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Doctoral Research at Mahatma Gandhi University 1983-2008: A Bibliometric Analysis

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Introduction

Giving a stunning vision of future, Alvin Toffler discusses in Power Shift about force, wealth and knowledge the three sources of power at the edge of the last century. The use of force as a source of power will continue. The state is not going to give up the gun. Control of immense wealth also will continue to confer enormous power. But what we are witnessing now is the most important change in the history of humanity. Knowledge is gaining importance over other sources of power with every fleeting nano second. The military might now depend not on the mindless fist, but on information systems and knowledge embedded in weapons and surveillance technologies. Wealth is also increasingly dependent on knowledge. The advanced economy cannot run without information systems and the knowledge of the new complexities of production and integration of diverse and constantly changing technologies. Knowledge therefore is not only the dominant of the three sources of power, but is also the most important constituent of the other two sources, force and wealth. Knowledge has gone from being an adjunct to money power and muscle power to being their very essence. The most important power shift of all therefore is according to Toffler not the shift from one person, party or one institution to another. It is the hidden shift of the relationship between force, wealth and knowledge. It has become an accepted fact that knowledge will rule the next century. This explains why the battle for control of knowledge and the means of communication is beating up all over the world.

Universities play a crucial role in the generation and application of new knowledge. Their contributions may belong to the four major areas into which the responsibilities of the universities are traditionally assigned; teaching, research, conservation and extension. Teaching is a systematic transfer of the sum total of knowledge a society holds to its growing generation through various well-structured courses of studies and training programmes. Research is pursuit of new frontiers of knowledge and wisdom in whatever directions and to whatever extent possible; Conservation is the preservation and maintenance of the knowledge generated and the cultural traditions and values of the people and Extension is the reaching out in service of the society at large for making the knowledge generated useful. The success or failure of a university is measured by the contributions it has made in the above areas. Here an

attempt is made analyze the research contribution and generation of new knowledge in the university during the last quarter of a century bibliometrically.

Research is a scientific undertaking, which by means of logical and systematized methods, aims to discover new facts relevant to the community or region in which it is produced or verify old facts analyze their sequences, interrelationships, casual explanations and the natural laws, which govern them. *Webster's New International Dictionary* defines research as 'studious enquiry or examination; specifically and usually, critical and exhaustive investigation of experimentation, having for its aim the discovery of new facts and their correct interpretation, the revision of accepted conclusions, theories or laws, in the light of newly discovered facts or the practical applications of such new or revised conclusions, etc. Research is governed by the rule of objectivity and not of subjectivity. It continuously develops a discipline or field of study with the use of scientific and rational methods. Thus research means advancement of science and knowledge. Every subject puts its best brains to do research. Researchers are always on the forefront of a profession or subject field and impart it new directions and dimensions. A discipline is based on existing knowledge base and research, which constantly update and add to it. No discipline can survive without constant and organized research.

Research is incomplete until its results have been communicated. Preferably this is best done in print, where the background to the study, the details of methods, the date extension, the placing of new findings in the perspective of the old, and the formulation of a hypothesis can all be exposed to the critical reader and enshrined in permanent form. The eminent physicist and science philosopher John Ziman, has declared that 'the object of research is publication'. Publication is still not enough: an article has to be read. But publication of all theses produced is impractical due to various reasons. So methods like digital open access repositories to expose them to the expected users need to be undertaken.

Knowledge is power and man is an inborn curious being and a power - seeker. So research has always been going on in every kind of human society - even in primitive society. Innate curiosity to know the unknown; or necessity to seek solutions to some problems endangering man's survival, or the desire to make life more comfortable has led mankind to probe and experiment constantly. Man's evolution is simply not a biological process. It is also due to his urge and

efforts to do research to know the unknown. Research may or may not be of immediate practical purpose in mind. In other words, the research may be basic or applied.

Research and Development

Research has always been a source of excitement and incalculable benefit to the society. Findings of research are invariably accompanied by social change and economic and political development. In the pre-industrial society, research was mostly a private affair. But after the industrial revolution the pace of research had to be quickened to meet the growing demands of the society. Mounting population pressure, growing consumerism, fast depletion of limited natural resources; perceived need to have political or military edge by one nation over the others, urge to save time and space, need to find cures for diseases to prolong health and long life have given rise to planned, organized and coordinated research. Our security, health, education and economy depend mainly on scientific research. Tremendous progress made by the mankind and the economic prosperity and military powers of big nations are only due to the availability of knowledge generated by research.

Investment in research yields rich dividends. Every government dedicated to democracy and social welfare not only encourages research but also funds it adequately without any undue interference regarding the results. In the information society, research has acquired new pace and dimension because society subsists on information and knowledge, which is generated by research.

Doctoral Studies

Doctoral studies comprise one subset of research and development for which the country mainly through approximately 450 universities and research institutions invests substantial resource. Investment on doctoral research in India is worth over Rs 3000 crore with about 30,000 theses written each year. But still now India is not having a reliable central repository of doctoral dissertations. The results of our doctoral research have not received its due attention in further research as well as application. This is due to the lack of bibliographical control of research done in the country as well as lack of facility for disseminating the results of research.

This has led to various problems from lack of visibility among academia for Indian doctoral research

to duplication, repetition and even plagiarism. Resultantly the stature of Indian universities and their research has lowered significantly when compared with the ancient days when scholars from all over the world respected and took hazardous journeys to learn at our great centers of knowledge like Nalanda and Takshasila. Now most of the advanced countries have created an online central database where universities as well as researchers post their theses and dissertations. In such countries most of the universities have now put their doctoral dissertations in Open Access Institutional Repositories.

There is also a view that if we put the results of our research – the doctoral dissertations in open domain, research of inferior quality will be made public which will mar the reputation of the institution as well as the individuals who have got benefited by the academic degrees. But we have to keep in mind that in a country like India 95 % of the expenses for higher education and research of a scholar is met by Government. When we use public fund for research that should become useful to society. The other researchers, the other universities and government departments engaged in public service and the public should the right to use the results of public funded research for the benefit of the society. They also have the right to evaluate its usefulness. It is a fact that if the results of public funded research is to be made into application for the benefit of the society, it is to be made open and kept freely accessible. They are not intended to be kept in closed shelves away from use. If death by neglect is not to be the fate of our doctoral dissertations they are to be put into Open Access institutional Repositories. By doing this future research also can be restructured qualitatively based on criticism attracted by the results put in Open Access Archives.

Every university should produce and periodically update a document with data on research conducted up to the present organized in a scientific way with subject wise classified listing and well-built indexes. The universities as per some national standards should database such documentation and these databases should be pooled together and made freely accessible to the public by organizations like UGC or INFLIBNET. Along with this universities should make available the full text of the PhD theses approved by them in their web sites as Digital Open Access Archives.

With the proliferation of the Web, theses digital archives have become a global showcases of research capabilities of each country. If every university could

create a complete reliable repository of their dissertations, they can be linked or content can be pooled by UGC or INFLIBNET. With this idea, MGU has envisaged its Digital Online Archives of PhD Theses.

Central agencies should pool such thesis collections and keep them accessible to public 24 hrs 365 days a year; if any university is not having the technical know how and manpower for that. This only can make the result of research accessible to the society at large, and bring it into application, which only can prove its relevance and worth. This only will put the work of a university into test and will ultimately ensure the quality and relevance of research. Without this the expenditure on research from public fund cannot be justified.

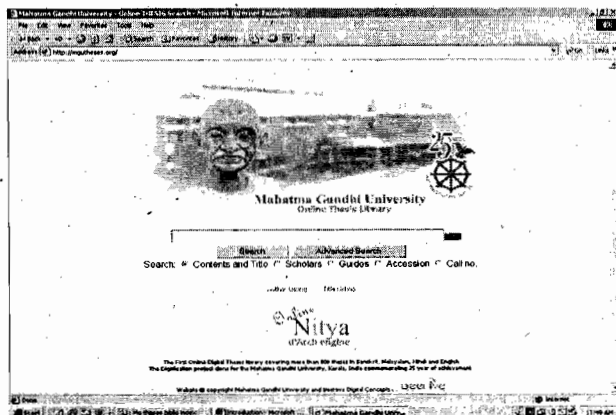
Presently thesis collections of the universities remain as restricted collections generally used only by the academic community inside the university. So the results of research reach not even 1% of their expected users. The relevance and utility of the doctoral research never come into question, which permits degradation of doctoral research into a mere formality for acquiring qualifications.

Some organizations of government of India have schemes to procure one copy each of science dissertation to preserve and make them available to the researchers for consultation. But they are available only within the premises of their libraries. But this is also not a reliable source, for the collection is limited to what could be identified by the organization. Latest information on PhD degrees awarded each week is regularly published in the weekly *University News* published by Association of Indian Universities (AIU), which is one of the most reliable documentation. But AIU also could not launch a reliable full database of PhD dissertations approved by Indian Universities.

Even though INFLIBNET, Vidya Nidhi and many other agencies have attempted to make Indian documents of doctoral research accessible to the public, due to lack of strict rules necessitating provision of data to these agencies they have not even got 25% of theses approved in India. Only funding agencies making it mandatory for the receiving agencies to make results of research freely accessible and prescribing standards for that can help to improve the situation. Also it should be the responsibility of each institution to develop a full and reliable digital collection of their research work. Central agencies can pool them or link them.

MGU Theses Open Access Archives

In the Silver Jubilee Year 2008 MGU has initiated the development of an Open Access Digital Archives of PhD Theses approved by the university. University has also developed software for the archives with search mechanism in the line of Google. This makes results of research conducted at MGU accessible to the public 24 hrs 365 days a year. It is the first such successful venture by any Indian University



Home Page of Online Digital Archives of MGU Doctoral Dissertations

It is the first Online Digital Theses of any Indian university covering more than 1000 theses in English, Malayalam, Hindi and Sanskrit. It was launched by H.E. Dr. APJ Abdul Kalam, Former President of India on 9th November, 2008. It is the first of its kind by any Indian University to apply a special archiving package for hosting its entire knowledge generated by doctoral research in the web. Its mechanism for online search based on Nitya Digital Archive (dArch). The specificity in search and retrieval offered by Online Nitya for MGU theses archive is commendable and its metadata can be made OAI-PMH (Open Access initiative – Protocol for Metadata Harvest) compliant.

Bibliography of Doctoral Research

University also published a bibliography of PhD theses approved by the university entitles Doctoral Research- Mahatma Gandhi University: 1983-2008. This volume in print documents data on Doctoral Research undertaken in MG University during the last quarter of a century, which is also available in the Internet. It also provides details of the approved research centers of the University, Research guides etc. the book has scholar and indexes as well as an

elaborate subject index.

Bibliometric Analysis

Bibliometrics is the use of mathematical and statistical methods to study document and patterns of research publications. It is a core methodology of Information Science, practiced long before the term bibliometrics (1996) itself was coined. Bibliometrics can be divided into descriptive and evaluative both of which can in turn be further divided by productive count (geography, time and discipline) and literature count (reference and citation). The term originated from earlier and narrower term *statistical bibliography*. Bibliometrics is now understood as part of the larger domain of Informetrics.

Bibliometrics limits the coverage within scholarly communities and their information generation and use while Informetrics covers a wider area of the society and also vast and varied types of information and knowledge resources. Informetric studies signify a new approach to scientific study of information generation, dissemination and use. The improved bibliometric methods are applied not only to scientometric studies, research evaluations or Science and Technology but also to the analysis of their mutual societal, industrial and other special relations. While bibliometrics is traditionally associated with the quantitative measurement of documentary materials, informetrics aims also to study information in all formats and sources. Methods from social science and humanities as well as experimental research in the natural science sense are normally applied in various contexts, serving as a base for careful validation and ensuring the scientific value of analysis. Informetrics is one of the rare truly interdisciplinary research fields and the sense of theoretical and methodological approaches is rich which is the strength of the discipline. Bibliometrics, scientometrics, technometrics, webometrics, cybermetrics etc are part of the domain Informetrics.

In this bibliometric analysis of data on 1006 theses an attempt is made to briefly describe the starting and growth of doctoral research and proliferation of knowledge in different faculties in university by year, subject, institution, guide, gender and language. The present analysis has only a simple bibliometric approach. But that also points out that serious informetric studies should be conducted on the research work of each and every organization periodically to assess the value and effect of projects sustained by public fund.

Research System at MGU

Mahatma Gandhi University (MGU) with "B" accreditation of National Assessment and Accreditation Council (NAAC) was established on 2nd October 1983 as the fifth university in southern most State of Kerala India. As per the Act 12 of 1985 the university has to cater to the higher education of Central Kerala consisting of the Revenue Districts of Kottayam, Ernakulam and Idukki; and a few Taluks of the Pathanamthitta and Alappuzha Districts. University has its main campus in Athirampuzha and also 8 satellite campuses at Pullarikkunnu, Sooryakalady Hills, Nattassery, Puthuppally, Gandhi Nagar, Cheruvandoor, Thodupuzha, Nedumkantham and Chuttippara in Kottayam, Idukki and Pathanamthitta Districts.

The university has seven faculties for Science, Fine Arts, Commerce, Engineering and Technology, Technology and Applied Science, Ayurveda, and Homeopathy. Under them university has 20 interdisciplinary Schools for teaching, research and higher learning in Applied Science and Professional Studies. The mandates of the schools are shared as follows.

Biosciences	Computer Sciences
Chemical Sciences	Environmental Sciences
Gandhian Thought / Devt Studies	Management/Business
International Relations / Politics	Physical Education and Sports
Pure / Applied Physics	Adult/ Continuing Edn/ Extension
Behavioral Sciences	Distance Education
Language and Literature	Communication/ Information Sciences
Pedagogical Sciences	Life Sciences
Indian Legal Thought	Medical Education
Social Sciences	Technology/Applied Sciences

The university has research collaboration with various national and international organizations like UGC, CSIR, ICMR, BARC, ISRO, Toronto University, Max Plank Institute of Technology, Edinburgh University, Ruth Cohn Institute etc to facilitate inflow of cutting edge of technologies and methods.

SciFinder Scholar Ranking of MGU

SciFinder Scholar (SFS) covers world's largest pool of scientific information updated daily by specially picked up 800 and more world's topmost scientists from concerned fields. An evaluation of the strong areas of research in MGU done using SFS revealed that MGU faculty have 731 papers sited worldwide and the university is strong in the area of substances in property studies under Physical Chemistry with 478 research works of international repute. Under this natural rubber having 84 research works is the strong specialization. An evaluation of the published research work of MGU scientists who were cited worldwide was also done using SFS. It revealed that Dr. Sabu Thomas with 151 research works selected by SFS ranked first and Dr. C S Menon with 90 selected works ranked second.

Doctoral Research at MGU

The university has awarded about 1006 doctoral degrees for research activities undertaken by the scholars in various disciplines. Scholars from the university have published over 6000 papers in research journals of International repute. At present the university offers research facilities and guidance in over 40 disciplines through its own Departments as well as about 150 approved research centers. The university has also set up a dedicated Intellectual Property Facilitation Centre, in order to promote research, acquiring of IPR's and for technology transfer.

The University's Library and Information system is having a web enabled Central Library and 20 Departmental Libraries, and 4 Study Centres. The University is a member of UGC INFONET E-Journal Consortia and has access to more than 8000 online journals and databases through the consortia as well as other sources.

The Library has set up a Centre for Digital Archiving in 2007. The Centre has built up a Digital Archive of PhD theses approved by the university, which is made accessible through Intranet and Internet as an Open Access Archive as part of Silver Jubilee Celebrations. The Centre is also developing an Institutional Repository of the research papers published by the scholars from the university. A Digital Archive of PhD dissertation brings into control the data on research which can help to give exposure to new knowledge generated, use it for further research, evaluate the research already done, identify relevant areas still remaining un touched and help to frame future policies and directions on research.

Research at MGU

Silver Jubilee Year is an occasion to assess and record the research contributions of the university during a quarter of a century of its existence. An overview of the areas in which work was done can reveal the relevance of research conducted in the university, the capabilities as well as constraints, and limitations of different faculties. This can help to formulate policies for future research and development in the university. This study covers 1006 doctoral dissertations and 16 patents produced in MG University in different disciplines during 1983-2008.

Chronological Distribution

As per the theses available at the MG University Library the university awarded the first Doctoral Degree in 1988 for the thesis on *Polymeric Analogues of t-butyl Hypohalites as Solid - Phase Organic Reagents* by Sreekumar, K in 1988 and was guided by Dr. Rajasekharan Pillai, V.N at the Department of Chemistry of the University.

In the first seven years that is from 1983 to 1990 the university awarded only 11 Doctoral Degrees. In the next ten years that is during 1991-2000, university awarded 370 Doctoral Degrees. In the next five years, that is from 2001 to 2005, university granted 381 PhDs which mean that approximately twice the number of doctorates granted in the last decade will come before the university for approval in the present decade. We have to consider that by the first ten years all the facilities of the university have become full fledged. About 39 PhD Dissertations were submitted and approved in the year 1993. Chronological distribution of PhD theses shows that since 1993 the number of PhD's awarded in 2006 was very high (101) and in 1994 it was very low (26).

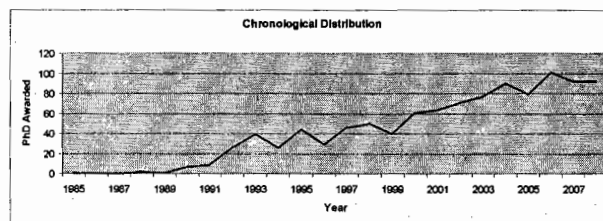


Fig.: Chronological Distribution of PhDs Awarded

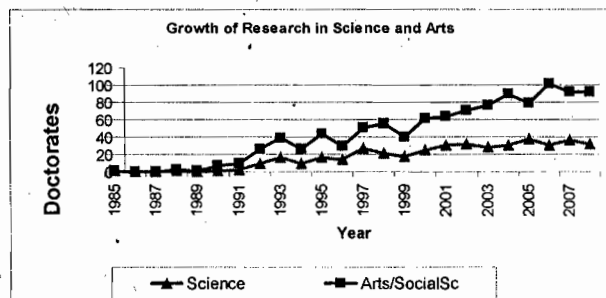
From 1983 to 1990 MG University has awarded 11 PhDs. In 1991 university awarded 9 doctorates. But in the next year that is 1992 the University approved 26 PhD dissertations, which is 166 % higher than the previous year and 39 in 1993, which shows 50% increase. The implementation of UGC Scheme in the State in 1988 and the conditions prescribed for appointment and Career advancement of teachers would have prompted many to register for research immediately. The cut off date of December 1992 for obtaining PhD degree for getting exemption from the UGC NET for teaching jobs in universities/colleges was later advanced to December 1993. After the cut off date there is a decline reflecting the loss of immediate relevance of PhD for Career. There is a 26% decline in the number of PhD awarded during 1994, which was the lowest growth rate between 1993 and 2008.

The UGC direction related to extension of time for acquiring qualification has caused a heavy rush for PhD registration again since 1998 and facilities for PhD research have been introduced and expanded according to the requirement in most of the universities. As a result, there has been a spectacular rise in doctoral research in MG University also. The graphical representation given here shows that the growth continues since then.

Table: Year wise Distribution of PhDs

Year	PhDs	Year	PhDs	Year	PhDs	Year	PhDs
1985	01	1991	09	1997	46	2003	77
1986	00	1992	27	1998	50	2004	90
1987	00	1993	39	1999	40	2005	79
1988	02	1994	26	2000	61	2006	101
1989	01	1995	44	2001	64	2007	92
1990	07	1996	29	2002	71	2008	51

Subject wise Distribution



The year wise comparative evaluation of research in science and arts subjects reveals that there is slow and steady growth with very little fluctuation in science subjects at the university. But in the case of arts and social science subjects there is a great fluctuation. There is a steep rise of doctorates in arts subjects since the implementation of UGC Scheme in 1988, which slowly declines during the next 10 years to again take an upward climb after the next revision of the scheme in 1998. But in the case of science subjects the growth achieved is small but is sustained in the succeeding years.

Table: Discipline wise Contributions

Subject	Doctorates	Percentage
Behavioral	26	2.58
Gandhian	35	3.47
Economics	49	4.87
Social Sc	52	5.16
Politics	35	3.47
Law	8	0.79
Management	35	3.47
Pedagogical	41	4.07
Literature	316	31.41
Chemistry	142	14.11
Physics	95	9.44
Bio Sc	172	17.09
	1106	100

In the analysis of the dissertations on subjects mandatory to schools of MGU difference between the subjects figure and the distribution rate shows distinct trends among various disciplines and schools. School

of Letters was established at the time of inception of the university. Research conducted under its leadership on language and literature (31.41%) has the greatest rate of the distribution. It is followed by Schools of Bio Science (17.09%), Chemical Sciences (14.11%), and Pure and Applied Physics (9.44%) on areas mandatory to them.

Except language and Literature the quantum of work done in individual subject areas of arts and social sciences is very less. Doctorates produced in Economics is 4.87%, History and related areas 5.16%, Politics and International Relations 3.87%, Gandhian Thought 3.47% Pedagogical Sciences 4.07% Management and Commerce 3.47%, Behavioral Sciences 2.58% and Legal Thought 0.79%.

When compared with Arts, the science disciplines were in better position and their contribution is considerable during all the years of existence of MG University.

Areas of Strength of the University

Literary Studies: Regional and World literature forms an area in which university is strong in research. Of the 1006 dissertations analyzed 316 are on literature. Of the research on language and literature 69 coming to 22% are studies on English Literature. Dissertations related to Latin American, African and Indian Literature other than Malayalam and Hindi come to 14%. The contributions in Hindi and Malayalam come to 31 % and 34 % of the total research on language and literature. Research on literature was mainly on areas like comparative literature, history of literature, psychological analysis of characters and incidents, as well as politics, mythology, feminism, sex, violence, ecology, family, humanism, tribal life, religion etc depicted in literature. The studies covered fiction, poetry and essays in various languages.

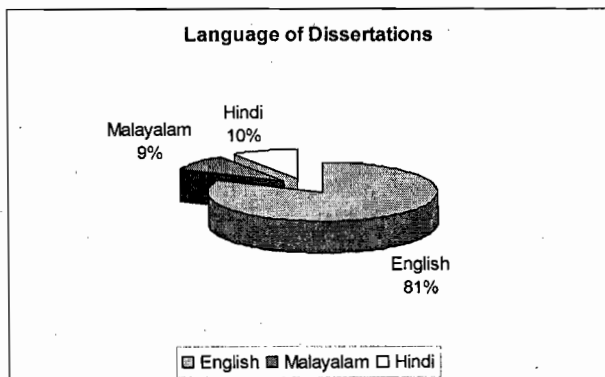
Chemical Sciences: The School of Chemical Sciences of the University has advanced commendably in their research pursuits by developing a host of new technologies indigenously, which has enabled the institution to get 6 U S Patents and 12 Indian Patents. In chemical sciences university has produced 142 doctorates, which is the highest in that subject in any university in Kerala. The quality and quantity of work done in this school has made it a very important research centre. With worldwide recognition the theses and papers from the Department are the most widely cited works in the discipline.

Polymer: Polymer Studies is an area on which the school of Chemical Science has given stress to. Of the 113 dissertations in Chemistry 45 dissertations that is 40% are research related to Polymer.

Rubber: Kerala, especially the geographical region covered by the university is a major Rubber producing region in India. Rubber related industries are also located in the region. This is reflected in the research work done in the university catering to the research and development need of the region. University has conducted 52 research works successfully on different aspects of production, processing, and marketing of rubber. Faculty members and scientists from CMS College, Government College of Kottayam, Assumption College and School of Chemical Sciences of M G University Guided these doctoral research projects.

Cancer: University has produced 30 doctorates on cancer, which is a highly specialized and important area of health sciences. The studies cover causes, varieties, treatment, application of indigenous medicines and plant extracts for curing cancer, and social and psychological problems of patients and their solutions. Faculty members from Rajagiri College, Amala Cancer Centre, and School of Chemical Sciences guided the projects. Altogether University has produced 34 doctorates on medicine. This research was done at School of Bio Science and Amala Cancer Research Centre. They mainly deal with diseases seen in the region and application of extracts of various medicinal and aromatic plants of the region in treatment. Some theses are on indigenous schools of medicine.

Language wise Distribution



Of the 1006 theses 823 were in English, 87 in

Hindi and 96 in Malayalam. This shows that our national language Hindi and regional language Malayalam got no less importance in higher education and research at the university.

Genderwise Distribution

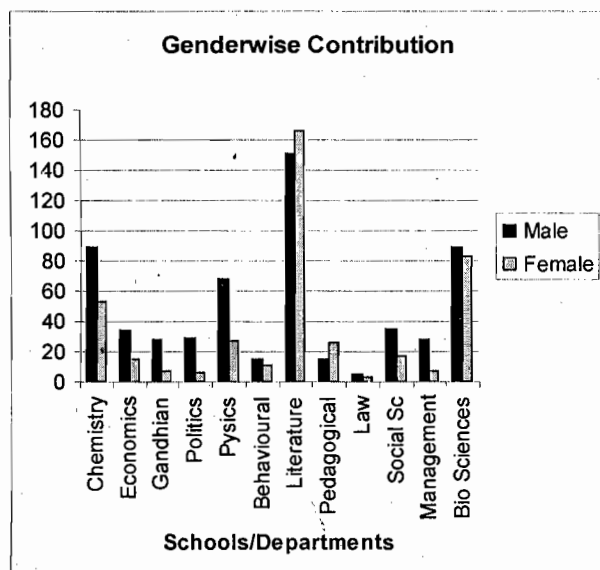
Research facilities are available in all subjects for both sexes and there is no gender discrimination in such programmes in MG University. But among the 316 Guides who supervised the PhD Research under various disciplines approved by MG University 43 guides coming to 12% only were Women. Of this under one guide 10 Scholars took PhD. Three guides supervised more than eight scholars each. Four guides supervised six scholars each.

Table: Gender wise Distribution of PhD's Produced

Subject	Male	Female	Total
Chemistry	89	53	142
Economics	34	15	49
Gandhian	28	7	35
Politics	29	6	35
Physics	68	27	95
Behavioral	15	11	26
Literature	151	166	316
Pedagogical	15	26	41
Law	5	3	8
Social Sc	35	17	52
Management	28	7	35
Bio Sciences	89	83	172
Total	586	421	1006

Of the total 1006 PhDs approved by the University 421 coming to 41 % were from women and 586 ie.59 % were from men.

The first PhD in MGU guided by a women Faculty member (Dr. S Umadevi) was accepted in 1990 in the discipline of Economics. By coincidence the first women research scholar from Kerala (V N Ramani) also obtained PhD from MGU in 1990 seven years after the establishment of the university for her thesis on 'Ideas on Women's Freedom in Post Independence Hindi novels'. It was written in Hindi and the topic on women's liberation movement was new at that time.



Year wise contribution of Doctoral Research on the basis of gender reveals that there is only a slow and steady growth in the case of women scholars acquiring PhD. The graph shows only minor declines, which were resumed, in the next years to continue the growth. The steep rise and fall as seen in the case of men after the implementation of UGC Scheme in 1988 and 1998 are not visible in women's case. The growth of women scholars is sustained and improved in most of the years. Except for a few years like 1996 and 2000 the number of women scholars submitting PhD theses were less than half of the men scholars.

In literature and education the contribution from the side of women are higher than men. In literature while 151 dissertations were from men women scholars contributed 166 doctoral dissertations. In education while men obtained 15 doctorates women got 26 doctorates, which is 20% higher than that of men.

Guide wise Distribution

During 1983 to 2008 approximately 316 guides supervised the 1006 Researchers. Of this, Dr. Shankar Shasidar from School of Bioscience guided 33 research scholars independently and another twelve scholars in association with other guides produced 45 doctorates in total. Dr. V N Rajasekaran Pillai from School of Chemical Sciences produced 24 doctorates and Dr. Sabu Thomas from the same school 23 doctorates. Dr. C S Menon guided 17 scholars under School of Pure and Applied Physics. Sri. Joseph Mathew from English Department of St Thomas College, Palai guided 14 scholars who got PhD in English.

Of the remaining guides two guided 11 scholars each, four guided 10 scholars each, two guided 9 scholars each, six guided 8 scholars each, seven guided 7 scholars each, nineteen guided 6 scholars each and fourteen guided 5 scholars each.

Out of the 316 guides the most productive guides by discipline were from Schools of Bio Sciences, Chemical Sciences and Pure and Applied Physics.

Coverage of the Subject by Institutions

Of the 20 works on Cancer coming under Chemistry and Bio Science disciplines all were done at Amala Cancer Research Centre, Thrissur. In Bioscience and Chemistry Rubber Research Institute produced 21 and eight PhDs each related to Rubber respectively. In Bio science St Theresa's College and Sacred Heart College produced 13 PhDs each, St Berchman's 10, CMS College, and Marthoma College seven each and Catholicate College five. In Pure and Applied Physics, St Berchmans produced six and St Thomas College and VSSC, five PhD's each.

In Economics, Government College, Kottayam produced 11 and Sacred Heart College produced 7

Table: Ranking of Guides According to No of PhDs Guided

Guide	School	PhDs
Dr. Shankar Sasidar	School of Bioscience	45
Dr. V N Rajasekaran Pillai	School of Chemical Sciences	24
Dr. Sabu Thomas	School of Chemical Sciences	23
Dr. C S Menon	Sc of Pure and Applied Physics	17
Dr. Joseph Mathew	St Thomas College	14

Table: Sectoral /Institution-wise Output

Institution	Doctorates
Mahatma Gandhi University, Kottayam	446
Other Colleges	130
St Thomas College, Palai	77
Catholicate College, Pathanamthitta	41
Maharaja's College, Ernakulam	37
St Berchman's College, Changanasseri	31
Rubber Research Institute, Kottayam	29
St Theresa's College, Ernakulam	28
Sacred Heart College, Thevara, Kochi	24
UC College, Aluva	24
Amala Cancer Research Centre, Thrissur	24
NSS Hindu College, Changanasseri	22
Marthoma College, Thiruvalla	18
Rajagiri College of Social Science, Kalamasseri	18
Government Sanskrit College, Thrippunithura	17
Mar Athanasious College, Kottayam	15
CMS College, Kottayam	14
Government College, Kottayam	11
Total	1006

PhDs each. In Social Work Raja Giri College produced 18 PhDs and in Politics St Thomas College 10 PhDs.

In Literature the research in the colleges was strong. St Thomas College produced 56 PhDs in Literature covering mainly English, Hindi and Malayalam. Maharaja's College, Ernakulam produced 33 PhDs in Hindi and English literature, Catholicate College produced 21 PhDs in Hindi literature and 10 on Malayalam literature, NSS Hindu College Changanacherry produced 20 in Malayalam and English Literature, St Berchmans 14 in Malayalam, English and Hindi; Mar Althanasious College and UC College 10 each in Literature. Sanskrit College, Thrippunithura produced 17 PhDs in different subjects related to Sanskrit like Nyaya, Sahithya and Vedanta.

Of the 170 PhDs awarded in Bio Science 121, which comes to 71%, were done at research centers in colleges. But of the 141 PhDs awarded in Chemistry 110 coming to 78% were done in the University Departments/Schools. Of the 98 PhDs awarded in Pure and Applied Physics 63 coming to 64% was done in University Departments.

Of the 310 PhDs approved in Language and Literature 233 coming to 75% was done in colleges. Of the 34 PhDs awarded in Management 28 coming to 82% was done in colleges. Out of 40 approved in Pedagogical Sciences 32 coming to 80% was done in University itself. Of the 35 PhDs in Politics 20 coming to 57% was done in University itself.

Conclusion

In last quarter of the century Science and Technology has triggered great changes in the country. Infrastructure for research, education and extension activities experienced fast expansion. The world has witnessed two major technological revolutions-information revolution and biological revolution. During the period MGU has also made monumental contribution to generation of knowledge, which is applied for development in different spheres of life in the region as well as the country. MGU has produced above 1000 doctoral dissertations and 16 patents in highly relevant areas for development.

Distribution and frequencies of theses of the faculties of science in MG University during the period shows a steady growth. Even though concerned Schools/Departments were established only recently university has produced doctorates in highly relevant and emerging areas of science like biotechnology, genetic engineering, biodiversity studies and environmental conservation. The study reveals that a few guides supervised research in sub fields of very specific areas and the research by them as well as by their students forms the highly cited works worldwide like in Polymer.

Doctoral theses form the primary sources of data for further research on that specific area. But doctoral theses of Indian universities are distanced from users as well as from their awareness due to the traditional ways in which we handle them. In spite of spending lakhs and lakhs of rupees for every research work, other researchers do not adequately use the dissertations containing the findings; nor are they cited or quoted by other researchers, scientists or textbook

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(Contd. from pg.no.10)

writers. Research results become hardly useful for later research or application and lack of awareness about what is done causes duplication in research wasting millions of rupees every year. This seems a continuing phenomenon in higher education and research system in India even though facilities for providing access to results of research have been provided by ICT in recent years. In such a situation the Open Archives Digital Library of Doctoral Dissertations of Mahatma Gandhi University in the web and the printed volume entitled Doctoral Research 1983-2008 can help to bring the research done into the awareness of the public and make it more accessible and useful to other researchers and policy makers and the public interested in using it.

Knowledge generated in institutions like the MG University should be disseminated freely and speedily to benefit various sectors of the society and economy. India is very rich in knowledge and every thing should be done to preserve and enrich it with value additions and disseminate it for the benefit of the society. MG University through this publication as well as the Open Archives of Doctoral Dissertations launched along with this in the web has made open its research results to the public for application in society to further research as well as for testing it in real life situations so that the feed back can be used by the university for improving

the quality and relevance of work going on in the university.

Centuries back the famous Indian Poet Bhartrihari stated that 'knowledge is a source that grows with sharing and decays by not sharing'. Let MG University through this printed volume as well as the Open Access Digital Archives be a model for other universities to make the knowledge generated by them open and live.

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