

How to Complete the Ph.D. Program in Time and Without Complications in India?

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ABSTRACT

Purpose: *The purpose of this article is to i) explain every step of the Ph.D. journey along with their importance, priority, and weightage, ii) provide a Ph.D. planner template, iii) introduce a self-evaluation calculator to understand scholars' Ph.D. progress, iv) throw some light on career opportunities for the Ph.D. holders, and v) Ph.D. holder's responsibilities.*

Design/Methodology/Approach: *Postmodernism philosophical paradigm; Inductive research approach; Observation data collection method; Longitudinal data collection time frame; Qualitative data analysis.*

Findings/Result: *As long as the Ph.D. scholars can understand i) which step of the Ph.D. journey is important?; ii) which step needs scholars' efforts?; iii) which steps require external support?; iv) what are the career prospects of a Ph.D. holder; v) what are the responsibilities of a Ph.D. scholar? They will be able to complete their Ph.D. journey in time and without complications.*

Originality/Value: *There is a vast literature about research methodology and other aspects of the research. However, only a few have explained the step-by-step process of the Ph.D. journey. In this article, we have attempted to explain every step of the Ph.D. journey; importance, weightage, and priority of each step; career options for Ph.D. holders; responsibilities of Ph.D. scholars/holders.*

Paper Type: *Conceptual.*

Keywords: PhD; Ph.D.; Doctoral Research; How to complete Ph.D.?; How to Complete PhD?; Careers for Ph.D. holders; Careers for PhD Holders; Research Ethics; Research Integrity; Ph.D. Planner; PhD Planner; Ph.D. Progress Calculator; PhD Progress Calculator; DDLR-SEC; Postmodernism

1. BACKGROUND :

One thing Ph.D. scholars must always remind themselves of throughout their Ph.D. journey is the fact that they will be awarded a Ph.D. degree for doing doctoral-level research. Doing doctoral-level research and generating research outputs such as research articles and a thesis determines the probability of success in getting a Ph.D. degree. Various research studies have identified factors affecting the Ph.D. success rate across the world. "To name a few a) scholar-supervisor/guide relationship; b) mentorship; c) dissertation process; d) role of the department; e) role of peer qualities; f) transformational learning experience provided; g) level of curiosity and interest in reviewing the existing literature; h) planning and time management skills; i) level of creative thinking and writing skills; j) amount of freedom in the research project; k) level of a supportive environment for Ph.D. scholars' well-being; l) higher-education practices; m) supervisors' research capabilities and gender; n) expectations set by the research environment; o) Ph.D. scholars' expectations; p) support network; q) level of Ph.D. scholars' socialization with the research community; r) Ph.D. scholars' navigation system; s) different terminologies for various components of doctoral-level research are given by different disciplines creating undue confusion in scholars' minds; t) data collection methods which just play the role of data collection and it is just one of the steps of the doctoral-level research process being portrayed as the research methodology/design; u) scholars' inability to identify their genuine interest in a

fact/phenomenon/reality/truth/dependent variable, intensive review of existing literature, locating an important research gap, and finally formulating a research question; v) a lower level of clarity about the most important and indispensable step of the doctoral-level research process i.e., choosing an appropriate research philosophical paradigm that lays stepping stones toward answering the research question in a scientific and scholarly way; w) a lower level of clarity about the most important and indispensable step of the doctoral-level research process i.e., choosing an appropriate research approach/reasoning that paves path for decision concerning data collection and analysis; x) a humongous confusion among Ph.D. scholars in India about the difference between research methodology/design and research data collection methods; y) lower level of clarity and the beginning of the Ph.D. journey without a clear understanding of the essence of research data collection time frames; z) lower level of clarity about the right sample size and appropriate sampling techniques; aa) lower level of clarity about the difference between Mechanical/Electrical/Electronic instruments and Human instruments, the difference between 'Adopted', 'Adapted', and 'Developed' Human instruments, and difference between validity and reliability; ab) fear among scholars about statistical techniques; ac) a lower level of clarity about the most important and indispensable steps of the doctoral-level research process viz., concluding and representing the research work, writing the research work, and publishing the research work " [1-57].

Furthermore, a majority of stakeholders in the research education system have a lower level of clarity about various steps involved in the Ph.D. journey and the weightage/importance/priority of every step. Doing a Ph.D. is a step-by-step process and unless this fact is realized by all the stakeholders it will be very difficult for the scholars to complete their Ph.D. in time and without complications. It is noticed that a majority of them guide Ph.D. scholars to begin the journey without educating the scholars about the essence, importance, and priority of every step. In addition, there is a humongous confusion among Ph.D. scholars about i) which step of the Ph.D. journey is important?; ii) which step needs scholars' efforts.; iii) which steps require external support? This lower level of clarity and the beginning of the Ph.D. journey without a clear understanding of the essence of each step of the Ph.D. journey is making it difficult for Ph.D. scholars to complete the journey successfully in time and most importantly if some scholars complete their Ph.D. journey successfully, their awareness about the step-by-step process of doing Ph.D. is very low. We believe that if the scholars can begin their Ph.D. journey by allocating a higher level of focus and time toward understanding each step of the Ph.D. journey and its importance at the beginning of the Ph.D. program, the journey will be complete with a very lower level of complications. But this reality is knowingly or unknowingly, intentionally, or unintentionally suppressed by a majority of stakeholders in the research education system in India. In other words, this *suppressed reality* has resulted in creating humongous confusion among Ph.D. scholars in India about what is the best way to complete their Ph.D. in time and without complications. The doctoral-level research which is the single most important requirement of the Ph.D. program is cognitively demanding and intends to create researchers who can create new knowledge or interpret existing knowledge about reality by using different perspectives, paradigms, and reasoning. Knowledge sharing requires autonomy, good quality time, a stress-free brain for deep thinking, and the freedom to look for more meaningful findings. This is the single most important reason for making doctoral-level research flexible wherein the scientific and scholarly world gives autonomy to Ph.D. scholars to formulate their question and answer it within 3-6 years using an appropriate research approach/reasoning. Nevertheless, only 50% of scholars admitted to Ph.D. in India completed, and that too in ten years whether or not they are aware of the importance of reasoning in doctoral-level research [46].

2. OBJECTIVE :

Surprisingly a majority of Ph.D. scholars and the stakeholders of the research education system in India are unaware of the fact that Ph.D. is a step-by-step journey. *Owing to such low awareness and low success rate in Ph.D. completion, the key objective of this article is to i) explain every step of the Ph.D. journey along with their importance, priority, and weightage; ii) provide a Ph.D. planner template; iii) introduce a self-evaluation calculator to understand scholars' Ph.D. progress; iv) throw some light on career opportunities for the Ph.D. holders; v) Ph.D. scholars'/holder's responsibilities.*

3. STEPS IN PH.D. JOURNEY? :

We have designed a step-by-step process following which scholars will be able to complete the Ph.D.

program in time and without any complications.

3.1. First Year of Ph.D. Program - Formulating Research Question :

Scholars need to spend at least one year formulating the research question. Unless scholars have formulated the research question we recommend, scholars, must not move further in the Ph.D. journey [48].

- **Step 1:** Understand what a doctoral-level research program is and how to do doctoral-level research by reading materials/books or attending programs/courses concerning Research Methodology.
- **Step 2:** Understand the doctoral-level research process in depth. Until scholars understand the research process do not move further. Scholars must be cognizant of the fact that unless they have understood the step-by-step process of doing doctoral-level research, they must not start their research journey during the Ph.D. program.
- **Step 3:** Understand the University's/Institute's Ph.D. regulations.
- **Step 4:** Choose the genuine area of interest.
- **Step 5:** Choose the Dependent Variable/Phenomenon/Reality/Truth/Effect scholars want to understand better than others based on their interests.
- **Step 6:** Do a Preliminary Literature Review to identify all the Independent Variables/Factors/ Causes that are related to the Dependent Variable (Minimum of 200 Research Articles).
- **Step 7:** Shortlist important Independent Variables.
- **Step 8:** Do a Mega Literature Review (Same 200 Research Articles).
- **Step 9:** Take the Course Work exam.
- **Step 10:** Register as a member of ORCID; Google Scholar; SSRN; Research Gate; Academia; Web of Science; Scopus etc.
- **Step 11:** Do note that by the end of the literature review, scholars would have gathered huge information/data about Variables and Research Population/Units of Analysis of their research question in the existing literature. This huge information/data gathered by scholars present the first opportunity for scholars to analyze and convert this literature information/data into what is called a 'Literature Review Article' that can be published as the first research publication during their Ph.D. Based on the Preliminary, and Mega Literature Review, write Literature Review Article and publish (Literature Analysis).
- **Step 12:** Using the research gaps identified during the Literature Review, Dependent Variable, Independent Variables, and Research Population/Unit of Analysis chosen, formulate the research question for the Ph.D. research.
- **Step 13:** Finalize the research and null hypotheses (if applicable).
- **Step 14:** Write Chapter 1 (Introduction) of the Ph.D. thesis. Ensure to cover What phenomenon/reality/truth/Dependent Variable is being studied?; What Independent Variables are being studied?; Which Population/Sample/Unit of analysis is being studied?; Why is this research question/problem need an in-depth investigation?; How will this research advance new knowledge or new ways of understanding?
- **Step 15:** Based on the Literature Review, write Chapter 2 (Existing Literature) of the Ph.D. thesis. Ensure to cover What is the existing knowledge about their Dependent Variable?; What is the existing knowledge about their Independent Variable 1?; What is the existing knowledge about their Independent Variable 2 (if any)?; What is the existing knowledge about their Independent Variable 3(if any)?; What is the existing knowledge about their Independent Variable 4 (if any)?; What is the existing knowledge about the Research Population/Unit of Analysis/Sample?
- **Step 16:** Write the 'Research Gap' which was identified during the Literature Review as the last paragraph of Chapter 2 (Existing Literature).

3.2. Second Year of Ph.D. Program – Understanding Components of The Research Question :

Immediately after the scholars have formulated the research question, they need to spend at least one year understanding all the components of their research question viz., Dependent Variable, Independent Variables, and Research Population/Unit of Analysis.

- **Step 17:** When scholars have formulated their research question during their first year of the

Ph.D. program, they have also finalized the Research Population/Unit of Analysis/Sample which poses the second opportunity for scholars to publish research articles known as Unit/Variable Analysis. Here scholars are required to select one of the Variables of their research question and conduct a mini-research (Exploratory phase/stage of research) with their Unit of Analysis/Sample (small sample size) using the simple primary data collection methods such as i) Single Case Study; ii) Phenomenology, iii) Archival, iv) Focus Group Discussion; v) Grounded Theory. Write and publish the Unit/Variable Analysis research articles.

- **Step 18:** When scholars have understood the 'Unit Analysis' and 'Variables' of their research question in step 17, now scholars are presented with the third opportunity which we have named Group Analysis. Here scholars are required to select one of the Variables of their research question and conduct a mini-research with multiple Units of Analysis/Samples (medium sample size) using simple primary data collection methods such as i) Multiple Case Study; ii) Meta-analysis, iii) Pilot Survey iv) Pilot Experiment. Write and publish the Group Analysis research articles.
- **Step 19:** Attend the first Research Advisory Committee (RAC) meeting, explain the research gap, and defend the research question to finalize the Ph.D. research title.
- **Step 20:** Write Chapter 3 (Conceptual/Theoretical Model) of the Ph.D. thesis based on Literature, Variable, and Group analysis. Write the main and sub-objectives of the research in the last paragraph of Chapter 3 of the Ph.D. thesis.
- **Step 21:** chose the philosophical paradigm, research approach, data collection methods, data collection time frame, sample size, sampling technique, and data collection instrument.
- **Step 22:** Finalize the data type and data requirement to answer the research question.

3.3. Third Year of Ph.D. Program – Data Collection and Analysis :

By the time scholars reach the third year of the Ph.D. program, scholars would have clearly understood the research question and all its components. This would automatically give scholars clear visibility on what is the best data collection method choice (Mono; Mixed, Multi).

- **Step 23:** Collect pilot data from a few Samples. Check the Validity and Reliability of the data collection Instrument.
- **Step 24:** Write Chapter 4 (Research Methodology) of the Ph.D. thesis. Ensure to cover the research philosophical paradigm chosen and the reasons for the choice; What is the research approach chosen and why? What are the data collection methods chosen and why?; What is the research time frame chosen for data collection and why?; What is the population of the study?; What is the definition/criteria of the unit of analysis/sample?; What is the sample size and how did scholars arrive at the size?; What is the sampling technique and why did scholars choose it?; What are the calibration details of the data collection instrument (if any)?; What is the validity of the data collection instrument (if any)?; What is the reliability of the data collection instrument (if any)?; What are the statistical techniques used in the significance testing, data analysis, and interpretation (if any)?
- **Step 25:** Collect Mega data (a large number of samples) from chosen Samples.
- **Step 26:** Statistically describe the collected Data and Samples.
- **Step 27:** Statistically discover the relationship among Variables of the research question.
- **Step 28:** Statistically test the Significance of discovered relationship and Accept/Refute the research hypotheses (if any) or Conceptual/Theoretical Model (if any).
- **Step 29:** Once scholars have collected the mega data (large sample size) to answer their Ph.D. research question they are presented with the fourth opportunity which we have named 'Relational Analysis'. Here scholars are required to take a fresh look at the data collected from different perspectives, slice and dice the data in different ways, and make groups beyond their research objectives. This exercise will be able to provide scholars with many new insights into their research question/problem. Using these new insights write and publish Relational Analysis research articles
- **Step 30:** Write Chapter 5 (Analysis, Results, and Findings) of the Ph.D. thesis based on statistical analysis. Show all the results of the statistical and non-statistical analysis in words, tables, figures, and equations/formulas (if any); What are the results of significance/ hypotheses testing for every null and research hypothesis (if any)?

- **Step 31:** Write Chapter 6 (Discussion and Conclusion) of the Ph.D. thesis. Ensure to cover what are the qualitative findings.; What are the quantitative findings (if any)?; Explain the meaning of the findings and why they are important; How do scholars relate their research findings to similar research studies?; Consider mentioning other findings even if they are not part of their research objectives.
- **Step 32:** Write Chapter 7 (Limitations). Explain all the limitations of the research viz., coverage, applicability, generalizability, geographical boundaries, context, validity, and reliability; Give detailed justifications for these limitations.
- **Step 33:** Write Chapter 8 (Suggestions). What are the scholars’ suggestions to the end-user of their research based on their research findings?

3.4. Fourth Year of Ph.D. Program – Presenting The Research Work :

It is not just finding the best answer for the research question but is also imperative to present the research work in such a way that it is acceptable to the scientific community.

- **Step 34:** Check all the references cited in the Ph.D. thesis for the citation style in the regulation.
- **Step 35:** Check the spelling/grammar of the Ph.D. thesis using ‘Grammarly Software’ or any similar software.
- **Step 36:** Check the Ph.D. thesis for Plagiarism using plagiarism check Software.
- **Step 37:** Modify/revise/correct the Ph.D. thesis until the plagiarism is reported as less than 10%.
- **Step 38:** Write the Abstract Section of the Ph.D. thesis. An abstract is a summary of scholars’ entire article/thesis and most importantly their research efforts.
- **Step 39:** Prepare a Synopsis (Summary) of the research and attend the Second RAC meeting to explain the entire Ph.D. research.
- **Step 40:** Modify/revise the thesis based on the Second RAC meeting feedback.
- **Step 41:** Submit the final Ph.D. thesis.
- **Step 42:** Modify/revise the Ph.D. thesis based on feedback from thesis Examiners.
- **Step 43:** Submit the final Ph.D. thesis, appear for the final Viva-Voce, and defend the Ph.D. thesis.

4. PH.D. PLANNER AND SELF-EVALUATION CALCULATOR :

We strongly recommend scholars prepare a Time and Action calendar or Ph.D. planner and update the same daily till scholars complete the Ph.D. program. We have designed a Ph.D. planner (1270 Days / 3.5 Years) as shown in Table 1 (Assuming the start date of the Ph.D. Program is 15th November 2022). Scholars must note that the lead time shown in the table must be modified according to the scholars’ target Ph.D. completion date.

Table 1: Ph.D. Planner

Step / Task	Target Start Date	Target End Date	Lead Time in Days	Actual End Date	Status
Understanding SU Ph.D. Regulations [46-47]	22 November 2022	29 November 2022	7		
Understanding Step-by-Step Research Process [46-48]	01 December 2022	30 May 2023	180		
Choosing a Genuine Area of Interest [49]	01 June 2023	01 July 2023	30		

Choosing the Dependent Variable / Phenomenon / Reality / Truth / Effect [49]	03 July 2023	02 August 2023	30		
Preliminary Literature Review [49]	04 August 2023	03 September 2023	30		
Choosing Independent Variables / Causes / Factors [49]	05 September 2023	12 September 2023	7		
Mega Literature Review [49]	14 September 2023	14 October 2023	30		
Finding Research Gap [49]	16 October 2023	23 October 2023	7		
Writing and Publishing Literature Analysis Article [57]	25 October 2023	01 November 2023	7		
Writing 'Chapter 1 - Introduction' of Thesis	03 November 2023	18 November 2023	15		
Writing 'Chapter 2 - Literature Review' of Thesis	20 November 2023	05 December 2023	15		
Defining Research Population / Unit of Analysis [49]	07 December 2023	14 December 2023	7		
Finalizing Research Question [49]	16 December 2023	23 December 2023	7		
Finalizing Research Topic [49]	25 December 2023	10 January 2024	7		
Understanding All the Variables of Research Question through Mini Research [57]	12 January 2024	11 April 2024	90		

Writing and Publishing Variable and Group Analysis Articles [57]	13 April 2024	13 May 2024	30		
Writing 'Chapter 3 - Conceptual Model' of Thesis	15 May 2024	30 May 2024	15		
Choosing Research Philosophical Paradigm [50]	01 June 2024	08 June 2024	7		
Choosing Research Approach/Reasoning [51]	10 June 2024	17 June 2024	7		
Choosing Data Collection Methods and Method-choice [52]	19 June 2024	26 June 2024	7		
Choosing Data Collection Time Frame [53]	28 June 2024	05 July 2024	7		
Deriving Sample Size [54]	07 July 2024	14 July 2024	7		
Choosing Sampling Technique [54]	16 July 2024	23 July 2024	7		
Choosing Samples from the Population [54]	25 July 2024	01 August 2024	7		
Choosing Data Collection Instrument [55]	03 August 2024	02 September 2024	30		
Checking Calibration of the Data Collection Instrument [55]	04 September 2024	11 September 2024	7		
Checking Validity of the Data Collection Instrument [55]	13 September 2024	28 September 2024	7		
Collecting Pilot Data from a Few Samples [55]	30 September 2024	14 November 2024	8		
Checking Reliability of the Data Collection Instrument [55]	16 November 2024	23 November 2024	7		

Writing 'Chapter 4 - Research Methodology' of Thesis	25 November 2024	10 December 2024	15		
Collecting Mega Data from All the Samples Chosen from the Research Population [56]	12 December 2024	10 June 2025	180		
Entering the Data Collected into a Microsoft Excel File [56]	12 June 2025	27 June 2025	15		
Cleaning the Data [56]	29 June 2025	14 July 2025	15		
Importing the Cleaned Data into a Statistics Software [56]	16 July 2025	23 July 2025	7		
Based on the Characteristics of the Data Collected, Setting Variables in the Statistics Software [56]	25 July 2025	01 August 2025	7		
Describing Samples and Data Collected [56]	03 August 2025	10 August 2025	7		
Discovering Relationship Among Variables of Research Question [56]	12 August 2025	19 August 2025	7		
Testing the Significance / Hypotheses of Relationship [56]	21 August 2025	28 August 2025	7		
Writing and Publishing Relational Analysis Articles	30 August 2025	29 September 2025	30		
Writing 'Chapter 5 - Analysis, Results, and Findings' of Thesis	01 October 2025	31 October 2025	30		
Writing 'Chapter 6 - Discussion and Conclusion' of Thesis [57]	02 November 2025	02 December 2025	30		
Writing 'Chapter 7 - Limitations' of Thesis [57]	04 December 2025	19 December 2025	15		

Writing 'Chapter 8 - Suggestions' of Thesis [57]	21 December 2025	05 January 2026	15		
Listing all the Articles / Books / Book Chapters / Theses / Websites cited in the Thesis in the 'Reference' Section of the Thesis [57]	07 January 2026	06 February 2026	30		
Checking and Correcting the Spelling / Grammar of the Thesis using 'Grammarly' Software [57]	08 February 2026	23 February 2026	15		
Checking and Correcting the Thesis for Plagiarism using Software [57]	25 February 2026	12 March 2026	15		
Checking the Numbering and Labelling of all the Tables and Figures of the Thesis [57]	14 March 2026	29 March 2026	15		
Writing 'Abstract' Section of Thesis [57]	31 March 2026	15 April 2026	15		
Writing 'Acknowledgement' Section of Thesis [57]	17 April 2026	02 May 2026	15		
Checking and Correcting the Thesis per the Regulations of the University / Institute	04 May 2026	19 May 2026	15		
Presenting the Overall Summary of the Research to the Research Supervisor / Guide	21 May 2026	28 May 2026	7		
Correcting Thesis Based on Research Supervisor's / Guide's Feedback	30 May 2026	14 June 2026	15		
Presenting the Overall Summary of Research to the Research Advisory Committee	16 June 2026	23 June 2026	7		
Correcting Thesis Based on Research Advisory Committee's Feedback	25 June 2026	10 July 2026	15		
Submitting Final Thesis Copy to University / Institute	12 July 2026	27 July 2026	15		

Attending Viva-voce and Defending Thesis	29 July 2026	13 August 2026	15		
Follow Up for Ph.D. Provisional Degree Certificate	15 August 2026	30 August 2026	15		
Follow Up for Provisional Ph.D. Degree Certificate	08 December 2026	15 December 2026	7		

Scholars must know that they are the whole and sole of the Ph.D. program. Scholars have to formulate/frame the research question and answer it within 3-4 years. Scholars should not rely too much on an external support system (University, Institute, Research Supervisor/Guide, etc.) [47], but rather realize that self-learning and self-evaluation are essential requirements of the Ph.D. program. Throughout the Ph.D. program, scholars might not come across many quantitative evaluations of their progress concerning the Ph.D. program. Most scholars come across qualitative evaluations by the RAC, Research Supervisor/Guide, Publishers, Indexing Agencies, External Examiners, etc. Nevertheless, we have developed a self-evaluation calculator named ‘DDLRL Self-evaluation Calculator for Checking the Ph.D. progress (DDLRL-SEC)’. By honestly filling scores in this calculator, scholars can quantitatively evaluate their Ph.D. progress and accordingly take appropriate actions or make changes to their plans by looking at the weightage allocated to each task. Table 1 illustrates the DDLRL self-evaluation calculator. Fill in the score and check the Ph.D. progress.

Table 2: Self-evaluation calculator for checking Ph.D. progress (DDLRL-SEC)

Year	Progress Measure	Maximum Score	Your Score
Year 1	Understanding Ph.D. Regulations of University / Institute	2.50	
Year 1	Understanding Step-by-Step Research Process	12.50	
Year 1	Clarity on Dependent Variable(s)	2.50	
Year 1	Clarity on Independent Variable(s)	2.50	
Year 1	Clarity on Unit(s) of Analysis	2.50	
Year 1	Clarity on Research Population	2.50	
Year 1	Clarity on Data Type of Variables	2.50	
Year 1	Formulation of Research Question	20.00	
Year 1	Publication of Literature Analysis Article	1.00	
Year 2	Publication of Variable 1 Analysis Article	1.00	
Year 2	Publication of Variable 2 Analysis Article	1.00	
Year 2	Publication of Variable 3 Analysis Article	1.00	
Year 2	Choosing Research Philosophical Paradigm	2.50	
Year 2	Choosing Research Approach / Reasoning	2.50	
Year 2	Choosing Data Collection Methods and Method-choice	2.50	

Year 2	Choosing Data Collection Time Frame	2.50	
Year 2	Deriving Sample Size	2.50	
Year 2	Choosing Sampling Technique	2.50	
Year 2	Choosing Samples from the Research Population	2.50	
Year 2	Choosing Data Collection Instrument	2.50	
Year 2	Checking Calibration of the Data Collection Instrument (If Any)	2.50	
Year 2	Checking the Validity of the Data Collection Instrument	2.50	
Year 3	Collecting Pilot Data from a Few Samples	2.50	
Year 3	Checking the Reliability of the Data Collection Instrument	2.50	
Year 3	Collecting Mega Data from All the Samples Chosen from the Research Population	9.50	
Year 3	Data Analysis using Statistical Software	1.00	
Year 3	Publication of Relational Analysis Article 1	1.00	
Year 3	Publication of Relational Analysis Article 2	1.00	
Year 4	Thesis Writing	5.00	
Year 4	Thesis Submission	1.00	

<i>Scholar's Performance</i>	DDLr-SEC Total Score		
	25 to 50%	51 to 75%	Above 75%
0 to 1 Year	<i>On-track</i>	<i>Off-track</i>	<i>Off-track</i>
1 to 2 Years	<i>Acceptable</i>	<i>On-track</i>	<i>Off-track</i>
2 to 3 Years	<i>Unacceptable</i>	<i>Acceptable</i>	<i>On-track</i>
3 to 4 Years	<i>Unacceptable</i>	<i>Unacceptable</i>	<i>Acceptable</i>
Above 4 Years	<i>Unacceptable</i>	<i>Unacceptable</i>	<i>Unacceptable</i>

Fig. 1: DDLR-SEC interpretation framework

Based on the total scores and the number of years spent doing the Ph.D., scholars can understand their Ph.D. progress with the help of the DDLR-SEC interpretation framework shown in figure 1.

5. CAREERS FOR PH.D. HOLDERS :

A majority of scholars think that a Ph.D. degree is limited to having careers in academics. However, many other fields require Ph.D. degree holders [58-76]. We have collected some information about the career prospects for scholars once scholars complete the Ph.D. program as listed below. Do note that,

it is very important for scholars to decide on long-term career goals before joining the Ph.D. program. Otherwise, scholars will not be able to integrate the Ph.D. program seamlessly with their career plans. Once scholars finalize the career plan, they must ensure an understanding of all the recruitment regulations of their dream Job/Career/Employer in addition to building the Resume/Biodata/Curriculum Vitae in line with the future Employer's expectations and visiting the dream Employer's website regularly to keep themselves updated on any changes in their recruitment regulations.

5.1. Post-doc Position :

Landing a post-doc position may be the most traditional step in academia. Post-doc contracts have varying lengths between 1 year and 4 years, typically. One option is to stay at the institution where scholars got the Ph.D. and get a continuation project on what scholars did for the Ph.D. Another option is to join the dream institution as a post-doc fellow which will serve as a great entry point. Scholars can use the years of the post-doc then to publish the work scholars did during the Ph.D. and grow the research network. Keep track of Government sponsored fellowships. Scholars might be able own intellectual property rights generated during their research if scholars chose this career option.

5.2. Faculty Position :

Some scholars skip the post-doc step and land a faculty position right away. If scholars become faculty member fresh out of a Ph.D. degree, scholars might be in a slightly disadvantaged position, because scholars do not have the post-doc years to up the publications. Typically, as young faculty members, scholars will spend quite some time teaching. However, if this is the career path scholars are seeking, and scholars are willing to make a move and become academic nomads, then scholars might find that other parts of the world are desperate to hire people with a Ph.D. title to join their faculty. Developing countries are a good bet for this option if scholars are considering moving abroad. Scholars might be able own intellectual property rights generated during their research if scholars chose this career option.

5.3. Adjunct/Visiting Position :

Adjunct positions are part-time positions at Universities/Institutes. Suitable for Ph.D. holders working in non-academic (Industry/Practice) and would like to be connected with academia. Scholars might be able own the intellectual property rights generated during their research if scholars chose this career option.

5.4. Industrial Research & Development (R&D) :

R&D in industry merges scientific achievement with industrial goals. It is a mentally stimulating field that demands practical and profitable results. Many researchers and academics are drawn to R&D in the industry by its financial rewards and challenging work. A few examples are Pharmaceuticals; Communications Technology; Automobiles and Aerospace; Banking and Financial Services; Defence; Fast-moving Consumer Goods (FMCG) Manufacturing. Scholars might not be able own the intellectual property rights generated during their research if scholars chose this career option.

5.5. Engineering Industry :

The engineering industry is a major part of the domestic economy businesses. It involves the design and production of everything from chemicals to vehicles. Jobs in the engineering industry for academics would include such roles as a product developer, salesperson (which demands engineering expertise for B2B), and traditional engineer. Academicians who want to move from academia jobs to industry jobs should look at utilizing their research experience to obtain a job. Ideally, a candidate will have a Ph.D. in a relevant area of engineering, as well as an understanding of the industry and the market, and practical knowledge of engineering processes. Scholars might not be able own the intellectual property rights generated during their research if scholars chose this career option.

5.6. Government :

There are many Government Departments and Agencies (Central and State) that require Ph.D. degree holders such as Central and State Government Projects; R&D Centers and Research Councils Viz., CSIR; DRDO; ESIC; ICAR; MOHFW; DBT; DST; ICMR; DAE; MHRD; MHA. Scholars might not be able own the intellectual property rights generated during their research if scholars chose this career option.

4.7. Others :

There are a few more roles for which Organizations recruit Ph.D. degree holders such as Market Research Analyst; Competitive Intelligence Analyst; Data Scientist; Management Consultant; Quantitative Analyst; Operations Research Analyst; Publication Coordinator; Proof Reader; Editor; Ph.D. Advisor; Research Advisor.

Be aware that a majority of recruiters subtract the work experience gained during the Ph.D. program from the total work experience. Thus, it becomes furthermore important for scholars to complete the Ph.D. program at the earliest possible time.

6. RESPONSIBILITIES OF PH.D. SCHOLARS AND PH.D. HOLDERS :

The whole idea of the scholarly world is to give undisputable autonomy to scholars to pursue the Ph.D. program wherein scholars are allowed to formulate the research question and answer it in expectation of the scholarly contribution to the improvement of knowledge. Higher autonomy is one of the basic requirements to motivate someone for knowledge sharing especially in cognitively demanding areas. Thus, during and after the Ph.D., it is the responsibility to contribute to the world of knowledge [77-101]. We have listed a few areas below where scholars can contribute to the integrity of scholarly research.

- Being ethical while doing research is one of the most important responsibilities of a researcher. Research should be conducted in an ethical manner ensuring dignity, rights, safety, and privacy within the researcher ecosystem.
- Ensure a high-quality research design, reliable data, appropriate use of methods, rigorous/careful analysis, transparent reporting, and interpretation of the results.
- Promote honesty through transparency in developing, undertaking, reviewing, reporting, and communicating research in a fair, comprehensive, and unbiased fashion.
- The process of research is aligned with the norms and traditions of society and its cultural heritage. Ensure respect for colleagues, research participants, and the environment.
- Objectivity and lack of bias are the core principles of research. Scholars should avoid conflicts of interest in setting research priorities, establishing research collaborations, choosing research questions, and interpreting and assessing the implications of the research results.
- Research functions must be insulated from both the appearance and the reality of the undue influence of funders or other non-researchers with a stake in the outcome of the research.
- The research will have to comply with both the spirit and the letter of relevant rules and procedures such as regulations governing professional standards.
- The robustness of the research results depends on thorough research execution, systematic documentation, and data quality. Careful collection of data and documentation is necessary to ensure the quality of the results & reproducibility.
- Producing plagiarism-free research output is mandatory. Intentionally or unintentionally, scholars might end up copying someone else's content and claim the same as their own. Always ensure scholars have double-checked the content of the research work for plagiarism before publishing. Do note that there are strict policies and regulations regarding plagiarism. Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.
- Do not manipulate primary information/data that scholars have collected to answer the research question. There is a possibility that scholars might manipulate the data to be able to prove the hypothesis. But scholars must be aware that rejecting the hypothesis is also an acceptable and good research output. Avoid manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- As a best practice for authorship, it is encouraged to give priority to the authors in order of their contributions irrespective of seniority. However, there is also the question of a corresponding author. Given that this role involves active correspondence with the journal or reviewers and other researchers, assigning it to a senior researcher may be more appropriate.
- Intellectual property created in the research has significant commercial value, which can be

protected by patents, trademarks, copyrights, and other forms of guarantees. The proper assignment of intellectual property and preservation of these rights takes on additional importance because of the associated economic value. Assigning intellectual property rights, to the extent possible, to the stakeholders at the start of the project is good research practice. Clarifying these aspects of the research outputs at the outset decreases the likelihood of problems and conflicts arising at later stages of the project.

- Do not commit Type I and Type II Errors whatsoever the reason. We have discussed the practical implications of committing such errors in Step 13 of the DDLR Model (Testing the significance of the relationship).

In addition to contributing to the upliftment of knowledge in the area of research, scholars must also contribute to the upliftment of the overall education system in the area of Research Methodology by sharing the knowledge about the Research Methodology with others. Finally, we would need scholars to know a few essential qualities of the lifestyle of a good Ph.D. scholar listed below.

- Talk less, listen more.
- Write less, read more.
- Glance less, practice more.
- Participate less, observe more.
- Assume less, verify more.
- React less, respond more.
- Personal opinions less, data-based opinions more.
- Worry less about the Ph.D. degree, think more about the research question.
- Prioritize, accuracy over speed; common knowledge over common sense; research integrity over research performance; happiness over pleasure.
- Adopt simple living and deep thinking.

7. CONCLUSION :

Ph.D. scholars must understand the various steps involved in the Ph.D. journey and the weightage/importance/priority of every step at the beginning of their journey. Doing a Ph.D. is a step-by-step process and unless this fact is realized by all the scholars and the stakeholders of the research education system in India it will be very difficult for the scholars to complete their Ph.D. in time and without complications. Scholars must be aware of i) which step of the Ph.D. journey is important?; ii) which step needs scholars' efforts.; iii) which steps require external support? We believe that if the scholars can begin their Ph.D. journey by allocating a higher level of focus and time toward understanding each step of the Ph.D. journey and its importance of them they will be able to complete the Ph.D. program in time and without complications. We strongly recommend scholars use the Ph.D. planner explained in this article and update the same daily till they complete the Ph.D. program. Scholars must also know that they are the whole and sole of the Ph.D. program. Scholars have to formulate/frame the research question (on their own based on their interest and in-depth literature review) and answer it within 3-4 years. Scholars should not rely too much on an external support system (For instance, University, Institute, Research Supervisor/Guide, etc.,) [47], rather they must realize that self-learning and self-evaluation are essential requirements of the Ph.D. program. Throughout the Ph.D. program, scholars might not come across many quantitative evaluations of their progress concerning the Ph.D. program. Most scholars come across qualitative evaluations by the RAC, Research Supervisor/Guide, Publishers, Indexing Agencies, External Examiners, etc. We recommend scholars make use of the self-evaluation calculator (DDLRL-SEC) introduced in this article and check their Ph.D. progress regularly.

Doing a Ph.D. is a step-by-step process and unless this fact is realized by all the stakeholders it will be very difficult for the scholars to complete their Ph.D. in time and without complications. This is only possible when every stakeholder in the research education system believe in this fact, practice it personally, and train scholars about the prioritization of important steps. It is the responsibility of every stakeholder in the research environment and system to ensure that the scholars are made aware of the step-by-step process of doing a Ph.D. which would enable them to complete their Ph.D. in time and without complications. Designing robust coursework that is intended to create awareness about each

step involved in the Ph.D. journey is an appropriate way of fulfilling this responsibility. As long as the Ph.D. scholars can understand i) which step of the Ph.D. journey is important?; ii) which step needs scholars' efforts?; iii) which steps require external support? They will be able to complete their Ph.D. journey in time and with a very lower level of complications.

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