

Graduate Training, Research and Excellence: Viewpoint from Mahidol University

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ABSTRACT: Graduate studies are important in helping a country to compete with others, since it produces researchers capable of creating innovation, as well as knowledgeable administrators, managers and other professionals. There has been rapid expansion in the number of graduate degree programs in Thailand in recent years at all levels, and this has raised concern about the quality of graduate training. This article explores the factors required for good graduate training, including the importance of research in graduate education, as well as the role of internationalization. Some examples are taken from the efforts of Mahidol University in promoting excellence in graduate training.

Graduate training is essential for any country to compete with others, since it produces the researchers needed to create innovation, as well as knowledgeable administrators, managers, and other professionals. Governments in Thailand have tended to place much emphasis on undergraduate training which is viewed as providing livelihood for the people and strengthening the educational standards of the country. On the other hand, insufficient support is provided to graduate training, since this is often viewed as a luxury, which should be paid for by those who can afford it. But, graduate training also provides research results of quality, so graduate education and research are closely linked, together promoting academic excellence at a university.

As a teacher, I sometimes ask myself what we should teach to our students. To answer this, it is useful to consider what kind of society we live in, as follows. We live in a knowledge-based society, where information is readily available through the internet. We live in a globalized world, where we must interact with people from other countries and where a global culture permeates the world. We live in a world of rapid change, where everything becomes outdated so quickly. We live in an age of science and technology, which shape our daily lives. So what then, should we be teaching our graduate students? Graduate study is certainly not learning various facts or memorizing information. But rather, we should help our students to develop various capabilities, such as learning how to think analytically and to evaluate knowledge, learning how to ask questions and define problems, learning how to think creatively and find solutions, learning how to learn and developing life-long learning capabilities, and finally developing confidence and skills to work independently. We as teachers must help students to develop these skills, and *research is probably the best way of doing this.*

Indeed, the term "Research Student" used in many countries for graduate students is an apt one, since graduate students learn by doing research.

In Thailand, there has been a rapid increase in the number of graduate degree programs in recent years. This, at least in part, reflects the expansion in the number of universities in 2005, so that the university system in Thailand numbers some 134 universities, including 24 Public Universities, 41 Rajabhat Universities, 59 Private Universities, and 10 Rajamangala Universities/Institutes of Technology. Information on the numbers of graduates produced at the Public Universities in 2005 has been collected by the Deans of Graduate Schools of Public Universities (DPGU) of Thailand, as shown in Table 1: data for other groups of university are not readily available, since data from the Commission for Higher Education's website are not reliable. As can be seen, there were 1,772 Graduate Certificate graduates, 183 Higher Graduate Diploma graduates, 33,862 Master's graduates and 749 Doctoral graduates produced by Thai Public Universities. The Open University Ramkhamhaeng University produced by far the most graduates, followed by Chulalongkorn and Kasetsart universities. In terms of Ph.D. graduates, Mahidol University produced the most followed by Chulalongkorn University, and Kasetsart University. A comparison of Naresuan University and Mahidol University is interesting, since they produce similar numbers of graduates, but Naresuan appears to specialize in Master's programs, while Mahidol places much emphasis on Ph.D. programs.

As more universities opened graduate programs not only at Master's level but also at Doctoral level, the Commission for Higher Education announced new regulations for graduate degree programs in an effort to maintain quality. Various measures were enacted, such as requiring that staff teaching in graduate

Table 1. Number of Graduates Produced by Different Thai Public Universities in 2005*.

Institution	Grad Cert	Higher Grad Dip	Masters	Doctoral	Total
Ramkhamhaeng	53	-	8,817	14	8,884
Chulalongkorn	299	144	3,367	149	3,959
Kasetsart	16	-	2,940	117	3,073
NIDA	-	-	2,759	10	2,769
Naresuan	4	37	2,557	9	2,607
Mahidol	711	2	1,607	164	2,484
Chiangmai	227	-	1,527	69	1,823
Maharakham	52	-	1,436	-	1,488
Srinakartwiroth	57	-	1,212	35	1,304
Khonkaen	123	-	1,087	48	1,258
KMUTT	20	-	1,196	38	1,254
Songkhla	20	-	986	21	1,027
Sukothai	68	-	882	-	950
KMITL	-	-	905	9	914
KMITNB	-	-	806	4	810
Burapha	35	-	559	33	627
Silpakorn	29	-	548	9	586
Thaksin	35	-	254	-	289
Maejo	-	-	200	-	200
Walailak	23	-	118	2	143
Ubon	-	-	67	3	70
Suranaree	-	-	32	15	47

*Data from the Deans of Graduate Schools of Public Universities (DPGU) of Thailand.

programs should have Ph.D. degrees or be Associate Professors, as well as requirements for appointing guest staff from outside the university and for having an external examiner from outside the university in the oral defense. Another regulation involves the requirement for publication, and now Master's students are required to publish, at least a proceedings article, while Ph.D.'s are required to publish in a journal (and at most universities an international journal). As a result of this, DPGU are now organizing Graduate Research Conferences twice a year to provide opportunities for Master's students to publish in the proceedings of these conferences, and other organizations are doing the same. The publication of work from the Ph.D. degree is also an important indicator of quality. *I personally believe that a Ph.D. degree should be of international quality*, so that graduates from any university in the world should be able to contribute to academic advancement at any other university in the world. Thus, I firmly believe that publications of Ph.D. research should be in international journals, so that international quality is assured. At Mahidol University, publications from Ph.D. theses in science are almost always published in journals listed in Institute for Scientific Information (ISI) Web of Science (WOS) Citation Databases. This is more difficult for Ph.D. theses in social science, arts and humanities, but there are also many other journals of international quality published in Thailand, as discussed in our recent

article [1].

Many senior academics in Thailand have expressed concern about the quality of Ph.D. programs, since some appear to be more geared towards making money, rather than in developing the student and achieving academic excellence. Interestingly, this concern is shared by academics elsewhere in the world. Thus the International Union of Biochemistry and Molecular (IUBMB) developed a "Standards for the Ph.D. degree in Molecular Biosciences" [2], to ensure uniform standards for Ph.D. degree worldwide. The first version was published in 1989, and the present second version was written in 1999 (and revised in 2006) by the IUBMB Education Committee, in consultation with 100 bioscientists in 50 countries, including myself. It is a very comprehensive document detailing the objectives of the Ph.D., and how these can be achieved. The introduction describing the problems leading to development of the guidelines is very instructive, as follows:

"However, while a large number of investigators have continued to develop the intellectual and experimental aspects of these sciences, there is anecdotal evidence that Ph.D. degrees are being awarded to individuals who are poorly prepared to contribute to scientific progress or to apply science to practical problems." [2]

And again:

"Departments in which the research capability is low should be discouraged from offering Ph.D. programs." [2]

This last statement is most important. Given that the Ph.D. is a research degree, departments with low research capability should not start Ph.D. programs, just to make money. Also, departments which hope to initiate research by starting Ph.D. programs are mistaken, since the department should have a strong track record of research before starting a Ph.D. program. If department staff not already doing research, who will act as thesis advisors for the students?

I will discuss some of the main features of the IUBMB Guidelines, since I believe they have some general application, despite being designed for science. The essence of the guidelines is that: "A Ph.D. graduate should have the knowledge, skills, perspectives and understanding to perform self-directed work of a quality acceptable to others in the field" [2]. This requires a) General knowledge of the field plus detailed knowledge of own specialized area of expertise; b) Familiarity with research literature in own field and ability to keep up with developments; c) Skill in the recognition of meaningful problems and questions for study and research; d) Technical skills of profession (such as laboratory skills); e) Oral and written communication skills; f) Skill in designing research protocols and in

conducting productive self-directed research. Each of these elements is discussed in much detail, and much thought has gone into the describing how these skills are acquired and in discussing the various considerations relating to each of these requirements. The interested reader is recommended to download and read the guidelines in detail [2].

I have focused attention on the doctoral degree, since this is the most important degree, but quality is important for other graduate degrees also. However, the Master's Degree may be of various types, not only a research degree alone, but also a degree with thematic paper or taught courses only. Higher Graduate Diploma and Postgraduate Certificates are more geared to developing professional skills. It is difficult to generalize on quality, but basically this depends on various factors, such as a) Quality of curriculum, such as response to needs of society, courses designed for proper development of student, and regular updates in response to annual evaluations; b) Quality and quantity of teaching staff, including qualifications of staff, and sufficient numbers to provide good supervision; c) Quality of Students, this will depend on emphasis on recruiting the best students or the most numbers of students; d) Research strength of department, including track record of staff in research and availability of resources and facilities for research. Efforts must be made to maintain quality, and it is good to hear that the Faculties of Graduate Studies in various universities have or are in the process of establishing Quality Assurance programs. This is essential because Graduate Schools generally have to work together with the subject faculties, who actually arrange the teaching, so there must be good coordination and understanding between those involved.

Given that research plays an important role in graduate training, all staff teaching at the graduate level should be doing research. Moreover, the success of graduate training depends on having sufficient numbers of staff with research capability. Good mentorship is a key to promoting the success of young researchers, not only at graduate student level but also postdoctoral level. There are numerous examples of outstanding mentor-advisee combinations, for example at the MRC Laboratory of Molecular Biology, Cambridge, where I obtained my Ph.D. Thus Frederick Sanger, who obtained two Nobel Prizes in Chemistry, the first in 1958 for defining the amino acid sequence of the protein insulin and the second in 1980 for establishing methods for determining nucleic acid sequences, was the Ph.D. advisor of Rodney Porter (Nobel Prize in Physiology or Medicine in 1972) and co-authored papers with my own advisor Cesar Milstein (Nobel Prize in Physiology or Medicine in 1984) during the latter's Ph.D. study. Another remarkable example was Max Perutz, who not

only shared the Nobel Prize in Chemistry in 1962 with his student John Kendrew for their work on the three-dimensional structure of proteins, but also had another student, Francis Crick win another Nobel Prize in Physiology or Medicine for the landmark discovery of DNA structure in the same year, 1962.

Apart from the track record of the mentor or advisor, the process of supervision itself is important, particularly in social sciences and humanities, where students may spend much time on their own without consulting with their advisor. Thus, during my term as Dean of the Faculty of Graduate Studies at Mahidol University, we have held a number of Good Supervision Workshops for staff and students, both separately and together, with the assistance with my colleague, Professor E.J. Wood from the University of Leeds, U.K. Linkages and collaboration are also important in research, since they allow researchers with interesting problems to join hands with those with the technology to solve the problem, and allow researchers with complementary expertise and/or facilities to obtain mutual benefit from collaboration. The Thailand Research Fund is to be commended for its Royal Golden Jubilee (RGJ) degree programs [3], which allow students in Ph.D. programs in Thailand to spend 6-12 months doing research with an overseas co-advisor, which not only helps in terms of research collaboration, but also provides students with overseas experience at a fraction of the cost of completing a Ph.D. abroad. The RGJ program not only selects advisors with good track record, but also tries to select good students. Since the program also requires that students publish their research work in international journals, or in a few selected journals of international quality published in Thailand [3], Ph.D. graduates tend to be of very good quality.

Another aspect is internationalization, which reflects the modern "borderless" era, where no country exists in isolation. Internationalization of degree programs enriches the study experience of students and ensures that degree programs have international quality. Mahidol University has both international and Thai-language graduate degree programs, and there is sometimes some confusion as to what we should aim for in an international degree program. Our recent Quality Assurance regulations have tried to address this question, using the words *must*, *should*, and *are suggested* to define different levels of requirement. Thus, international degree programs: a) *must* have all teaching, including writing of thesis, completely in English; b) *should* try to attract foreign students to study in the program; c) *are suggested* to have both foreign and Thai students; d) *must* have curriculum comparable to degree programs at top academic institutions overseas; e) *must* have staff with international experience and with very

good English skills; f) *should* have academic collaboration with overseas institutions; g) *must* support cultural exchange activities to encourage students to become global citizens; h) *should* have foreign staff involved in teaching and research.

Mahidol University has consistently placed strong emphasis on internationalization and research quality, and in the last two years has chosen the motto “Global Quality Thai Touch” to describe the aspirations of graduate education at the university. This means aiming for international quality, while retaining the best characteristics of Thai culture and ideals. Mahidol University has also achieved some notable successes. Thus, staff members have received more RGJ scholarships than any other university, particularly in the areas of medical science and biological science. Our Ph.D. graduates also have competed successfully with other Thai students graduating from the best universities in the world, for the Outstanding Thesis Awards of the National Research Council of Thailand, especially in Medical Science. Mahidol University has also received the Prime Minister’s Export Award 2006 for Most Recognized Service in International Education. But we must not rest on our laurels. During my term of office, special efforts have been made to attract more international students, through participating in international education fairs, but the faculty’s international services still also need improvement. Greater efforts must be made to improve the quality of research through various means. This includes Good Supervision workshops, assuring the quality of publications through selection of suitable approved journals, and providing more grants, not only for research, but also to reward good publications and to present the results at overseas meetings. Efforts have also been made to attract the best students in the country to study at Mahidol University, through providing more entry-level scholarships and through creating goodwill among students by encouraging students’ activities. Most importantly, new quality assurance measures are being introduced to help ensure that all degree programs are of high quality. Such measures to assure quality should also allow Mahidol University to respond better to the needs of working students, by offering more special degree programs taught outside office hours, while still maintaining quality.

Another difficult question is that of ethics and morals. I have previously quoted Sir Francis Bacon, my predecessor at Trinity College, Cambridge, four hundred years ago, who said “Knowledge is Power”, an apt description of the importance of educational establishments, such as universities. But there is another quotation “Money is Power”, apparently of unknown origin, perhaps because so many people adhere to these ideas. In Thailand, in recent years, we also have

the phenomenon, “Power is Money”. So, we now have the full cycle, “Money is Power” and “Power is Money”, a never-ending cycle where money buys power and power is used to make money to buy more power: this has caused so much harm to our country. What can we do, as teachers, to make students respect ethical values? There are certainly excellent guidelines for research ethics, such as those listed by the National Research Council of Thailand [4], which I would recommend for all researchers, whether they are staff or students. But we are talking about more than that, it is the challenge of creating a “good person”, who has a sense of right and wrong, and who will naturally choose right over wrong, even if it has less benefits. This, I submit, is as important for graduate training as the other aspects that I have discussed, and it is a challenge that I leave to all those involved in graduate training.

This article has emphasized the importance of maintaining the quality of graduate education, and the importance of research as a means of training students, using Mahidol University as an example. However, I hope that the ideas described here will be useful for graduate schools at other universities, as well as for advisors of graduate students. Graduate education is essential in helping Thailand compete with other countries, but to be successful, it is vital that we maintain quality.

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Many of the ideas expressed in this article are also being presented in an article by the author in a commemorative book published by the Faculty of Graduate Studies, Mahidol University on the occasion of the author’s 60th birthday.

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