*Journal of Engineering Education Transformations,*
*Volume 30, No. 4, April 2017, ISSN 2349-2473, eISSN 2394-1707*

# Development of Research Specs Framework for Assessment and Evaluation of Research Code of Conduct: A Higher Education Research Focus

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**Abstract:** In this paper, we focus over the higher educational research complexities which are the outcome of our experience and observations. It is necessary for master level research regulations to provide specific project development lifecycle execution. Different universities follow different research life cycles. Though in India, UGC 2009 regulations are strict for Ph.D. courses, there is a need for more clear guidelines and regulations for Master level research conduct. In this paper, we presented findings of lack of coordination between student understanding about research domain and difficulties faced by students during the master level research in education. This article also focuses on problems facing by private institutions about research funding and capacity building. A new research regulations framework "ResearchSpecs" is developed and presented in this paper which can be implemented by any higher education research organization to uplift their research quotient. We also suggested Uni-HERS model with roles and responsibilities for research analysis and evaluation. This paper can be a good step to build higher educational research regulations at University, institutional and department level.

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**Keywords:** Research Specs, process, role, responsibilities, web portal

## 1. Introduction

Research is a small word without limits. The research itself implies Re-search for social, technological benefit to the human being. It is important to understand the need of research at bachelor level of technical education. Unfortunately, student aim is to complete final year project for the sake of completion of the degree. There is huge potential in each Indian student but, it is our responsibility to spread awareness about research. The research guide is the pivot of research who actively works as a part of research team but as per our rigorous observations and experience; most guides are rigid about their views. A good research always needs think-tanks to reach up to desired milestones. There can be lots of reasons about why some guides are unable to support research dedicatedly. But, if the student gets direction about research at bachelor's degree level, they can focus on next stage (Master level degree/Ph.D.) of research with their respective domain. Hence it is necessary to analyze failure factors, environmental impact and socioeconomic elements which can be a part of the failure. Developing research interest among students is important to set the success goals.

## 2. Significance of Master Level Research

In higher education, resistance to change and innovation might be a consequence of the students rigidity which includes academics experiences as students, the objectives of present day students and learned techniques from peers. Equally, a couple of elements which often identify technology resistance are routine in the direction of a present practice along with observed risks linked to the innovation [1]. Also, undergraduate research can be a particular method to handle the challenge of getting required competencies for a complex job and also to enhance the fund platform of the teaching occupation is modest know-how about precisely how final year project programs handle research for students. Nevertheless, the purpose of research in undergraduate learning is still unclear [2]. Youthful people's engagement in science, technology, and engineering education is a topic of global concern [3]. Consequently, precisely what is left out of the higher education change goal list is a formidable impression of the way in which its goals can be accomplished [4].

Looking at the present scenarios, Master degree level students are doing "Simulation-Based" projects rather than physical model development. Consequently, no real time research is produced to prove these "Simulation-Based" projects. There is a definite need for the establishment of "University Research Regulations (URR)" for M.E. (Master of Engineering) /M. Tech (Master of Technology) courses. Further section-3 outlines the specific issues observed.

## 3. Research Life Cycle Problem

We identified following key issues causing the failure of research life cycle (RLC):

A. Students Perspective:

- Lack of student's domain knowledge
- Lack of availability of study resources
- Insufficient understanding of technical subject
- Lack of views toward real research models development
- Student focusing on only degree completion for further
- employment
- Lack of self-motivation
- Socio-Economic burdens like self-responsibilities /educational loans etc.
- Less knowledge about availability of project funding
- Lack of coordination/communication with Mentor
- No research work diary is maintained
- No project timeframe is calculated at project initiation
- Students try to get ready-to-deploy project without understanding
- design phase of research

B. Mentor Perspective:

- A mentor may be overloaded with multiple responsibilities and cannot give time to students assigned to him/her.
- A mentor does not get scheduled reporting response from the student about research progress.
- No fixed time duration allocated to any project (this means, new regulation must compel the student to provide research timeline for his/her project).
- Mentor may be rigid (in some cases) towards research topic or cooperation
- No response from mentor for student's queries

There can be more reasons for any Master level degree research failure, but we outlined some common elements which severely affect research project life cycle. As a solution to such problems and to avoid degradation of higher educational research, we developed new research life cycle framework "Research Specs". We present this in detail within next section- 4.

## 4. Research Specs: A Research Life Cycle Framework

As per our observation, M.E/M.Tech project development starts with synopsis submission. But, core reasons of project failure are: vague research objectives, less literature study, absence of feasibility study, no idea about proposed project utilization, and no project cost estimation or no clear project development timeline and no project evaluation regulations etc. Hence, we developed following framework for web portal (refer figure-1) and regulations which can safeguard and streamline the higher educational research development as well as evaluation. (Refer table-1)

As mentioned in Fig.1 and Table I, both web-portal research evaluation along with strong research regulations can lead to fruitful and feasible research outcome. The next task can be to design micro-level research assessment process identification and can be done after positive support for such a change from Universities and institutions affiliated with each university. Now, education is not limited to urban areas. Rural area student research can be re-connected with global aspects, and such portal can be open to reading anyone's research progress for future references for other research.

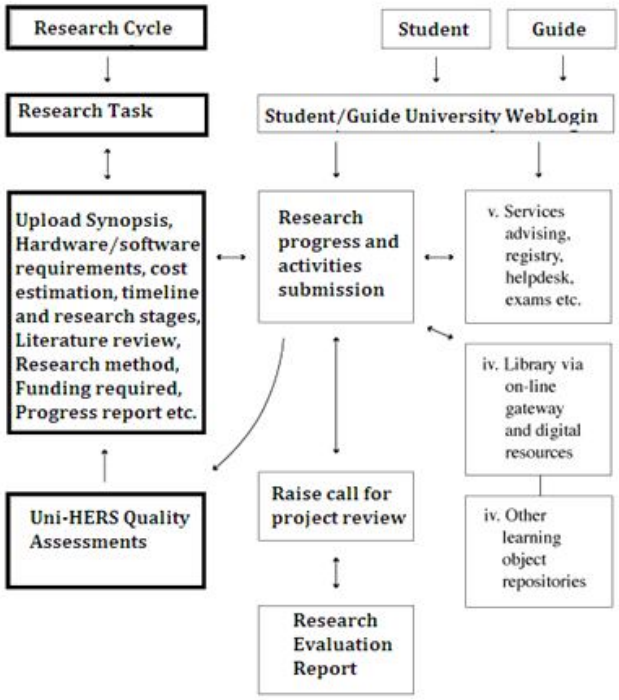


**Fig. 1 University Research Web-portal-Research Specs framework**

Many times, it happens that many students submit similar synopsis/research titles to the same university. So, such web-portal can provide facility to search existing research titles or research objectives to avoid repeated research. Now, if we assume the research title is confirmed by the student with approval of University, we can outline funding possibilities. Next section gives an outline of contemporary funding issues.

**Table 1 Elements of Research Specs Framework**

| Research Process | Key Responsibilities |
|---|---|
| Domain knowledge test of duration 1 hour for student | To check in which area student can perform better or he/she is with in-depth study knowledge |
| Research topic selection | Research topic must be new, less focused but with good future scope |
| Feasibility study | Student must develop simulation project to test project feasibility. (Ex: MATLAB simulation development) |
| Area of utilization | If simulation is successful, student must design physical model focusing over any particular area of utilization.(Ex: Power Quality improvement device which can be used at industry etc.) |
| Project Cost Estimation | Guide/University Higher Educational |
| Project timeline estimation (Should not more than 1 year) | Research Squad (Uni- ERS) must verify and approve after pre-viva. |
| Scope of project | This must be within cost & timeline estimation limits |
| Project Development Life Cycle | Evaluation Report by guide |
| Final Project Design | Guide must conduct viva-1 |
| Hardware component list, specifications and availability of required material | Guide must verify and approve material bills |
| Requirement documentation | Guide must verify final list of requirements |
| Project module-1 to 'n' development | Guide must arrange module wise presentation sessions |
| Project module-1 to 'n' testing | followed by viva-2 to 'n' |
| Work diary writing | Guide must verify work progress as per project timeline estimation. Any slippage of schedule may increase overall cost estimation. |
| Alpha Testing: Entire final simulation and physical project testing at institution level | Guide must arrange final presentation sessions followed by viva-3. Presentation must be attended by institutional and industrial experts along with University Higher Educational Research Squad (This team must be developed by university). |

| | |
|---|---|
| Beta-Testing/Onsite Testing: Entire final simulation and physical project testing at institution level | To prove feasibility and utilization of project, onsite testing must be done. The desired industry must provide project completion letter to university. |
| Evaluation of research project | Uni-HERS, industrial experts and guide can evaluate research and can upload comments on university research evaluation web-portal "Research Specs". |

## 5. Difficulties For Research Funding

Everyone is aware of funding for research projects. But, to know how fund flows and utilized is a systematic process. There are lots of funding opportunities are available globally. But, the funded project must be able to meet the desired requirements regarding utilization and benefit from the particular project. Hence fund raisers look for the practicable projects and not interested in just simulation projects. As per our experience and observations, 80% of projects are with simulation-based results under one University. Hence, the fund cannot be utilized to get good, implementable research. In next section, we suggested new University research management team framework. Such a research team may work dedicatedly to establish and follow new research regulations and to evaluate funded/non-funded research projects. This can be very useful to maintain and upgrade the quality of higher educational (M.E./M.Tech.) research.

## 6. University Higher Educational Research Squad (Uni-Hers)

As shown above in Table I, the role of guide is significant, but it is crucial to forming a research body of University for "Research Evaluation". Following (Table II) roles and responsibilities will keep the eye on research regulations and can evaluate the performance of the particular project.

As mentioned above these are broad areas of responsibilities. Further, we can analyze micro-level regulations like the quality of the publication, patent development, product development, to support startup/ Make in India initiative (which may generate employment for many people), etc. A further section focuses on one key element "Research Publication". Also, there must be clear regulation for publication, patent, book writing, etc.

**Table II Suggested Roles and Responsibilities of Research Evaluation Team**

| Role | Responsibility |
|---|---|
| University Higher Educational Research Squad | To analyze research evaluation report and grant funding/declare final presentation date and declare the result of the student based on all subsequent evaluation reports. |
| Institutional Research Head | To take the meeting of all guides and to review work progress of each research project and submit the evaluation report to Higher Educational Research Squad. |
| Industrial Research Head | To visit project site/ evaluate the progress of the project regarding practical approach execution and submit the report to institutional research head. |
| Departmental Research Head | To keep track of guide comments/ evaluation report and crosscheck with student's progress report/ work diary. |
| Project Guide | To evaluate project li fe cycle responsibilities (refer Table I). |
| Student | To follow instructions provided by the guide and support responsibilities mentioned in Table I. |

## 7. Difficulties In "Good" Research Publications

Everyone can see thousands of journals online. Some journals can give (acceptance/rejection) review in just two days too. Or some journals never reject the paper (how to read such papers or who will cite it?). But, many students, research scholars publish articles with such journals for the sake of completion. As a responsible academic person, we must publish good research with the good journal. Again the biggest glitch is that guide pressurizes research scholar/student to publish the paper in Scopus, SCI, Thomson Reuter, etc. high indexed and high impact factor journals (it is, in fact, good). The student also tries to write and submit papers to such esteemed journals but fails to get acceptance. Why? The reason is simple "No Research Done" and "No Results". Now we must understand research guide's responsibilities, or research regulation can cover this area. There must be coordination between student and guide. The guide must be involved in every research

step. The guide must give sufficient time to student and student must work on the project as per project life cycle mentioned in above Table I.

If research is real, results are available with execution proof then only good research will get acceptance from good journals. If at M.E./M.Tech level University develops and acts on regulations then these candidates can perform well at Ph.D. level research. If we able to regulate higher education research, then patent development ratio will be increased in India.

## 8. Conclusion

The intention of this paper is to contribute experiences and observations with educational experts. As research must be either useful at social, economical and technological areas, it is the responsibility of every person/ organization/ university involved with higher educational research. How can we maintain educational quality for next generation and how many institutions are already following world class research facilities are two sides of the coin. In this paper, we provided a higher level structure of web-portal along with various roles and responsibilities of research stakeholders. It is also important for institutions/ universities to upgrade services for quality research along with quality educational facilities. If student research is regulated and monitored by university-institution industry and guide, then the outcome will be a real and feasible research. As a future development, we are focusing on the parallel development of web-portal and research regulations at micro-level. This micro-level analysis required to focus on research publications, patent development, funding cell organization and employment cell for outstanding research.

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