

Experiences of Addis Ababa University in National Graduate Training and Research

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Brief Description of Graduate Training Programs at Addis Ababa University-

Graduate training programs were launched at Addis Ababa University in the 1978/79 academic year. A combination of factors prompted the University to launch graduate training programs at the time. Among the major factors was the need to provide qualified staff for the higher education sector. At the time, many of the expatriate staff were unqualified.

assure a mastery of special knowledge and skills, and a thesis where the candidate has the opportunity to learn to formulate a research project and to present information in written and oral form to a variety of audiences. Thus, Masters programs provide an introduction to scholarly activities and research and often serve as preparations for teaching careers in colleges and universities.

Table 1: Sponsorship of Graduates for 1980,1981 and 1982

Sponsors	Number of Graduates			
	1980	1981	1982	Total
Addis Ababa University	22	25	42	89
Institute of Agricultural Research	—	1	7	8
Ministry of Education	—	—	5	5
National Health Research Institute	1	1	1	3
Ministry of Culture and Sport	—	2	—	2
Central Planning Supreme Council	—	—	2	2
Ministry of Mines and Forestry	1	—	—	1
Goetebe College of Teachers Education	—	1	—	1
Commission for Higher Education	—	—	1	1
Asmara University	—	—	1	1
Ministry of Health	—	1	—	1
Ministry of Agriculture	—	—	1	1
English School	—	1	—	1
Ethiopian Nutrition Institute	—	—	1	1
Ethiopian Spice Extraction Corporation	—	—	1	1
Arsi Rural Development Unit	—	—	1	1
Volita Agricultural Development Bank	—	—	1	1
Addis Ababa Water Sewerage Authority	—	—	1	1
National Bank of Ethiopia	—	—	1	1
Ethiopian Air Force	—	—	1	1
German Cultural Institute	—	—	1	1
Total	24	32	68	124

Medical residency programs usually take three to four years to complete. An important aspect of the residency programs is that the training is task-oriented in that candidates actively participate in the care of patients under close supervision by senior academic staff. This is enriched with lectures, tutorials, seminars, grand-rounds and conferences. In this regard, candidates contribute significantly to the routine services of the hospitals in which they are being trained, and conversely the quality of services available in the hospitals equally contribute to their training.

Table 2; Sponsorship of Graduates for 1994 and 1995

Sponsors	Number of Graduates		
	1994	1995	Total
Ministry of Health	61	64	125
Ministry of Education	34	47	81
Addis Ababa University	23	18	41
Ministry of Planning and Economic Development *	9	6	15
Water Resources Commission	8	6	14
Ministry of Culture and Sport	5	6	11
Self	4	6	10
Alemaya University of Agriculture	5	4	9
International Development Research Centre	4	4	8
National Urban Planning Institute	3	4	7
Higher Education Main Department**	1	4	5
Jimma Insitute of Health Sciences	4	1	5
DAAD-NAPRECA	4		
Ministry of Internal Affairs	2	2	4
African Economic Research Consortium	—	3	3
SAREC	1	2	3
National Health Research Insitute	1	2	3
Asmara University	3	—	3
Public Service Commission	—	2	2
Region 14 Administration	—	2	2
Ministry of Agreculture	1	1	2
Yekatit 66 Political School	2	—	2
Ethiopian Building Construction Enterprise	2	—	2
Addis Ababa Sewerage Authority	—	1	1
Ethiopian Telecommunications Authority	—	1	1
Rental House Administration	—	1	1
Ethiopian Dill Paints Factory	—	1	1
Ethiopian Spice Extraction Corporation	—	1	1
NORAD	1	—	1
Ministry of Defence	1	—	1
Ministry of Labour	1	—	1
Ministry of Information	1	—	1
Ministry of Finance	1	—	1
Ministry of Trade	1	—	1
Ministry of Industry	1	—	1
Ethiopian Air Lines	1	—	1
Ethiopian Freight Transport Corporation	1	—	1
Ethiopian Science & Technology Commission	1	—	1
Ethiopian Navy	1	—	1
Ethiopian Wild Life Conservation Authority	1	—	1
Economic Commission for Africa	1	—	1
Engineering Industry Commision	1	—	1
Total	191	189	380

* Previously the Central Planning Supreme Council

** Previously the Commission for Higher Education

The Ph.D. degree is the highest academic degree granted by AAU. It is awarded to those who have demonstrated mastery of a field of study.

Table 4: Total Number of Graduates by Department (1980 - 1995]

Faculty of Science	453	College of Agriculture	71
<i>Biology</i>	???	(up to 1985)	
<i>Chemistry</i>	112**	<i>Agri. Economics</i>	6
<i>Geology</i>	26	<i>Animal Production</i>	17
<i>Mathematics</i>	103	<i>Plant Science</i>	48
<i>Physics</i>	68		
<i>Statistics</i>	33		
	* includes 3 Ph.D.		
	** includes 4 Ph.D.		
Faculty of Medicine	447	College of Social Sciences	123
<i>Anatomy</i>	2	<i>Demography</i>	22
<i>Anaesthesiology</i>	4	<i>Geography</i>	52
<i>Biochemistry</i>	1	<i>History</i>	33
<i>Internal Med.</i>	78	<i>Social Anthropology</i>	16
<i>Med. Microbiology</i>	3		
<i>Med. Physiology</i>	1	Faculty of Business & Economics	56
<i>Obs/Gynaecology</i>	48	<i>Economics</i>	56
<i>Ophthalmology</i>	30		
<i>Orthopaedic Surgery</i>	7	Faculty of Education	68
<i>Paed. & Child H.</i>	72	<i>Currie. & Instruc.</i>	27
<i>Pathology</i>	10	<i>Educ. Administ.</i>	13
<i>Public Health</i>	98	<i>Educ. Psychology</i>	28
<i>Radiology</i>	21		
<i>Surgery</i>	7	Faculty of Technology	34
Institute of Language Studies	179	<i>Civil Engin.</i>	22
<i>Linguistics</i>	45	<i>Electrical Engin.</i>	12
<i>Literature</i>	39*		
<i>TEFL</i>	84**	School of Information Studies	43
<i>TEAM 11</i>		<i>Information Science</i>	43
	* includes 1 Ph.D.		
	** includes 4 Ph.D.		
		Grand Total	1474

Table 5: 1994/95 Enrolment by Faculty

Faculty	Number of Graduates
Faculty of Business and Economics	35
Faculty of Education	65
School of Information Science for Africa	32
Institute of Language Studies	62
Faculty of Medicine	256
Faculty of Science	131
Faculty of Social Science*	84
Faculty of Technology	18
Total	683

* Includes Demography

The graduate study programs have also contributed to research output. The number of theses and dissertations written in the context of the graduate studies now exceeds 900, many of which are of high standard and thus of publishable quality. The opening of graduate programs has provided an impetus and an opportunity for staff members of the University to undertake research projects which are on topics of relevance for the country and some even applicable towards solving the problems context

grams, has the responsibility of ensuring availability of services (computer equipment, transportation, etc.), so that physical constraints do not restrict the productivity of researchers. On the other hand, there must be an appropriate level of sharing of these resources across departmental boundaries, since AAU lacks the financial and human resources to build and sustain such services on a diversified basis. Thus:

- Research equipment and consumables ordered from abroad for the various postgraduate programs are consolidated by the School of Graduate Studies so as to minimize duplication of efforts and maximize savings through bulk orders.

- As far as possible, efforts are made to build up common research and supporting facilities, such as
 - a pool of vehicles for transportation
 - computer facilities
 - photocopying facilities
 - electronic workshop, etc.

The Sponsorship Scheme

The other important strategy that Addis Ababa University has pursued is the sponsorship scheme. A candidate who applies to pursue a graduate study program at AAU is required to be sponsored by his/her employer, a government or private agency. Government and private institutions are encouraged to sponsor their employees to pursue graduate studies locally instead of sending them abroad on scholarships. This requirement has

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External Examination

One important mechanism that AAU has pursued in order to monitor the quality of theses/dissertations is to use the services of external examiners. Besides providing a valuable safeguard of standards from the university's point of view, the external examiner, usually from another university abroad, also ensures impartiality from the candidate's point of view. External examiners are also used to make comprehensive reviews of the programs, i.e. to systematically look at the teaching of graduate courses, the research infrastructure and research output, and forward their comments. Moreover, inviting external examiners, especially from universities abroad, may help our researchers overcome intellectual isolation and may even facilitate the creation of linkages for further collaboration. However, as the number of graduate candidates increases, the cost of financing external examiners from abroad is becoming increasingly burdensome.

The Sandwich Model for Ph.D. Training

As indicated earlier, the model adopted for the Ph.D. degree programs is of the so-called sandwich type. In this scheme, the Ph.D. student is sent abroad only for the "necessary" experience of working some time at another research laboratory. This exposure abroad has the additional benefit of giving the candidate the chance to appreciate what education abroad in a well-established university means. On the other hand, temptations to remain abroad are minimized by arranging the program so that as large a part as possible of the Ph.D. studies are completed in Ethiopia. It is important to note that the attrition rate so far is negligible, which means that the sandwich programs have turned out to be very successful in bringing about a decline of the brain drain. Moreover, the Ph.D. dissertations are based on issues that contribute to the solution of the country's development problems and not on problems that are either hypothetical or unique to some other country. The ultimate goal is that AAU will have a self-sustained Ph.D. program in operation without being dependent on foreign institutions.

University - Industry Interaction and Research Utilization

It is obvious that our researchers should have their research projects geared towards the solution of the socio-economic problems prevailing in our country. However, we find that there are very few channels linking research

to development. The technological or industrial base to absorb and apply graduate research results is weak.

In an attempt to tackle this problem, the Ministry of Industry and the Addis Ababa University have instituted a Cooperation Program. The Cooperation Program was established in February 1986. The agreement provides an institutional mechanism through which collaborative endeavors can be initiated and undertaken so that the technical expertise and facilities of the two institutions may be utilized to assist both in realizing their respective developmental objectives.

The two parties have identified and established, among others, the following activities:

- Research and Development work whereby the university faculty, with or without the collaboration of industrial personnel, identify and undertake applied research projects of immediate interest to the two parties.
- Thesis and Project Support. In order to identify and solve practical problems in industry, graduate students are encouraged, through financial assistance, to gear their thesis research to industry.

Graduate Training as a Component in Institutional Linkages

In research, creation of a critical mass is required to address common problems. In the situation we find ourselves, lack of financial and human resources makes building of such critical mass difficult on several fronts. Thus, developing useful linkages with well developed universities abroad for collaborative research in areas of common interest is one way of overcoming these national and/or institutional limitations. Such contacts help researchers in developing countries to sharpen their technical skills, to develop research methodologies, to overcome intellectual isolation, and provide access to research resources that may not be available locally.

Developing appropriate linkages with universities, departments or research groups abroad is thus an important area of concern for a university like ours.

Through linkages created with other universities such as Uppsala and Lund Universities in Sweden, University of London in the UK, University of Bonn in the FRG, and University of Waterloo in Canada, Addis Ababa University has been able to strengthen some of its graduate programs and

has in particular been able to enter into collaborations around Ph.D. sandwich programs. Important aspects of such a collaborative program are:

- a) It is a two-way learning process and as such, a good linkage must be based on mutual interest and demonstrable gains on both sides.

- b) It does not have to be a part of a formal twinning arrangement between departments. It can often be arranged between researchers without any formal agreements. Once contacts are established, cooperation takes on a variety of forms.

Support Provided by Overseas Donors to Graduate Study Programs at AAU

Addis Ababa University has received support for its graduate study programs from a number of different sources, among which can be mentioned: SAREC, UNDP, DAAD, CIDA, IDRC, ICTP, WHO, AREC, The British Council, NORAD, the Italian Government, etc.

When looking at support provided by different donors, it is possible to see specific patterns in the kinds of support that is provided.

Most donors prefer to be involved in supplying bigger pieces of equipment or long term fellowships. Inputs of these kind are, of course, important for Third World institutions beginning the building of research institutions. However, it is very often forgotten that the actual running of an institution requires a recurrent influx of foreign currency. In this respect, the support provided by SAREC for the graduate programs at Addis Ababa University deserves to be singled out as a model. SAREC not only covered the foreign exchange required to purchase minor pieces of equipment or expendable supplies crucial to the operations of the M.Sc. and Ph.D. programs in the Faculties of Science, Technology, and Medicine, but continued to provide such support for a number of years.

The foreign exchange supplied by SAREC amounts at present to SEK 500,000 per year for the M.Sc. programs and SEK 1,500,000 per year for the Ph.D. programs. The total amount of funds provided by SAREC, although rather limited for a project of this size, have been of very substantial importance. Compared with the input of resources from other donors, funds from SAREC represent a different kind of support, a support which has enabled the School of Graduate Studies to execute self-sustained M.Sc. and Ph.D. programs. To build a graduate training and research program with the necessary local infrastructure and scientific networks takes considerable

time, and it is imperative that the assistance also includes a long term component. Addis Ababa University is grateful to SAREC for recognizing this requirement in the case of Ethiopia.

Impacts of the Graduate Training Programs at Addis Ababa University

Pressing High Level Manpower Needs Met

The School of Graduate Studies can look back with pride on 16 years of successful efforts for the development of graduate studies programs. The number of graduate studies programs offered by the University has increased from 7 in the 1978/79 academic year to 41 in the 1994/95 academic year. During the same period, a total of 1474 students have graduated (including 12 from the Ph.D. program). These achievements, while very small compared to what remains to be done, are encouraging.

Moreover, with the exception of a few inter-institutional transfers, all graduates have returned to their sponsoring institutions, where they are presently in active service or pursuing further studies abroad.

The number of graduates from the various programs from 1980 to 1995 is presented in Tables 6 and 7, which give the number of graduates from 1980 to 1995 by faculty and year, respectively.

Table 5; Total Number of Graduates by Faculty (1980 - 1995)

Faculty	Number of Graduates
Alemaya College of Agriculture*	71
Faculty of Business and Economics	56
Faculty of Education	68
School of Information Science for Africa	43
Faculty of Medicine	179
Faculty of Science	447
Faculty of Social Science**	453
Faculty of Technology	123
	34
Total	1474

* Transferred to Alemaya University of Agriculture in 1985

** Includes Demography

Table 7: Total Number of Graduates by Year (1980 - 1995)

Year	Number of Graduates
1980	24
1981	32
1982	68
1983	62
1984	65
1985	60
1986	48
1987	63
1988	76
1989	110
1990	108
1991	118
1992	119
1993	141
1994	191
1995	189
Total	1474

Indigenous Research Capability Enhanced

The initiation of locally based graduate training programs has played a very significant role in the enhancement of research at the university.

Let us consider graduate research in biology and chemistry from the natural sciences and geography from the social sciences as samples to obtain insight into the kinds of graduate research done and to appreciate its impacts.

Biology

The Biology M.Sc. degree program was initiated in the academic year 1978/1979. The Ph.D. degree program was launched in 1987. The Department has so far graduated 108 students with the M.Sc. degree and 3 with the Ph.D. degree. Most of the students have attended the Department of Biology and other colleges at AAU, with some from coming from the College of Teacher Education, Ministry of Health and Ministry of Agriculture. After graduation, all have returned to their sponsoring institutions and are in active service.

The 108 M.Sc. theses completed so far have covered the following themes of research:

- crop, livestock and dairy production

- fisheries and aquatic resources utilization
- forestry
- soil, water vegetation and wildlife conservation
- disease and vector control
- traditional medicine
- water supply development planning
- physiological, ecological and taxonomic studies

About one third of the theses have formed thee

The Ph.D. program was launched in 1984. The Department has up to now graduated 108 students with the degree of M.Sc. and four with the Ph.D. degree. One third of these students were staff members of the Department of Chemistry at AAU. Other major sponsors have been Asmara University, Alemaya University of Agriculture, Ministry of Education, Ministry of Health, Commission for Higher Education, and the Ministry of Industry. With the exception of a few inter-institutional transfers, all M.Sc. graduates have returned to their sponsoring institutions, where they presently are in active service or are pursuing further studies abroad.

The research themes of the 108 theses so far completed have been:

- Natural products
- Spectrophotometric determination of metal ions.
- Organo-metallic and coordination chemistry
- Electrochemistry
- Electro-analytical chemistry

About 50% of these theses have resulted in publications in Scientific Journals.

The scientific strength of the Chemistry Department can be demonstrated by mentioning that the Bulletin of the Chemical Society of Ethiopia is published at AAU with an editorial board composed of Chemistry Department staff. This is an internationally recognized journal indexed and abstracted by Chemical Abstracts.

The Chemistry Department is reasonably well equipped with core equipment, which includes UV, visible and IR spectrometers, chromatographs, a 90 MHz NMR facility and a mass spectrometer.

A very good selection of both scientific journals and books on chemistry is located in the central library. However, one very serious problem has developed recently, in that all subscriptions have been canceled as of January 1st 1989 because of lack of foreign exchange. This problem must be solved as soon as possible in order not to damage too seriously both the M.Sc. and Ph.D. programs in chemistry a subject in which it is imperative to have access to the most recent literature.

Geography

The M.A. program in geography started in the academic year 1979/80, when the first batch of students were admitted. The existing curriculum offers two streams: human/economic and physical geography. There are several com-

mon courses between the two streams and in addition a number of specialized courses. The thesis work that is required may encompass the analysis of the physical endowments of regions such as land resources (soil, biomass, climate, etc.) as well as the analysis of agricultural activities, industrial location, population distribution and transportation networks, as well as other topics.

A total of 52 students have completed their studies and graduated. Most of the students have been sponsored by Department of Geography and other colleges at AAU, with some from Ministry of Education, Asmara University, Kotebe Teachers College, National Urban Planning Institute and the Institute of the Study of Ethiopian Nationalities

All theses completed have dealt with relevant development and planning issues in Ethiopia. 50% of the theses are in the general area of human/economic geography with the following typical topics:

- problems of socio-economic regionalization in national planning
- state commerce and peasant service cooperatives
- labor migration
- problems related to zonal road transport system
- distribution of postal services
- problems of urban housing shortage
- problems of urban journey-to-work
- distribution and utilization of government health facilities
- regional disparity in education

The remaining 50% of the theses were in physical geography, on topics like:

- soil toposequence
- ecological and altitudinal zonation studies of vegetation
- climate trends and variations
- stream erosion
- land use, agricultural production and soil conservation
- prevalence of schistosomiasis

Many graduates have continued to develop various aspects of their thesis topics into journal articles and conference/workshop/seminar papers.

In spite of rather meager resources for:

- the undergraduate as well as the graduate library
- facilities for collection of field data

- production of the rather voluminous theses
- computing facilities

... the Department has within the M.A. program been able to carry out an impressive amount of original research, which has been recognized internationally through staff members' ability to gain consultancy contracts and obtain research funds in international competition.