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The Essence of Research Development as a Component in the Faculty Workload of Technological Universities and Engineering Colleges

A. Chennakesava Reddy

A. Chennakesava Reddy, Professor, BOS-Chairman, Department of Mechanical Engineering, JNT University, Hyderabad-500 085, India

Abstract: ***The technological Universities should give major concern for teaching and research. The instruction hours and contact hours must be treated equally as the existence of individual importance in the teaching-learning process. The quality of performance of a faculty member should not be a factor in assigning workloads. The Universities and peer Engineering Colleges should attend the basic research projects that seek wide ranging scientific understanding useful to entire industries. M.Phil/Ph.D and M.E/M.Tech candidates respectively shall publish three and one research papers in a referred Journals before the submission of the thesis for adjudication. The reasonable workload for the Universities consists of 35% of teaching, 45% of research and 20% of service.***

Keywords: Teaching, research development, learning, service, workload, University, Engineering College.

1. Introduction

Workload of faculty members is of intellectual hours but not labour hours. Teaching is fundamental to the core mission of a University, and undoubtedly to an Engineering College. No single, simple formula for an equitable faculty workload can be devised for all the academic units. The University must have a system that facilitates accountability in the use of its resources. Across the country, the formula of workload varies among the Universities. In fact, it varies across department and programs in ways that reflect differences in the actual workload demanded for typical research and teaching in those areas, changes in national practices, demand of industries/companies and other factors. The University/College guidelines should be periodically reviewed at least once in a five years period by the Faculty Affairs Committee of the Academic Senate. Underlying these guidelines are four principles as follows:

1. The University/College should have a mission of excellence in teaching and every faculty member should have a goal to raise this expectation. The University/College should be a platform of community of learners where there is significant faculty-student interaction that produces excellent teaching-learning process across disciplines.
2. Every faculty member of the University/College must involve in the research activity that is circulated or published useful for the scholarly community in particular and the society at large.
3. Every faculty member should regularly review his/her workload and improve upon it as per the demand of the industries/companies, the society, the national priority and on par with the technological growth.
4. The faculty member should participate in the services defined by the University/College. Equal opportunity should be given for all the faculty members based on their seniority.

This paper addresses the design of University/College faculty work load based on teaching, learning, research and service.

2. Mission of University or Engineering College

Every University or Engineering College defines its mission in terms of teaching, learning, research and service. The most of the Universities have primary concern of teaching and research. Also some Universities and Engineering Colleges do not claim an equal commitment to teaching and research. Many of them admit to be primarily teaching institutions and neither encourages nor recognizes activities in research to the degree that research-oriented Universities do.

3. Faculty Activities

There is a misconception of workload that a faculty member engages only classroom teaching. This is wrong. In fact, the faculty member spends several hours either at home or in the library preparing lectures, dedicate huge sum of time to research, and work long and hard on administration, evaluation of students assignments, setting of question papers, attending to examination duties, evaluation of answer scripts, preparation of results, attending to parent's enquires, prevention of ragging, student advising, and other types of academic service. There is no essence of specific work hours and an explicit location to do perform his/her tasks.

Individual faculty members often have pretty different duties, some of which may be highly specialized, and the relative weight of these duties may vary considerably during the year. The individual workloads must be determined in consultation between the Department faculty member and the Department Head who is familiar with the requirement and demand of that Department and the University/College.

4. Inequity in the Distribution of Workloads

Some characteristic sources of inequity in the distribution of workloads are mentioned below:

Complexity of courses: No two courses are exactly alike, and some differences among individual loads are to be expected. While preparing the workload, the number of different

courses offered within a semester and within the academic year should be considered, not only the total class hours per week. If there is any recruitment in a particular University/College, the new faculty members must be given meaningful time to develop their teaching. When there is a revision of curriculum in the University/College, special adjustments may be given for the faculty members to revise an older course.

Size of class: The larger class is not good. It becomes very difficult to the faculty member to maintain discipline in the class as well as to attend the questions and doubts raised by the students. The meaningful strength is 60 students per classroom. When the intake is doubled, the requirement of faculty members increases in proportion. For instance, five students are readmitted into a course or a semester, the small additional load extended to these students cannot be considered as an extra load to any faculty member.

Type of teaching: The class room teaching is different to the laboratory practices. The project work is an essential part of curriculum in the Engineering Colleges and Technological Universities. Here is an issue of instruction hours and contact hours. Both the hours must be treated equally as the existence of individual importance in the teaching-learning process.

Research: The research and development is also very important in the Universities and Engineering Colleges. The faculty members who are actively involved in the research there must be a relaxation of instruction and contact hours.

Service: The service in terms of administration, hostel in charges, etc are major concerned in calculating the workload of the faculty member. Here also some amount of work load relaxation is inevitable.

5. Teaching

When one looks at faculty workload the first activity comes to mind is classroom teaching. In fact, the teaching is beyond the classroom activity during which the faculty members and the students spend the few hours a week. The additional activities are preparation of course time table, evaluation of assignment, attending to tutorial sessions, monitoring of attendance and intimating the same to the parents, question paper setting, evaluation of answer scripts pertaining to the ends exams, grading the students, guiding and monitoring the under graduate student projects especially M.E./M.Tech theses and Ph.D dissertations.

6. Learning

Similar to other professional areas, the faculty members in the Technological Universities and Engineering Colleges require a substantial amount of time to maintain their knowledge base through the refresher and oriental courses. Opportunities to learn through examining case studies, participating in internships, exemplary teacher-preparation programs allow the faculty members the time to apply their learning of theory in the context of teaching in a real classroom. Mentoring and coaching from veteran colleagues is critical to the successful development of a new teacher. These are highly essential to compete with current and future demands of technological growth across the world.
It is critical for veteran faculty members to have ongoing and regular opportunities to learn from each other. Ongoing professional development keeps teachers up-to-date on new research on how student learn, emerging technology tools for the classroom, new curriculum resources, and more.

7. Research Development (RD)

It has been apparent for at least a century that future economic progress will be driven by the invention and application of new technologies. RD is one category of spending that develops and drives these new technologies. However, private sector organizations are prone to focus their RD on applied projects, where the payoff to their bottom line is likely to accrue only to them. Their role is not to undertake broad RD for the general benefit of our nation. In contrast, the Universities and peer Engineering Colleges can attend the kind of basic research projects that seek wide ranging scientific understanding that can affect entire industries, rather than individual organizations. Research development is a set of strategic, proactive, catalytic, and capacity-building activities designed to facilitate individual faculty members in attracting extramural research funding, creating relationships, and developing and implementing strategies that increase institutional competitiveness. These activities are typically practiced at Universities, but are also in use at a variety of other research institutions [1]. RD strengthens research programs and proposals to make them more competitive for extramural contracts and grants from governmental, private and non-profit funding agencies. The mission of a University or a College should promote sustainable growth by funding needs driven research and developing effective innovation systems.

Research is not a process but a product [2]. The products of original research, patents, published books and articles, become teaching tools and extend the mission beyond the University or College campus. Teaching and research are the vital organs of a University or of a College. They should run parallel. To promote research in the Universities or Engineering Colleges there must be some kind of proactive schemes such as financial assistance, relaxation of workload, rewarding the best research, etc.

All Universities, Deemed to be Universities and Colleges/Institutions of National Importance shall lay down the criteria for the faculty to be recognized as Research Supervisor for M.Phil and Ph.D. programs. The allocation of the supervisor for a selected student shall be decided by the Department in a formal manner depending on the number of student per faculty member, the available specialization among the faculty supervisors, and the research interest of the student as indicated during interview by the student.

After having been admitted, the student undertakes course work for a minimum period of one semester. This must include a course on research methodology and computer applications. It may also involve reviewing of published research in the relevant field. Prior to submission of the thesis, the student shall make a pre-M.Phi/Ph.D presentation in the Department that may be open to all faculty members

and research students, for getting feedback and comments, which may be suitably incorporated into the draft thesis under the advice of the Supervisor. Ph.D candidates shall publish three research papers in a referred Journals before the submission of the thesis for adjudication. Following the successful completion of the evaluation process and announcements of the award of M.Phil/Ph.D, the University shall submit a soft copy of the M.Phil/Ph.D thesis to the UGC within a period of thirty days.

The M.E/M.Tech programs are two years duration in India. Out of these two years, one year is allocated for the project. M.E/M.Tech candidates shall publish one research paper in a referred Journal before the submission of the thesis for adjudication.

There should be a mechanism of plagiarism check for M.Phil/Ph.D and M.E/M.Tech projects. If possible this may be extended to B.E/B.Tech projects. Industry visits should be made mandatory to the undergraduate programs. To improve soft skills of undergraduate and graduate students there must be seminar presentations which are to be monitored and evaluated by the faculty members.

8. Service

There may be two categories of services namely institutional and professional in the Universities or in the Engineering Colleges. The institutional service includes administrative duties such as Coordinator of M.E/M.Tech specialization, Head of the department, Vice-principal, Principal, Deputy warden, Chief warden, Maintenance engineer, Additional director, Director, Placement officer, Controller/Director of examinations, Registrar, Rector and Vice-chancellor. Apart from these there are additional activities like student advising, prevention of ragging, etc.

Professional service includes the activities in support of academic discipline such as serving on committees and boards of professional organizations, organizing or chairing sessions at national or international workshops, seminars, conferences, short-term training programs, oriental and refresher courses, editing or reading manuscripts for professional journals.

Many vital academic activities are followed outside the normal working hours and away from the University or the College.

9. Workload

The workload must consist of teaching, learning, research and service. As per University Grants Commission (UGC), New Delhi [4], the workload of the teachers in full employment should not be less than 40 hours a week for 30 working weeks (180 teaching days) in an academic year. It should be necessary for the teacher to be available for at least 5 hours daily in the University/College for which necessary space and infrastructure should be provided by the University/College. Direct teaching-learning process hours should be as follows:

Assistant Professor: 16 hours
Associate Professor and Professor: 14 hours

A relaxation of two hours in the workload may, however, be given to Professors who are actively involved in extension activities and administration. A minimum of 6 hours per week may have to be allocated for research activities of a teacher.

Remember: class hours are usually 50-minute hours. This is a traditional standard for each class taught.

The American Association of University Professors [3], in its "Statement on Faculty Workload," recommends maximum classroom teaching loads of twelve hours a week for undergraduate instruction and nine hours a week for graduate instruction. The statement continues:

"It should be stressed that these represent maximum workloads, not optimum workloads. Institutions aspiring to distinction should seriously consider further reduction of these classroom-hour limits. Moreover, these maxima presume no unusual additional expectations in terms of research, administration, counseling or other institutional responsibilities."

The standard formal course load for research-active faculty in the technical institutes, as at research Universities nationally, tends to be 4 courses per year depending on the discipline. To calculate the workload, the course loads are counted; number of courses offered; number of student projects assigned; but the reasonable workload should also take account of enrolments in any single course and the availability of faculty member to teach the said courses. Departments should use the merit exercise not just as an assessment of workload over the previous year.

The salient points to be considered while calculating the workload as follows:

1. The Department goals should reflect into the mission of the University or College.
2. The Department should consider that every faculty member need not shine equally at teaching, research and service.
3. The administration should be as flexible as possible in determining the workload distribution for each member of the Department.
4. The instruction hours and contact hours must be treated equal. The instruction hours are of classroom teaching. The contact hours are of laboratory practicing classes, project monitoring hours and seminar evaluation hours.
5. 60 students is the optimum size of classroom for the instruction hours. 30 students is the optimum size for the contact hours in the laboratory sessions. For undergraduate programs the project size should be limited to four students per batch. For graduate programs the project size should be limited to one student per project. At least a minimum of one contact hour per week should be allocated for guiding, monitoring and evaluating undergraduate and graduate projects. Seminar load should be treated as the laboratory class.

6. The engineering drawing should be treated as one theory and one practicing class.
7. For laboratory, engineering drawing practice and seminar sessions, the faculty to student ratio should be 1:15.
8. In the University or College the overall faculty to student ratio should be 1:10 for research oriented University or 1:15 for teaching oriented University or College.
9. There must be automatic consideration for in administrative duties based on the seniority. All faculty members must be given equal opportunities to the required ranked positions based on the seniority at each category.
10. There should not be any favored group and no favored group.
11. Quality of performance is not a factor in assigning workloads. Some professors work longer, harder, better, or more efficiently than others, but there is no way to take such matters into account when designing a workload policy.
12. Each four-credit class taught equals 20% of an individual faculty member's effort for the year. This percentage is not arbitrary among faculty members.

The average workload for Universities can adopt the following formula to promote research:

Teaching: Research: Service :: 3.5 : 4.5:2.0 (1)

This means that 40 x 3.5/10 = 14 hours must be assigned to teaching, 40 x 4.5/10 = 18 hours to research and 40 x 2.0/10 = 8 hours to service. This distribution may be appropriate for the Universities claiming research as first priority in the developing countries like India. Many institutions do not have a mandate to participate in research, nor do they assert a commitment to research. This is often seen in the self-financing institutions and private Deemed to be Universities. The reasonable workload for these institutions is as follows:

Teaching: Research: Service :: 6.0 : 2.5:1.5 (2)

This means that 40 x 6.0/10 = 24 hours must be assigned to teaching, 40 x 2.5/10 = 10 hours to research and 40 x 1.5/10 = 6 hours to service.

The peer and prestigious Engineering Colleges can adopt Eq. (1) or less relaxed formula as follows:

Teaching: Research: Service :: 5.0 : 3.0:2.0 (3)

This means that 40 x 5.0/10 = 20 hours must be assigned to teaching, 40 x 3.0/10 = 12 hours to research and 40 x 2.0/10 = 8 hours to service.

The workload distribution in a hypothetical department at a University having first priority of research is given in table 1. Assistant professor 1 may be a newly recruited with PG qualification into the University/College has been exempted from administrative duties and has given importance to complete Ph.D which is essential for higher promotions. Assistant professor 2 is having Ph.D at the time recruitment and may be given preparatory work of AICTE, NBA, NAAC, UGC and assistance work of project proposals, etc. Assistant Professor (with senior scale) 3 is just perceived Ph.D and may be given Coordinator, Deputy warden, etc. Assistant Professor (with selection grade) 4 is having Ph.D and inclined towards research and additional service may be given Additional controller, etc. Serial numbers 6 and 7 are Associate Professors with Ph.D and inclined towards academics and service based on seniority may be assigned Placement officer, Controller, Additional director, etc. Serial number 8 is a Professor with Ph.D involved in research and service may be given Head of the Department, Vice-principal, etc. Serial number 9 is a Professor with ten of experience in that category may be given Principal, Director, Registrar and Rector based on their seniority. These are the typical allocations purely made to differentiate from one level to other.

Table 1: Work load distribution

S.No	*Category*	*Scale of Pay*	*Percentage of Time*		
			Teaching	*Research*	*Service*
1	Assistant Professor	15600-39100+AGP6000	40	60	0
2	Assistant Professor	15600-39100+AGP6000	40	55	5
3	Assistant Professor (Sr. Scale)	15600-39100+AGP7000	40	50	10
4	Assistant Professor (Sr. Scale)	15600-39100+AGP7000	40	45	15
5	Assistant Professor (sl. Grade)	15600-39100+AGP8000	40	45	15
6	Associate Professor	15600-39100+AGP9000	35	45	20
7	Associate Professor	15600-39100+AGP9000	30	45	25
8	Professor	15600-39100+AGP10000	25	50	25
9	Professor	15600-39100+AGP10000	20	50	30

Also, the calculation of the departmental average workload should take into account the contributions of part-time and adjunct faculty members, faculty members who have external grants that account for a certain portion of their time, and faculty members on sabbatical or research or any other leave as per the existing rules prevailed in the University or College. All part time faculty members must be recruited as per UGC norms. Many Colleges and Universities involve in double-standards toward teaching and research. Many Colleges declare teaching to be their primary importance but give importance to publications as substantial credence in promotion and salary deliberations. However, UGC has introduced Academic Performance index (API) based on Performance Based Appraisal System (PBAS) to count credentials of a faculty member in the University/College.

10. Conclusions

Teaching and research are the vital organs of a University or of a College. Research is not a process but a product. The Universities and peer Engineering Colleges should attend the

basic research projects that seek wide ranging scientific understanding useful to entire industries. 60 students is the optimum size of classroom for the instruction hours. 30 students is the optimum size for the contact hours in the laboratory sessions. At least a minimum of one contact hour per week should be allocated for guiding, monitoring and evaluating undergraduate and graduate projects. For laboratory, engineering drawing practice and seminar sessions the faculty to student ratio should be 1:15. The reasonable workload for the Universities consists of 35% of teaching, 45% of research and 20% of service.

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Author Profile

Dr. A. Chennakesava Reddy, B.E., M.E (prod). M.Tech (CAD/CAM)., Ph.D (prod)., Ph.D (CAD/CAM) is a Professor in Mechanical Engineering, Jawaharlal Nehru Technological University, Hyderabad. The Author has published 246 technical papers worldwide. He is the recipient of best paper awards ten times. He is the recipient of Best Teacher Award from the Telangana State, India. He has successfully completed several R&D and consultancy projects. He has guided 14 Research Scholars for their Ph.D. He is a Governing Body Member for several Engineering Colleges in Telangana. He is also editorial member of Journal of Manufacturing Engineering. He is the Author of books namely: FEA, Computer Graphics, CAD/CAM, Fuzzy Logic and Neural Networks, and Instrumentation and Controls published by PHI, New-Age International and Cengage Learning. Number of citations are 536. The total impact factors are 121.725. The Author's h-index and i10-index are 18 and 21, respectively. His research interests include Fuzzy Logic, Neural Networks, Genetic Algorithms, Finite Element Methods, CAD/CAM, Robotics and Characterization of Composite Materials and Manufacturing Technologies.