Presidential address

by

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UNDERGRADUATE RESEARCH IN THE UNIVERSITY OF JAFFNA

Universities, as centres of higher learning have been traditionally associated with research. Research activity and excellence in it is an essential requirement to the University teacher in his academic performance. However, although activities by students, that could be classified as research take place in many University departments, these activities are rarely highlighted as essential fulfilments for his future or national needs. Research as its name implies is a careful search or inquiry into facts, old and new, by scientific methods. It is a course of critical investigation. Hence it is a branch of instruction or learning, the methods of which should be imparted to all undergraduates irrespective of the discipline and whether the course leads to a special or general degree.

The importance of this aspect of training was recognised in this country at the secondary schools level twenty years ago. Diyasena (in Sanyal Ch. 3) states that 'The educational reforms of 1972 brought in curricular changes at the higher secondary schools (grades 10 and 11) and a compulsary component that was introduced in the curriculum was called 'Project Work'. This was introduced with a view to including training, in problem solving, in multi disciplinary approaches to community problems, in data gathering and their use in arriving at decisions. This was basically a community based educational programme. These reforms and activities that came under what was called the HNCE programme were short lived and were hardly given a trial'. At present there is no component in the school curriculum that caters for any project work.

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However it has been said that the radical changes made in formal school system during the decade 1970 – 1980 had considerable influence and impact on some of the curricular changes and development that took place at the University level. (Diasena, in Sanyal)

During this decade efforts were made by some Universities to relate University education to employment. During the 1970s these efforts culminated in the development of the job oriented courses of study in the Arts Faculties. (Bertram Bastiampillai, Ch. 5 in Sanyal)

University education was to be refashioned so that graduates could be profitably employed. There was also an interest in making education meaningful for Sri Lanka's development needs.

Studies were then made to find out the job opportunities of the graduates and also their role in national development. It was found that the public sector i. e. employment by the Government, provided the largest number of employment opportunities, and the teaching service provided the single largest area for the employment of University graduates. During this time Basanayake (1971, preface) observed that there is in Ceylon a wide gap between local research and school teachers. Research goes on in research institutions, Universities, museums and the like. It gets published in reports and journals. Practically none of it gets to the teacher.He suggested that the teachers could be encouraged to do research and thereby activate the habit of reading research reports Local research material would increase the relevance of the content of their courses to the interest of their pupils and to the needs of the country.

The Sri Lanka administrative service (SLAS) is another field of employment open to graduates in this country. (Ch.6 Sanyal) Next come the semi-government sector, which covers all corporations, Boards, Statutary Bodies and National Banks. These provide employment opportunities at specific levels of the hierarchy of employment. The private sector uses comparatively

few graduates. (Ch.6 Sanyal) In the Government and Semi-government Sectors, the executive / administrative level jobs were open to all catagories of graduates in arts and sciences. Although clerical grades generally require secondary level qualifications under the present situation, University graduates especially in the Arts oriented subjects were invariably being absorbed into clerical positions, and they rise to administrative posts in later years.

It is thus seen that the graduates of a University are responsible for teaching children, who would be national leaders of the future or are holding important posts from which they decide the future of this country now. Both these positions need men and women, whether there are graduates in special or general courses, in Arts or Sciences, with a University training that would equip him or her to:

i. identify the rationale behind any action taken in any assignment and solve problems as they arise.
ii. generate new and innovative ideas with a sound base of knowledge of the past.
iii. formulate and construct a fact finding document, for example a questionnaire or record form in order to understand the present position of any situation in which he works.
iv. write a report or circular after any short or long term assignment keeping in mind the person or persons going to read it.
v. make the best use of available resources in terms of men, money and materials.
vi. make a realistic assessment of his own capability, which is an essential qualification for successful work in almost any profession (SRHE).
vii. Face the challenges of professional life by helping him to accept his own limitation and to become aware of when and how to seek advice (SRHE), and finally as Suseendrarajah (Pers.Common) remarked.
viii. make him think logically and to the point in his institution and on public platforms.

The unit in the curriculum that would give him an opportunity to acquire a mind possessing these abilities will be training in research methods. The value of such research, call it projects, exploratory studies, essays, dissertations, reports or whatever, has been acknowledged world wide.

The role of research also varies, the contribution of some disciplines as in the Physical Sciences, is more visible and quantifiable, while others are general and subjective. For example historical research helps in inculcating among the people a sense of national determination, cultural identity and formulation of national ethics. Sociological research gives information for the nation's planning and policy making. Health Systems Research gives immediate information of the working of the Health Systems to the Health administrator and so on.

Research in the Different Faculties

In this address I have attempted to describe and catalogue the research done by undergraduates in the Faculties of Science, Arts and Medicine. The research activities in the Faculty of Medicine have been dealt with in more detail than the work in other Faculties. Comparisons were not always possible as the disciplines vary in their conceptual approach from concreteness to abstraction, for example physics and Mathematics on one hand to Philosophy and Fine Arts on the other.

From the data available I have discussed the programmes and made suggestions that could improve the present status of undergraduate research in this University.

Methodology

Information was collected from the Heads of Departments and Professors in the various disciplines where research is a component and is being evaluated in the curriculum, by using a semi-structured self administered questionnaire. Interviews were also made with the respondents whenever it was necessary to clarify the data provided. There was one hundred percent response. Heads of eleven departments in the Faculty of Arts, five in the Faculty of Science and two in the Faculty of

Medicine supplied information. In addition Professors of Geography, Physics, Chemistry and Biochemistry who are not Heads in their departments gave their views. Three of them are Deans of the three Faculties considered in this study. In the Faculty of Arts, the Department of Sociology which is a new one, has no students who are at a stage for research studies. In Science, Mathematics has no research component. In the Faculty of Medicine, undergraduates do research in the curriculum of Biochemistry and Community Medicine, and they involve all the subjects taught in the whole medical course. For the sake of uniformity and completeness. information from the last batch of students evaluated in the research component was used in this analysis.

Faculty of Science

The faculty has five Departments of study, namely Chemistry, Botany, Zoology, Physics and Mathematics & Statistics. It also has a computer Unit for teaching and research. It provides courses leading to a three year General Degree and a four year Special Degree.

General Degree Course

Students following the general degree take three subjects in different combinations, and according to the subjects are classified Bio-Science students or Physical Science students. In the 1989/90 batch there were 45 students in the Bio-Science and 89 in the Physical Science courses. There is no research component in the general science courses and therefore these 134 students had no opportunity for training in research. Even if they were exposed to activities such as field surveys in Botany or Zoology, there was no formal evaluation so as to give such an investigation any importance.

Special Degree Course

Students who perform well in the first two annual examinations are admitted in the third year to follow the special degree course choosing a main subject in which they obtain their

degree. These students do research, which is compulsory, and is timed to be in the fourth and final year. In the 1989/90 batch there were 34 students in all.

The number of students working for the special degree in each discipline is small, four each in Zoology and Statistics, six in Physics, eight in Botany and twelve in Chemistry. The research done is of an applied nature and the time a student takes in his resarch ranges from 8 - 12 months. Research methodology is taught as a module only in Zoology and Statistics. Department of Statistics devotes 45 hours mainly concentrating on computer soft-ware for statistical techniques. The Department of Zoology teaches the methodology in entomological and Fisheries Biology research for a period of two months. The final presentation of the research is in the form of reports, except in Chemistry where the term dissertation is preferred. The weightage given in the final assessment is as follows:

1/4 of 8 units in Botany, 2/5 of 8 units in Chemistry and 1/2 of 8 units in Physics and Statistics.

Faculty of Arts

The Faculty of Arts has 14 Departments of study. As in the Faculty of Science courses are available for general and special degrees in all disciplines except Siddha Medicine, where there is no differentiation. In the batch taken for study there were 201 students in the special courses. Of these 114(56.7%) are in the Department of Commerce and Management, 79 students in Commerce and 35 in Business Administration. Twenty four (11.9%) are Geography special students and 21(10.4%) are in Economics. Rest of the students i.e. 21% of them are in the other subjects, varying from 11 to 2. There were no students in the special course in Linguistics and English in the batch under study. As stated earlier students doing Sociology have not come up to the year for research.

Special Degree Course

Special degree courses are of four years duration and research component is compulsory. It is conducted in the final year except in Philosophy and Tamil where it is in the third

year. Research in Commerce. Business Administration and Geography was described as applied research, while other departments called it essentially basic in nature.

Table 1 shows how the 54 projects in Commerce and Management could be classified by categories of Management. Of these 22 were in the public secter, 15 in the co-operative and 17 in private sectors. Fifteen projects dealt with industries, nine with banks and the rest were not classified.

Table 1. Projects in Commerce and management, 1991 Batch

Management category	No.	%
Marketing	20	37.0
Production	12	22.2
Organisational	12	22.2
Personal	9	16.7
Financial	1	1.9
All catagories	54	100.0

In most departments the students were given an years time to work on their projects and submit it documented. Commerce, Business Administration, Economics and Political Science however insisted on a more intense work and expected the research to be completed in 4–6 months. However it is not possible to state the number of hours actually spent by the students in their research study.

Course in Methodology

Organised class room teaching in research methodology as a module or unit is done by some departments before the research, while some prefer to give necessary instructions when the students are on the project. Useful inputs for research eg. Statistics are also incorporated in other modules by some departments. The number of hours spent for classroom instruction is defined only when methodology is taught as a module. In others the times vary with the disciplines and are not comparable.

Commerce and Business Administration which has the highest number of students doing research in the Arts Faculty has no organised module in research methodology. In addition to the information imparted in the normal curriculum, individual guidance is given to the students by the superivsors at all stages of their assignment. A student gets on an average 2 hours of guidance per week and this goes on for 2 - 3 months. The student also learns statistics in a course unit, where problem oriented assignments are given.

The Department of Economics gives instructions in research methodology as lectures totalling four hours. Statistics is taught as a separate module.

The Department of Geography has a well organised programme of class room teaching in research methodology, and is spread out as 1-2 hours per week for 2 terms. The theoretical instruction includes all aspects of methodology from problem identification to report writing. Cartographic techniques in Geography, while this form the normal curriculum in the discipline are further emphasised in the programme, in relevance to the assignments given to the students.

The Department of Political Science spends four hours in class room sessions where students are taught the format of writing an essay or dissertation on the subject, together with the use of references. In addition students who need knowledge of statistics are taught basic methods whenever necessary.

Departments of History and Hindu Civilization which have 5 students each, have a similar type of training in research, giving instructions in selection of topic, collection of material, analysis, drafting, marking foot notes and bibliography etc. This takes about 30 hours in both departments.

The Department of Christian and Islamic Civilization has a module on research methodology, and this is done on an average in 7 classes.

The Departmnet of Philosophy teaches scientific methods as applied to philosophy in two short modules, one each in the second and third years.

The three Departments dealing with languages, namely Tamil, Sanskrit and Linguistics together with English have no module for research methodology. Students are taught the methods during their project work.

The Department of Siddha Medicine has no research project, but has a project on Family Health which needs skills of observation, recording, interpretation and documentation Elementary introduction to these skills is given during the lectures given to them by the Department of Community Medicine.

Documentation and Evaluation

The research by students is submitted in the form of dissertation. Departments of Philosophy and Sanskrit call them essays. Evaluation of the research goes into the final assessment and the weightage given in all departments is in the region of 1 in 15 or 16 units.

General Degree

Only the Department of Geography has a research component in its course and is evaluated on a dissertation. There were 5 students in the batch, which is small compared with the 24 in the special course.

Departments of philosophy and Tamil insists on a report from the students.

FACULTY OF MEDICINE

The Faculty of Medicine has identified research by students as one of its institutional objectives. It reads thus:

Objective 3.3(e): 'to encourage basic and applied research particularly the identification of regional and national health problems as well as indigenous medicine and therapeutics'. Further in defining the characteristics of the end product of the Jaffna Medical Faculty it states that he should be able to design, implement and submit a report on a research project'. (Hand book, Medical Faculty).

The students undertake two research projects at different stages in their course. First is in the second year course, before the Second MBBS Examination. This research comes within the perview of the Department of Biochemistry. It is largely laboratory based and involves other departments, especially Physiology in terms of content identity and for it supervision. The second research is done in the Fourth Year before he takes the Third MBBS Part II examination. By this time he has passed Anatomy, Physiology, Biochemistry, Microbiology, Parasitology, Pharmacology and Forensic Medicine. He has almost completed his course in Pathology and Community Medicine and done 1½ years of clinical work in the hospital. He is at a level of maturity comparable to that of a young post-graduate student in the Arts and Science Faculties. This research is undertaken as a requirement in the curriculum of Community Medicine and the studies are based in the Community and the Hospital. I wish to give in some detail information about these courses.

Research under the Department of Biochemistry

The Department of Biochemistry has integrated planned research projects with their modified practical classes in biochemistry at various periods of time. This strategy in the curriculum was adopted to enable the students to see the relevance of biochemistry in their medical career and was seen as a motivating factor. It was found necessary to change the format of the traditional biochemistry practicals, so that time was available for research projects of the students. The students, from the first term itself, was given a training in calorimetric estimations and the use of chromatography and electrophoresis instead of their qualitative studies. By the third term in his course, the students were familiar with most of the routine clinical biochemistry practicals and general methodologies that could be applied in basic and clinical research. About this time, physiology practicals in the cardio vascular and respiratory systems have been completed, a requirement for the students to choose research projects in a wider clinical context. The students have also had a series of lessons in basic statistics given by the teachers in Community Medicine, accomodated in the physiology time table

The Department of Biochemistry has had the research project for six batches of students so far. It carries 10% of the marks in biochemistry which is one of the three subjects in the 2nd MBBS examination. The areas for research are suggested by the department, but the students carry out individual projects. The projects cover a wide range of subjects. In the earlier batches the spread was more, for example it covered fields embracing genetics, nutrition, hypoglycaemic drugs, allergy, exercise transcendental meditation etc. In later batches, as the topic areas were grouped the projects seemed to be more manageable for supervision. A grouping of the recent batch is shown in Table 2. Of these 87 projects 8 were supervised by the teachers in physiology, and the others by the biochemistry teachers. Supervision and help during the students projects consume a considerable amount of time of not only the teachers in biochemistry but also of the technicians, as an accademic member and the two technicians are always available in the laboratory right through the week including Saturdays.

Table 2. Biochemistry Student Projects

Subject Groups	No. of Projects	%
Effect of Smoking (Includes cigar, beedi) Effect of tobacco chew	27	31.0%
Effect of dietary fibre and soya bean	16	18.4%
Effect of hormonal Contraceptives	14	16.1%
Effect of drugs, tea, coffee	10	11.5%
Effect of other substances	06	6.9%
Disease related biochemical changes	07	8.0%
Others	07	8.0%
	87	99.9%

The effect of the research component in the biochemistry curriculum was discussed by the curriculum committee of the Faculty at the end of the projects of the first batch, that carried out research. The committee had a favourable view of this trial and recommended that the weightage given to the research project in evaluation be increased (Balasubramaniam, 1992). It considered the project work to be a motivating factor for the learning of biochemistry, as it provided exposure to information retrieval and developing their innate ability to judge case and research reports.

The motivational factor was also studied by the Dept. of Biochemistry by getting the opinion of students by means of a structured questionnaire administered to the first research batch (Balasubramaniam, 1992). All the 69 respondents said that they liked doing the projects. The reasons given for their liking the project work is worth consideration, 40.5% said that it helps them to gather and accumulate knowledge and 24.6% said that it helps in analysis and deductive thinking. 21.7% believed that they were contributing to medical knowledge. 3% said that they liked it because they could meet people. 10% wanted the projects to earn marks. To a question whether the projects should be compulsory, 58 students ie 55% said that although made compulsory, it should not be included for marks in the examination. The major difficulties experienced by the students in carrying out the projects were identifying and approaching people (37.7%) and getting specimen and other data (34.8%), which means 72.5% of the students considered getting the required specimen from selected people to be their major hurdle. An important information worth the Faculty's consideration was that 23 of the 69 respondents ie. 33.3% recommended that there be one research project for the entire medical course. The rest wanted several projects at different stages in their course. However it should be added that it was too early for the students to form a definite opinion on this issue. The marks obtained by the students for the research batch out of 100 was 73.5 and the 2nd batch was 70.1, the standard deviation being 11.6 and 12.1 respectively.

Some of the students have been successful in getting their findings published in journals or reading them in meetings of scientific associations. Upto now 3 students projects have been published together with their supervisors names, two in the Jaffna Medical Journal and one in the Journal of Natural Science Council. Eight research papers have been read; five of them at the annual scientific sessions of the Jaffna Medical Association, and 3 at the present sessions of the J. S. A. Recognition of student research has high motivating value to future batches of students for maintaining quality of their studies.

Research under the Department of Community Medicine

TEACHING FOR RESEARCH

Some of the subjects taught in Community Medicine, like epidemiology, statistics and sociology provide the elements of knowledge and skill that is fundamental for research in the medical field In addition the students are given a 7 hours course of lectures in research methodology before they embark on their research projects in the fourth year. This course covers all stages, from identifying a problem for study, getting permission to do the study from various authorities including the ethical committee, to writing and reading a report. The main topics dealt with are : Formulation of general and specific objectives, construction of a hypothesis, identification of variables, research design including sampling, construction of appropriate instrument (Eg.questionnaire) pilot study, collection of data, analysis and interpretation.

This course enables the students to identify projects that could use descriptive, analytic or experimental and quasi-experimental methods in various situations in the hospital and community. Methods of interviewing and training on data collection are emphasised during the teaching. Health System Research concepts are also clarified, so that he could recognize the applied nature of this type of research for timely decisions for the Health administrator.

At a later stage in the Community Medicine course, the students are given a class on critiquing a research paper, as one of the objectives of the research component in the curriculum is that the student should be able to read a research article critically and evaluate it for his own development.

RESEARCH ACTIVITIES

The batch evaluated in 1990 was the first to do the research project in Community Medicine, as stipulated at present. The earlier batches from the 1st batch had a component known as the 'Family Study' which they followed up for 1 year and wrote a report at the end. It carried 10% of the marks in Community Medicine.

This Family study project had several sub-studies in it, such as knowledge, attitude and practice of the family on health matters and also a full nutritional assessment and follow up of their health status for 1 year. The one year family study therefore had the elements of observation, recording and interpretation in its own context.

However the present research project carried out by the last 3 batches has defined qualities of a Research Project.

Selection of the Topic is of considerable importance because a difficult unmanagable topic would, along the way, fatigue the student and the supervisor. and the end would be hard to achieve. By the time the course in Research Methodology is over,the student is capable of identifying the problem area or discipline in which he is interested. He is full of enthusiasm, which is very gratifying to the teacher, but the teacher finds it difficult to narrow down his enthusiasm to a well defined topic with clear objectives or simple hypothesis so that the study is relevant, feasible, practical and can be done in a short time with little cost.

The research projects selected cover a wide range of topics, as expected because of the multidisciplinary nature of

the Health Care, which is emphasised in the various components of the curriculum in Community Medicine itself - mother and child care, prevention of diseases, occupational health, nutrition, sociological and psychological components of health, management for care etc. A broad grouping of the research subjects by category is given in Table 3. Quarter of projects deal with general diseases, communicable and non-communicable in all age groups, 16% with diseases of women and childbirth, 14% with childrens' diseases and care, 7% with psychiatry and 5% with drugs and poisons. One third are projects related to behaviour of the patient and care by the provider.

Table 3. Subjects of Research by Batches

Subjects	Batches			Total	%
	1992	1991	1990		
General Diseases	05	07	25	37	25 2
Gyn & Obs	03	05	16	24	16.3
Paediatrics	09	04	08	21	14 3
Psychiatry	01	06	03	10	6.8
Drugs & Poisons	03	01	03	24	4.8
Others	12	12	24	48	32.7
Total	33	35	79	147	100.1

Table 4 shows the major types of research into which these projects could be classified. Almost half use the epidemiological methods of study and of these almost all of them use descriptive epidemiology. A quarter of the projects inquired into the knowledge, attitude and practice (KAP studies) of well and ill people and used sociological methods of inquiry. About 20% have a high clinical component where student actively collect information by examining the patients. These are classified as clinical. The rest 7% deal with simple studies on the working of the Health System.

Table 4. Category of Research by Batches in Community Medicine

Category	Batches			Total	%
	1992	1991	1990		
Epidemiological	08*	18	42*	68	46.3
Sociological	15	05	17	37	25.2
Clinical	07	08	17	32	21.8
Health Care analysis	03	04	03	10	6.8
Total	33	35	79	147	100.1

* 1 Lab Based

SUPERVISION

Supervision in the early stages of the project is vital for the success of the students research. The importance of the selection of the topic has been already mentioned. In the department of Community Medicine the average number of consultations with the teacher for selection of the topic and formation of the general objectives or hypothesis is about two, which we consider is a reasonable contact time.

The students in our projects usually make their first contact with a teacher in Community Medicine. as the project has to be approved by the Head of the Department of Community Medicine, and sent to the ethical committee. They usually select their immediate supervisor in consultation with the teachers of Community Medicine. Taking all the three batches together, 50% of the projects have been supervised by the clinicians at the teaching hospital, Jaffna, 40% by the teachers in Community Medicine and 10% by the other departments in the Medical Faculty. In addition all students make it a point to have some contact with the teaehers in Community Medicine whether it is necessary or not, because they are aware that the evaluation of their projects is done by them.

It was pointed out that only 40% of the supervision is from the Dept. of Community Medicine, so that a clear understanding of the purpose and format of this project work

was necessary among the other supervisors, chiefly consultants in the Teaching Hospital. In Feb. 1987 when the first batch of students (1984 batch) started their research a circular was sent by the Dean, Faculty of Medicine to the prospective supervisors, clincians and teachers in other departments explaining the objectives of the research project. It gave the elements of a project proposal and the format of the final project report. Supervision of these projects by the clinical teachers, not just helped to ease the load of work of teachers in Community Medicine but gave much credibility to the projects relating to the discipline, which was their speciality.

EVALUATION

The research project is given 15 of the 100 marks in Community Medicine which is one of the 6 subjects in the 3rd MBBS examination. In the batch evaluated in 1990 each student carried out a project and evaluation was on the report submitted and on a viva, both carrying equal marks. However later, projects were allowed to be done by 2 or 3 students as some projects were large for a single student. Further monitoring large number of single projects, reading the reports and having viva were beyond the scope of the teachers with a limited time. When more than one student did a project same marks were given to the report, but the marks varied in the viva depending on the students performance. In the last batch time restrictions and shortage of one member of the staff forced us to mark only on the report. No students gets less than 40% of the marks in the research project, as projects are returned to the students for correction and if necessary re-writing if the standard of the report falls below this mark. If he does not come up to this mark before the examination, he is not allowed to sit the examination. So far this happened to one student only.

EVALUATION BY STUDENTS

Students evaluation of the research projects was obtained by means of a questionnaire which was answered anonymously. For the batch 1990 it was done just before the evaluation,

61 out of 79 responded, ie 77%. As we thought that there might be a tendency to please us before the examination even annonymously for 1992 batch the questionare was administered just after the results were published. Many students had left the peninsula and were not available. We asked the students how confident they feel for the future in doing the various stages in research. Answers were given on a 5 point scale ranging from very poor to very good, point 3 was average. All students scored more than 3 in each of the 12 stages identified. The first 5 stages where highest number scored 5 points were in order of numbers-collection of data, selection of sample, selection of topic, selection of method and literature search. In the other stages their response was average. Least number of 'very confident' responses was for writing objective and hypothesis. A feed back from the students was found to be very useful and we were conscious of our defects in teaching, and attempts were made to correct them both in the lecture and during student contact times. The students' satisfaction regards supervision of their projects certainly improved by our efforts to have more contact times.

When the opinion of students on some selected items or issues were inquired into, only 46% of the 1991 batch said that the degree of help they received from the supervisors was more than their average expectation. In the 1992 batch 70% said so, as regards usefulness of the project for their doing research in their future carier 87% of the 1990 batch and 85% of the 1991 batch said that their usefulness was more than average. In fact 60% thought it was very useful. Again 92% in the 1991 batch and 80% in the 1992 batch said that the project exercise was more than average help in reading articles in scientific journals. However 20% in both batches said that they did not enjoy doing the research project.

Facilities and Limitations

Library

The opinion regarding library facilities for undergraduate research varied among the respondents. In the Science Faculty of the six respondents four said it was good or satisfactory. In

the Arts Faculty similar response was 8 out of 11 respondents. Hence 70 per cent of the Heads of departments were satisfied with the library facilities. However in both Faculties majority of the teachers said that the current publications came late as is expected under the present situation. It was also pointed out that the reference books in Tamil were limited and the Tamil periodicals very inadequate. The library facilities in the Faculty of Medicine is good, especially because of the books and publications sent very regularly by the WHO as donations. This Faculty also gives priority to the purchase of books suitable for reference by students in using the WHO and other grants.

Only the Department of Geography mentioned the lack of microfilm reading facilities as a limitation. It appears that the Departments have taken the present adversity in life in general as a matter of course and not considered as a limitation the lack of facilities usually found in modern libraries.

Laboratory

The Head of the Department of Chemistry is of opinion that the facilities in the laboratory are poor for research by students. Chemicals are in very short supply and basic apparatus Eg. spectroscopic instruments and instruments for chromatographic seperation are not available. S. Maheswaran said that inadequate equipment hinders monitoring of research. Hence projects are limited to certain types. Similar views regarding lack of chemicals were expressed by the Heads of Zoology and Biochemistry. Both the Head and Professor of Physics remarked that the lack of equipment and material affects the flexibility of the research work. (Often the students were forced to adopt techniques which can be implemented using standard equipments and materials if available). It was also difficult to find standard projects for students with the facilities available in the laboratory. Only the Department of Botany was satisfied with the available facilities.

Computer

The Departments in science and arts that reported the dearth of computer facilities are Chemistry, Geography, and Commerce and Management. The Head of the last department

remarked that the computer unit is not in a position to accomodate large number of students from his department. In the Faculty of Medicine, the Department of Biochemistry does not have sufficient computers for use of undergraduates. Some students working on research projects of the Department of Community Medicine use the Computer unit of the University.

Travel

Student research in almost all departments is affected by the present difficulties in transport. The departments most affected are Geography, History, Hindu Civilisation, Economics and Commerce and Management. Balakrishnan remarks that ideally professional courses like Commerce and Buisness administration should relate to work place experience including research. Under the present constraints, this is not possible.

Funds

There are no funds available for undergraduate research n their curriculum. Most of the respondents identified lack of funds as a substantial limitation for research by students.

Others

Other limitations identified were lack of supervisors, time, paucity of projects and the inadequate English proficiency. Several Departments especially Physics, Commerce and Management and Community Medicine pointed out that the supervisors lacked the time to give sufficient guidance to the student projects due to their committments to teaching, administration and field work. Kunaratnam was of opinion that 'when large number of students get involved in research, it becomes difficult in the course of time, to find suitable projects which are different from the ones given in previous years.' The same opinion was expressed by Balakrishnan regarding projects in Commerce and Buisness Administration. S.K.S. Nathan observed that the references in economics and political sciences were in English and the students' proficiency in English was inadequate to make the best use of these references. This observation is likely to be true for other disciplines as well.

Observations of the Heads of Departments on undergraduate research

All the Heads and Professors of the Dapartments interviewed were of opinion that research at the undergraduate level was a useful component in the curriculum. Kunaratnam summarises this usefulness by saying "that research enables the student to apply the knowledge to real problems. It makes them think independently and critically and exposes them to the limitations of models used in lectures. In our context, classroom teaching only encourages passive learning while research results in active learning, as the student himself explores."

V. K. Ganeshalingam, K. Kandasamy, K. Balasubramaniam and S. Krishnarajah express similar opinions when they remark that research:

(1) Gives primary strength to the undergraduate ie Confidence (V. K. G. & K. K.)

(2) Motivates and promotes better understanding of the subject (K. B. and S. K.)

(3) Stimulates intellectual, independent, and analytic thinking (V. K. G., K. B. and S. K.)

(4) Improves communicative skills (V. K. G.) and

(5) Prepares for continued education (K. B.)

Maheswaran, Professor of organic chemistry indicated that the research is useful to students doing postgraduate studies and those seeking jobs in the industry. Balachandran dealing with research in geography states that this training helps in all future jobs by the graduates in private and public sectors. Five heads of departments in the Faculty of Arts stated that research in the undergraduate course enables the student to do post-graduate degrees eg: M. Phil in their disciplines. A comment made by Kunaratnam is worthy of quotation here. He states that 'if all teachers are able to engage in active research (real research, and not preudo-research!) a better alternative to research projects would be to

get students to assist the teachers in various aspects of their research, but unfortunately, in our context, this seems to be a remote possibility'.

Discussion and Suggestion

The emphasis given to the research component in the courses leading to special degrees in Sciences and Arts and that of Medicine is gratifying. Sufficient analysis was not attempted in this study, which is of an exploratory nature, to determine either the degree of sophistication reached by individual research or the usefulness of the research to the country. A cursory inspection of the titles of projects in geography, economics, commerce and management showed that many of them have relevance to national needs and demands. Some of the projects in Community Medicine and Biochemistry are good enough to be pilot projects for more intensive research by teachers.

Suggestion No. 1 : The teachers of all disciplines should identify the research contribution by students for further research and publicise short abstracts of the studies already done by students for use by others.

The total absence of a research component in the general degrees, except geography, deserves thought and timely action. Students in the general courses form a formidable number in a batch, in the one studied 134 in Science and 104 in Arts. They will also be our future administrators, Bankers, Business-man, policy makers and above all teachers of our children. All the good qualities of research discussed in this paper should be their forte as well. In fact I see no reason for not training a 'general' graduate in research. It has been omitted by tradition, as one of the professors (Nathan, S.S.K.) told me.

Suggestion No. 2 : Students following the general course should be given a training in research methodology and directed to projects relevant to their future jobs and to the country

Many departments do not have a class room teaching module for research methodology. In some departments the training appears inadequate. All disciplines have their own methodologies and those have to be imparted before projects are given. Recently Joseph E. Stiglitz (1991) writing in the Economic Journal described the methodological innovation in economics as the triumph of 20th Century economics. This is equally true for many other disciplines; the development of Health Systems Research in recent years could be cited as another example, Research into the working of the Health System, apart from using epidemiological methods depends heavily on the techniques used by Sociologists, as many studies are based in a society setting. Similarly all disciplines in the Faculty of Arts have a direct link with the society. They produce graduates special or 'ordinary' who are thrust among people with their problems - cultural, occupational, socio-economic and political in various settings. Work in these settings need humanistic approach, a mode of inquiry andtraining linked with anthropology and social psychology. In short social research teaches a student, methods which are part and parcel of every day administration.

Certain disciplines for example those dealing with languages, philosophy, civilisation and political Science should get away from their 'purist' attitude and come in terms with reality if their under graduates are to fit into society. Kim and colleagues (1980) state that modern thought is to broaden the curricula and "liberate" it from the "purist" tradition. This is not easy. They state that at the Chulalonkon University of Thailand "the advent of the behavioural approach has split social scientists in Thailand into two opposing groups.

To the traditionalists, the correct tactics for social sciences is the introspective study of the mind rather than observations of external behaviour. Advocates of the new approach, on the other hand, find it a great stimulus for research". Again, "with the rapid development of sociology and anthropology excessive formalism in political science has been toned down by approaches through political sociology." (Kim et al 1980)

Suggestion No. 3: A course in appropriate research methodology is essential for all disciplines.

Students in the Faculty of Arts, related to humanities - History, Languages, Political Science, Economics and those dealing with Hindu, Christian and Islamic civilisations – would benefit by training in sociological methodology. Data collecting techniques, such as Focus Group Discussion, Nominal Group Techniques, Delphi technique, case studies and participatory research give a wide range of possibilities for gathering information on the economic, social, political and cultural aspects of national life.

Tamil, as a language of modern thought and communication needs research on its usage by different sections of the people in every day life - education, administration, law, aesthetics etc. Readability and relevance of modern prose for fiction and non-fiction, readership of Tamil literature and other books in Tamil could be assessed by these methods.

Suggestion No. 4: A common methodology course in the social sciences, conducted as lectures, seminars or workshops should be organised for the disciplines dealing with humanities ie those that come under Section D of this Association. The Department of Sociology is best suited for the formation and execution of this common curriculum.

This arrangement also provides for inter-departmental co-operation in research, for example a student in Tamil could have as his supervisor a lecturer from Sociology.

Suggestion No. 5: Inter-departmental or even inter-faculty collaboration should be encouraged in student research.

A notable absence in the Arts and Science Faculties is academic orientation to the library. In the Faculty of Medicine, every new batch is introduced, by groups, to the use of the library. This includes organisation of the library resources, classification and shelving of books and the use of catalogue for location of the books. In addition special instruction is given by the Senior Assistant Librarian on the use of Medical Index, before the research projects.

Suggestion No. 6: A common course on the usage of library should be organised for the students at entry to the University. This should be supplemented by additional instructions on the library for research.

Various limitations were identified by the teachers in the execution of student projects. The following three suggestions are put forward in order to make the best use of the materials, time and the supervisor.

Suggestion No. 7: As far as possible group research involving 2 – 3 students should be encouraged, and appropriate methods for marking individual student be devised, as done by Community Medicine.

Suggestion No. 8: Get students to participate in the research projects of the teacher wherever possible.

This gives opportunity to the students to see a lecturer not only as a teacher but as a research scientist.

Suggestion No. 9: The Computer Unit of the University be enlarged and re-organised so as to enable students to get their research material analysed by appointment.

Students must be encouraged to produce research of quality, without which the whole excercise would be meaningless, infact counter productive.

Suggestion No. 10: Selected student research should be

i. kept for reference in the library, even in abstract form.

ii. given a chance of appearing in local Scientific or Medical journals.

iii. presented at the meeting of the JSA and JMA.

Further opinion of students on their research activities will supply the departments methods of improvement of this component in the curriculum.

Suggestion No. 11: Students evaluation of the research activity must be obtained for each batch by using an anonymous questionnaire.

Finally, regular monitoring of the students research activities is important in order to find out the many issues related to it.

Suggestion No. 12: Each Faculty should have its curriculum committee that regularly monitor the execution of the student research. In the case of the Faculty of Arts the Department of Education should take an active role in co-ordinating the activities related to undergraduate research.

Ladies and gentlemen, I have chosen a subject which is important and worthwhile. My study has been of an exploratory nature. The comments made by the Heads and Professors have been very useful. I have studied them before making my suggestions. I hope my simple study would give rise to better thought and action so that we produce graduates who are capable of reasoning for truth, and live up to the motto of this University.

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அப்பொருள் மெய்ப்பொருள் காண்பது அறிவு

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