrative position for a period not exceeding five years
- d) Ineligibility for outside teaching activities or the privilege to practice profession for a period not exceeding five years.

The foregoing shall be without prejudice to such penalties, liabilities or charges under existing contracts and agreements.

Rules of construction

The UP IPR Policy stipulates that nothing in these rules shall be construed:

- a) To prevent university administration from implementing rules relating to the enforcement of academic standards such as plagiarism and dishonesty.
- b) To alter existing university policy affecting conflict of interest including guidelines for outside teaching activities or practice of profession.
- c) To limit the University's ability to negotiate and to meet obligation for deliverables under any contract, grant, or other arrangements with third parties, including sponsored research agreements, collaboration agreements, license agreements and the like if these terms are more beneficial to meet the purposes and principles of these guidelines.
- d) To limit the interpretation of the Code of Ethics for Faculty as approved by the Board of Regents during its 1129th meeting on 25 Feb. 1999.
- e) To interfere with the discretions of editorial boards, textbook committees and the like to publish works.

7.2

INVENTION DISCLOSURE INCENTIVE

The Invention Disclosure Incentive (IDI) is an incentive program available to inventors, researchers, faculty members, students, staff and visiting professors undertaking research and/or creative activities pursuant to any program, project grant or contract under the auspices of the University, who disclose the existence and assign patent rights and other related rights such as undisclosed information or know-how pertaining to the following inventions to the University in accordance with contractual stipulations, the UP Intellectual Property Rights Policy, the implementing rules and regulations of the Philippine Technology Transfer Act of 2009, other guidelines and the implementing rules that may be promulgated by the Office of the President.

OBJECTIVES

The IDI shall be governed by the following objectives:

- a) Expand and enhance the patent portfolio and IP database of UP
- b) Support disclosure and publication of innovation through the patent process, in addition to traditional publication channels
- c) Reward diligence of inventors through the lengthy and painstaking process from preparation of applications to granting of patents
- d) Stimulate the creation of ground-breaking research and emergence of entrepreneurial ideas among inventors and researchers

- e) Encourage early disclosure of innovation, ideally prior to traditional publication channels, to protect the rights of the inventors, to facilitate technology transfer, and to increase the impact of the innovation by triggering the customer development process in parallel with the IP protection process

INCENTIVE SCHEME

A total fixed amount of P40,000 is awarded for each invention, in milestone-based tranches, to the inventor who has completed the invention disclosure process as described in these guidelines. The incentive amount shall be released following the schedule below:

- a) P15,000 for assessed and accepted disclosure
- b) P25,000 for patent filed

The grant of incentive is applicable only to a patent application filed in the Philippines.

If the invention is the result of a collaboration between multiple inventors from the University and outside entity, the incentive shall be shared by the collaborating inventors in accordance with the determination of their participation or contribution in the authorship or invention.

PROCESS FLOW

- a) To signify his/her intent to disclose, the inventor shall submit a duly accomplished IDI application form to the respective constituent university's Technology Transfer and Business Development Office (CU-TTBDO) for preliminary assessment.
- b) Upon review and consideration, the inventor is requested to accomplish the complete IDF and submit it to the CU-TTBDO together with the supporting documents, if any, such as but not limited to the following: (1) proof of concept, (2) preliminary prior art search, (3) presentation and public communication materials, and (4) copy of relevant agreements, contracts, grants and similar documents.
- c) The receiving Technology Transfer Office (TTO) shall assign an IDF reference number for proper documentation.
- d) The CU-TTBDO shall review the disclosure materials and note which part needs additional disclosure information. The CU-TTBDO may always attempt to have at least one meeting with the inventor, either in person or by telephone, to verify that he or she has a complete understanding of the invention including its technical, legal and commercially significant aspects.
- e) Submitted IDFs shall be assessed and ranked by the CU-TTBDO according to its novelty, inventive step and industrial application – taking into account the stage/ maturity of development, priority areas and potential commercialization – for review and approval of the UP System TTBD O Executive Committee (Execomm). It is suggested that the CU-TTBDO conduct a preliminary review of prior art (stage 1) including patent documents and scholarly articles before endorsing the IDF to the Execomm.
- f) Only a duly accomplished IDF, reviewed and approved by the Execomm, shall qualify for the incentive in the amount of P15,000.
- g) Inability to complete the IDF and supporting documents within the required response time of the TTBD O or its counterpart office in the CU shall delay the completion of invention disclosure process as well as the grant of incentive for qualified invention disclosure.

- h) The assigned patent agent (PA) shall draft the claims to define the scope of protection in terms of technical, structural and/ or functional features of the invention, sought by the inventor.
- i) Upon completion of the claims draft, the PA may send a copy thereof to the inventor for review. The CU-TTBDO and inventor may have at least one meeting prior to filing of the Request for Grant of a Philippine Patent to certify that the claims draft is accurate.
- j) The PA will conduct prior art search (stage 2) based on the claims drafted.
- k) Completed prior art search will be presented to the IP committee (IPC) designated by the CU-TTBDO for further evaluation and recommendation for patent filing.
- l) In the event that the invention is not patentable, the IPC may assist the inventor in considering possible alternative embodiments for the invention and may recommend a different approach of IP protection.
- m) A duly accomplished and filed Request for Grant of a Philippine Patent with the Intellectual Property Office (IPOP HL), including required documents set by the IPOP HL, grants the inventor the incentive in the amount of P25,000.
- n) The patent application will be published in the IPO Gazette together with the search document that reflects prior art established by the PA or on behalf of UP, and the process by which the IPOP HL examined whether the patent application satisfied the patentability requirements of IPOP HL under a given time.

OBLIGATIONS OF THE INVENTOR

- a) The inventor shall disclose the existence and assign to the University patent rights and other related rights such as undisclosed information, know-how pertaining to inventions in accordance with the UP IPR Policy, implementing rules and regulations of the Philippine Technology Transfer Act and other related laws and policies.
- b) The inventor shall coordinate with the CU-TTBDO prior to any form of public disclosure or entering into contracts such as but not limited to research agreements, IP agreements and commercial contracts with third parties to avoid risking the scope of IP protection and possibly hindering the opportunity to market the invention.
- c) The inventor shall closely coordinate, respond to requests and maintain contact with the TTBD O or CU-TTBDO until the completion of the disclosure and technology transfer process.

DISBURSEMENT OF THE INCENTIVE

Notification of incentive is released within 30 days upon review and approval of final documents by the Execomm.

The incentive shall be formalized with an issuance of check from the TTBD O to the inventor or main inventor, and in the case of collaboration work, as determined on the IDF, and signing of the payment acknowledgment receipt.

GENERAL GUIDELINES

A maximum of 10 IDFs shall be endorsed by the Execomm monthly for grant of incentive. IDFs that are not approved for grant of incentive due to maximum reach per month shall be automatically included for consideration in the following month.

IDF, patent claims, records and all supporting documents shall remain confidential. Likewise, the parties involved in the invention disclosure process shall obtain a confidentiality and nondisclosure agreement.

All disputes, controversies or claims arising out of or relating to these guidelines or about their termination or invalidity, shall be settled through negotiation and/or mediation facilitated by the Office of the Vice President for Academic Affairs within 60 days from the receipt of a notice by the other party from the party injured.

Invention disclosure, IP ownership and the grant of a Philippine patent are subject to the provisions of the UP IPR Policy, Philippine Technology Transfer Act, IP Code of the Philippines and such other related laws, rules and regulations.

THE COMPILER

Dr. Francis Paraan has a BS in Applied Physics and MS in Physics from the University of the Philippines Diliman. He received his PhD from the State University of New York at Stony Brook. He is an assistant professor at the National Institute of Physics, UP Diliman. His research centers on quantum information theory and parallel computing.

