



Research Methods

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What is Research?


- **Definition:** (from www.dictionary.com)

n.

- Scholarly or scientific investigation or inquiry.
- Close, careful study.

v.

- To study (something) thoroughly so as to present in a detailed, accurate manner:
researching the effects of acid rain.
- To do research for: *research a magazine article.*



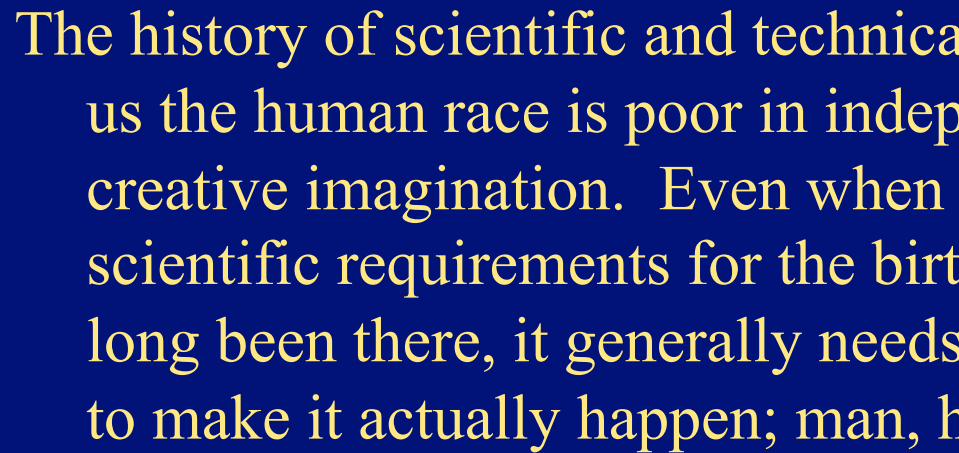
If we knew what it was we were doing, it
would not be called research, would it?

-- Albert Einstein



University and Research

- **Research I Institutions**
 - Texas A&M University is a Research I school
 - **Research enhances the quality of education**
 - Leverage research resources
 - Assist in solidifying and consolidating course knowledge
 - Provide means to practice technical communication and collaboration
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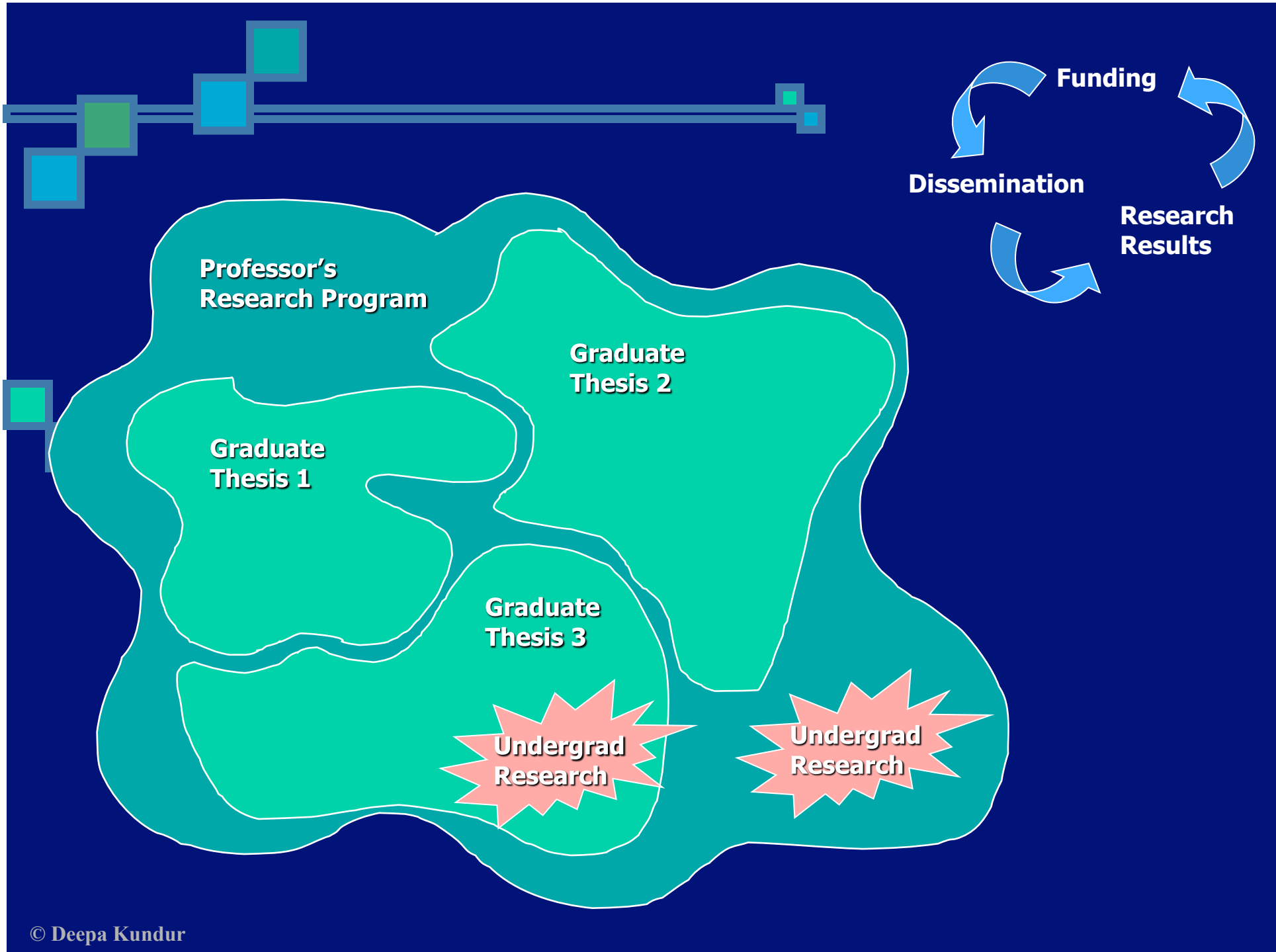


The history of scientific and technical discovery teaches us the human race is poor in independent thinking and creative imagination. Even when the external and scientific requirements for the birth of an idea have long been there, it generally needs an external stimulus to make it actually happen; man, has so to speak, to stumble right up against the thing before the right idea comes.

-- Albert Einstein

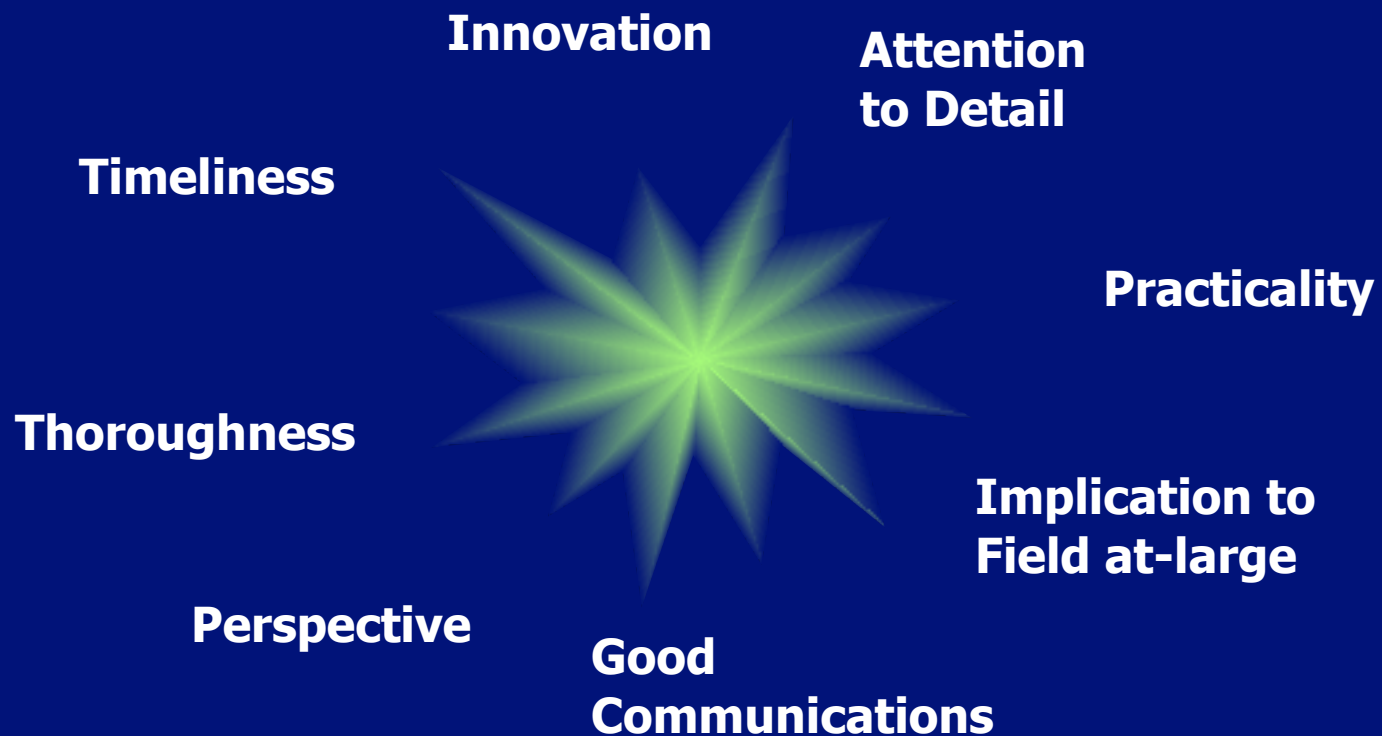
Research Universities provide the context in which the external stimuli operate with the greatest effectiveness.

Inquiry, investigation and discovery are the heart of educational and research institutions.





Elements of Good Research




Understand Your Project

- Read, read, read!
- Talk to other members of the research team
- Work with software, equipment or test subjects
- Focus on both learning the technical details and understanding the research style of your group



Define Your Project

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- **Problem formulation:** What is the problem you are trying to solve?
 - What exactly are you responsible for doing?
 - Define the **scope** of your project
 - Ask questions to verify you have understood correctly

Motivation and Applications


- Why are you investigating this problem?
- Why is it an important issue?
- How are existing solutions, if any, insufficient?
- Ask questions to learn about the big picture

Research Survey

- Look at similar solutions, if any, to the project you are working on
- Are there any obvious ways to classify what is being done?
- Are there any general trends or insights you can glean?
- Ask questions




Make a Schedule

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- Work with your faculty mentor and other members of the research team to make a timeline for your progress
 - Be realistic and flexible
 - Make sure that something is completed at the end of your 9-weeks



Ask Questions




“True learning is based on discovery
guided by mentoring rather than the
transmission of knowledge.”

-- John Dewey

A decorative graphic consisting of a horizontal line with several colored squares (blue, green, cyan) and a vertical line on the left side.

Take Initiative

A decorative graphic consisting of two overlapping cyan squares.

“Inherent in inquiry-based learning is an element of reciprocity: faculty can learn from students as students are learning from faculty.”

from “Reinventing Undergraduate Education: A Blueprint for America’s Research Universities” by the Boyer Commission