

Comprehensive Researcher Development Framework (CRDF)

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The CRDF synthesizes 56 published frameworks from across disciplines and input from the research community into 79 core learning outcomes across 8 areas of researcher development for undergraduate through postdoctoral researchers in training.

1. Foundational Disciplinary Knowledge

Understand historical and emerging disciplinary content, concepts, frameworks, and theories and how they relate to other disciplines.

Researchers:

- 1.1. know the fundamental content in their discipline (e.g., frameworks, theories, and models).
- 1.2. know the history of knowledge generation in their discipline.
- 1.3. know the processes by which new knowledge is generated and evaluated.
- 1.4. ground hypotheses and research questions in established disciplinary knowledge, theories, frameworks, or observations.
- 1.5. know inferences and implications of research findings.
- 1.6. know the ways that content knowledge from other disciplines is related to content knowledge in their discipline.

2. Practical and Cognitive Research Skills

Know and apply disciplinary knowledge, technical, and reasoning skills to conduct research that advances knowledge in the discipline.

Researchers:

- 2.1. use tools and databases to search the disciplinary literature.
- 2.2. use literature search strategies that identify relevant prior research.
- 2.3. use logical and critical thinking in evaluating research.
- 2.4. connect diverse research ideas and approaches in novel and creative ways.
- 2.5. consider alternative approaches and interpretations of research.
- 2.6. make connections between content knowledge in their discipline and content knowledge in other disciplines.
- 2.7. identify gaps in existing knowledge or research results to investigate.
- 2.8. set research goals.
- 2.9. use disciplinary theories, frameworks and models in designing research studies.
- 2.10. provide a logical rationale for their study designs.
- 2.11. know assumptions and limitations in study designs (e.g., reporting uncertainty/error).
- 2.12. formulate hypotheses and research questions that can be systematically tested or investigated.
- 2.13. select appropriate methods to investigate research questions.
- 2.14. follow standard protocols to collect and store research data.
- 2.15. have up-to-date technical skills to conduct research in the discipline.
- 2.16. develop new data collection or analytical methods when needed.

- 2.17. use troubleshooting skills to address theoretical or technical problems in research.
- 2.18. apply the appropriate analytic and statistical methods to analyze data.
- 2.19. use disciplinary theories, frameworks and models in analyzing data.
- 2.20. interpret the results of data analyses (e.g., coding, mathematical, and statistical calculations).
- 2.21. interpret or synthesize research findings.
- 2.22. propose new inferences and implications of research findings (their own and/or others’).
- 2.23. draw conclusions from research findings.
- 2.24. refine existing and/or contribute new disciplinary theories, frameworks, and models based on research findings.

3. Ethical & Responsible Research Practices

Follow guidelines for responsible conduct of research and recognize and respond to ethical issues that impact and emerge from conducting research.

Researchers:

- 3.1. follow research safety regulations.
- 3.2. follow disciplinary data ownership and stewardship practices.
- 3.3. follow ethical guidelines for working with research data.
- 3.4. follow guidelines for ethical treatment of research subjects (e.g., individuals, communities, animals, etc.).
- 3.5. follow guidelines for conducting rigorous and reproducible research in their discipline.
- 3.6. follow disciplinary norms and policies regarding credit for contributions to research (e.g., citing previous research, authorship order, acknowledging work).
- 3.7. recognize and minimize legal issues, ethical issues, and potential conflicts of interest in research.
- 3.8. recognize instances of research misconduct and take steps to address them.
- 3.9. consider the role of social and cultural factors in research.
- 3.10. consider the implications of research to individuals and society.
- 3.11. consider how system structures provide differential access to participation in research.
- 3.12. act to increase access to research for all.

4. Research Communication Skills

Translate and communicate research ideas and findings in multiple formats to multiple audiences.

Researchers:

- 4.1. construct appropriate ways to present and visualize data.
- 4.2. use disciplinary conventions to communicate research (e.g., ideas, results, implications) orally (e.g., conference presentations, invited talks, research team meetings).

- 4.3. use disciplinary conventions to communicate research (e.g., ideas, results, implications) in writing (e.g., research articles, grant proposals, policy briefs).
- 4.4. translate research findings into policies and practices.
- 4.5. translate research (e.g., ideas, results, implications) and engage with audiences outside of their research discipline (e.g., scholars in other disciplines, non-research, or general audiences).
- 4.6. promote and advocate for research through communications to various audiences (e.g., institutions, disciplines, public stakeholders).

5. Interpersonal Research Skills

Build relationships and skills to productively interact and collaborate with people from diverse backgrounds and perspectives in the research environment.

Researchers:

- 5.1. understand and conduct themselves in accordance with the cultural and social norms of professionals in the discipline.
- 5.2. express respect for others’ differences.
- 5.3. use appropriate and effective interpersonal communication practices with research colleagues.
- 5.4. manage difficult conversations and conflicts with research colleagues.
- 5.5. work effectively with others on collaborative and/or interdisciplinary teams.
- 5.6. consider and include multiple perspectives in decision making.
- 5.7. make meaningful contributions to collaborative research projects.
- 5.8. provide critical and constructive feedback on research to colleagues.
- 5.9. accept, interpret, and modify their research based on constructive criticism and feedback from colleagues.
- 5.10. network with other research professionals.

6. Researcher Self-Beliefs and Attitudes

Develop personal qualities (i.e., curiosity, confidence, identity, self-regulation, self-assessment and perseverance) that are critical for long-term success in research.

Researchers:

- 6.1. proactively set their research goals and secure the guidance and resources needed to achieve those goals.
- 6.2. persevere when problems or challenges arise in research (e.g., unexpected, ambiguous, or uncertain results, failed projects).
- 6.3. recognize and manage their feelings and behaviors in the research environment.
- 6.4. accurately self-assess their research strengths and weaknesses.
- 6.5. express curiosity in exploring and conducting research.
- 6.6. work at an appropriate level of independence.
- 6.7. manage time to meet individual research project milestones.
- 6.8. develop confidence in their capability to successfully conduct research.
- 6.9. identify themselves as a researcher or expert in their discipline.
- 6.10. engage in practices that support work-life balance (e.g., time management, pursuing interests beyond research).

7. Knowledge and Skills to Pursue a Research or Research-Related Career

Apply and translate knowledge and skills as a researcher to identify and pursue a research or research-related career.

Researchers:

- 7.1. are aware of career pathways related to their research training.
- 7.2. identify and clarify a long-term strategic vision for their research career.
- 7.3. translate and apply their research skills and knowledge across career pathways.
- 7.4. are prepared to pursue research career pathways.

8. Knowledge and Skills to Administer and Manage Research Projects and Teams

Develop administrative skills to lead research personnel and projects.

Researchers:

- 8.1. identify and clarify a long-term strategic vision for a program of research.
- 8.2. identify opportunities and make decisions about the research to be done.
- 8.3. mentor other developing researchers using best practices in mentoring.
- 8.4. know how to identify and secure funding (e.g. investments, grants) to support research in their discipline.
- 8.5. estimate and secure the funds needed to conduct research.
- 8.6. track research expenditures.
- 8.7. have the administrative skills to manage research projects and/or heterogenous research teams.

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