What is Research?
Steps of Research Process?
Academic Classification (Who is Researcher?)

- Undergraduate Students
- Graduate Researcher
Research is a logical, step by step process to solve problems.
Definition:

- **Research** is **creative** work undertaken on a **systematic** basis in order to:
  - Create new **knowledge**
  - Devise new **application** of knowledge
Research Project

- Research projects can be used to **develop further knowledge** on a topic.
- A research project may be **an expansion on past work** in the field.
Steps of the research process

- Step 0: General Study: General Knowledge of the Field (Undergraduate Education)
Steps of the research process

- **Step 1: Identify the Problem**: develop a research question.
  - Is it possible? Is there any way?
  - It is **curiosity** that breeds new knowledge.
Steps of the research process

- Step 2: Review the **Literature** (existing knowledge) about the question: provides foundational background knowledge about the topic.
Literature Review:
Literature Review Resources:

- Books
- Journals
- Conferences
- Technical reports
- Dissertations
- Internet
Literature Review:

- Search using **Keywords**
- Conduct a **Brief Review**
- Expand your keywords
- Expand References using keywords and citations
- **Evaluate References**
- **Organize References**
- **Take Note**
- **Categorize your Knowledge**
Steps of the research process

- Step 3: Clarify the Problem: clarifying and narrowing the research project
- Clearly Define Objectives and Specifications

- What to make?
- Need a Deep Study
Steps of the research process

- **Step 4: Develop the Instrumentation Plan:** the road map for the entire research
  - How to make?
  - Need a very Deep Study

- List your **Materials, Software, Hardware**
- List your **procedure**
- Divide Project into Parts
Steps of the research process

- Step 5: Form your hypothesis

Writing the Research Proposal
Steps of the research process

- **Step 6: Start First Part:**
- **Design and Conduct an experiment:**
  Test your hypothesis.
Steps of the research process

- Step 7: Collect results
Steps of the research process

- Step 8: Analyze and Interpret results
- Step 9: Compare the results
- Making Decision
Steps of the research process

- Results are not satisfactory

- Step 10:
  - Troubleshooting
  - Check everything
  - Repeat Experiment
Steps of the research process

- NOT WORKING!!
- Back to Step 2:
  - Re-search and Review Literature especially technical reports
- Conduct new experiment
Steps of the research process

- Success in Part 1

- Start Next Part: Back to Step 6: Conduct the Experiment: Test your hypothesis.
Steps of the research process

- Step 11: Combine All Parts together
- Conduct the Complete Experiment
Steps of the research process

- Step 13: Compare the results with Proposal objectives
Steps of the research process

- **Results: Terrible**

- Do not feel **disappointed**.

- You need **Hope**, be **Calm**!
Steps of the research process

- Check Everything
- Troubleshooting
Steps of the research process

- Everything Fixed
Steps of the research process

- **STEP 14**: Make conclusion
- **Step 15**: Report your findings.
Steps of the research process

- End of research process

Writing the Dissertation
1. Ask a Question
2. Do Background Research
3. Construct a Hypothesis
4. Test with an Experiment
   - Procedure Working?
     - No: Troubleshoot procedure. Carefully check all steps and set-up.
     - Yes: Analyze Data and Draw Conclusions
6. Results Align with Hypothesis
7. Communicate Results

- Experimental data becomes background research for new/future project. Ask new question, form new hypothesis, experiment again!
Researcher Personality
Researcher Personality
Researcher Personality
Researcher Personality
Researcher Personality

What I Know is nearly 0.00000….00001% of Total Existing Knowledge !!!
THANKS!