ALMUSTAQBAL UNIVERSITY

College of Health and Medical Techniques
Medical Laboratory Techniques Department

Stage : Fourth year students
Subject : Research Methods - Lecture 6

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Applied Research & Pilot Study

Scientific research is broadly divided into **basic (**fundamental**)** and **applied** research. While basic research focuses on generating new knowledge and theories, applied research aims to solve real-world problems and translate scientific concepts into practical applications.

A related concept is the **pilot study**, which is a preliminary, small-scale study conducted before the main research to test feasibility, methods, and tools.

Applied Research

Is a **systematic investigation that aims to solve specific, practical problems using scientific methods**. It uses knowledge generated from basic research and applies it to real situations in medicine, engineering, industry, and healthcare to produce practical solutions and innovations.

Objectives of Applied Research

- To **solve real-world problems**
- To improve **practices, procedures, and programs**
- To **test theories** in real settings
- To **develop new products, devices, techniques**

Applied research Examples :

In Healthcare and Medicine:

- **Developing new drug treatments**: Testing a new drug to see if it is effective and safe.
- **Improving surgical procedures**: Researching how to best prepare patients for a specific type of surgery to improve outcomes.
- **Development of a new vaccine to combat a specific viral strain**
- **Developing** a **new diagnostic tool** for early cancer detection
- Studying ways to **reduce hospital infections**
- **Developing a new prosthetic limb desi**gn

In Technology

- **Creating new technologies**: Designing a more efficient and lightweight battery for electric cars.

- **Improving existing systems**: Developing an algorithm to enhance image recognition in smartphones.
- **Designing solutions**: Creating an earthquake-resistant building based on geological research.

In Agriculture:

Introducing a genetically modified crop variety to improve yield and pest resistance.

In Chemistry:

Developing a new drug formulation for faster pain relief.

In Physics:

Creating more efficient solar panels based on the study of photovoltaic materials.

Other fields

Applied research is also practical in areas of science, such as Engineering which is the practice of using natural science, mathematics, and the engineering design process to solve technical problems, increase efficiency and productivity, and improve systems.

Also in Medical sciences, fields such as medical microbiology, pharmaceutical research, and clinical virology, which are applied sciences that apply biology and chemistry to medicine.

Importance of Applied Research

Problem Solving:

Applied research provides effective solutions to real-world problems, improving processes, products, and services. **(Solves urgent clinical problems , Improves patient care and treatment outcomes that Supports public health programs)**

Innovation:

It drives innovation by identifying opportunities for enhancement and developing practical solutions.(**Drives medical innovation)**

Competitive Advantage:

In business, applied research can lead to improved products, increased efficiency, and a competitive edge in the market.

Technological Advancement:

In technology and engineering, It Bridges theory with practice and fuels advancements by applying scientific knowledge to practical applications.

Applied Research vs. Basic Research

Applied research differs from basic research in several ways:

- **Objectives:**

Applied research aims to solve a specific practical problems or improve existing processes, products, or services using existing knowledge while basic research seeks to expand general knowledge.

- **Focus:**

Applied research focuses on solving real-world challenges, whereas basic research explores fundamental principles and concepts.

- **Applicability:**

Applied research findings are directly applicable to practical situations, while basic research often lacks immediate practical applications.

- **Immediate Impact:**

Applied research has a more immediate impact on solving problems and improving practices, whereas basic research may have longer-term or indirect effects on knowledge and innovation.

- **Research Questions:**

Applied research formulates research questions related to practical issues, while basic research poses questions to explore theoretical or fundamental concepts.

Pilot Study

Definition

A **pilot study** is a **small-scale preliminary study** conducted before a full research project or clinical trial to evaluate feasibility, time, cost, risks, and study methods.To ensure that the main study will be feasible and scientifically sound.

Purpose of a Pilot Study

- **Check feasibility & logistics**
- **Test research tools**
- **Identify problems in study execution**
- **Train researchers and field workers**
- **Estimate study duration & budget needs**

Advantages

- Reduces errors in the final study
- Saves time and money
- Improves reliability & validity
- Helps refine methodology & instruments
- Identifies ethical or safety concerns

Limitations

- May require additional time and resources
- Can reveal problems that require redesign

Example in Health Research

Full Study	Pilot Study
Testing a new diabetes medication in 1,500 patients	Small-scale test with 30 patients to check dosage & side effects
Evaluating hospital infection control program	Test in one unit before full hospital rollout

Differences Between Applied Research and Pilot Study

Applied Research	Pilot Study
Solves practical real-world problems	Tests feasibility of a full study
Main research activity	Pre-research phase
Focuses on **effectiveness and innovation**	Focuses on **methods and logistics**
Conducted on full sample	Conducted on small sample

Applied research turns scientific knowledge into real-world solutions, Focuses on **effectiveness and innovation** to Solve practical real problems especially in medicine and healthcare.

Pilot studies is a pre- research phase Focuses on **methods and logistics** Conducted on small sample test feasibility before conducting full-scale research, preventing errors and saving resources.

Steps in Conducting a Pilot Study

1. Define purpose of the pilot
2. Select a small sample similar to target population
3. Develop research instruments (experiment setup)
4. Conduct the pilot
5. Collect and analyze feedback
6. Make necessary revisions
7. Document findings and adjustments

Applied research translates scientific knowledge into real solutions, while pilot studies ensure that research methods are effective and feasible. Together, they enhance the **validity, efficiency, and impact** of research in practical fields.