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Discussion for Lesson 01: Introduction to Research

1. **Why does research need a clear problem?**

Research needs to study the clear problem because it is a fundamental and initial step in the systematic process of investigation. Defining the right problem clearly provides direction and focus for the entire research project. Formulating a hypothesis to collect and analyze data processes, and it can help reach a conclusion that can help solve that specific problem. Above all, research is fundamentally a way of thinking that seeks to find answers to problems. If researchers don't have a clear problem or requirement, they cannot do what they want to research.

2. **Why do we need to do research?**

The aim of the research is that they want to find out the truth, which is hidden and hasn't been discovered yet. We conduct research for several key reasons:

- Research is a tool for building knowledge and efficient learning.
    - Research is required not just for students and academics but for all professionals. For some issues, it is crucial to find possible solutions, as well as how to prevent creating new issues. Research is instrumental in building and improving the knowledge.
- A way to prove lies and to support the truths
    - Research can be used to "prove lies" when this process is deliberately manipulated.
- To solve problems facing society.
    - It involves finding solutions for immediate and urgent issues that affect a community or industry.
- To contribute to the betterment of humanity.
    - Which is concerned with creating general theories and expanding knowledge. An example is studying human behavior to make a generalized conclusion.
- To Enhance the reputation of an organization or a county
    - When a research institution, company, or an entire country produces important discoveries, its reputation and influence grow; it can make their organization or their country reach out on a global scale.
- For Personal gain or interest

- Research is driven by people, and a major motivation is the personal satisfaction that comes from the work. For Researchers, the process of solving the problem, making a new discovery, and contributing to a field of knowledge can be deeply rewarding personal experience

3. **List down other areas of research (at least 5 areas).**

Five Areas of Research: Here are five specific areas:

- **Health and Medicine**
  - This field includes research in medicine, finding a solution to help people in the health industry. For example, in China, they research how to prevent the **COVID-19** disease that they are being treated for with the **Sinovac** (CoronaVac) and **Sinopharm** (BBIBP-CorV) vaccines. These played a significant role in global vaccination efforts, particularly across Asia, South America, and Africa. Unlike the **mRNA** technology that was developed by Germans and the U.S., it is used by Pfizer and Moderna. China's primary vaccines utilized a more traditional method.
- **Agriculture**
  - In agriculture, research is making a field of agriculture more productive, exportable and improving food supply. How can a researcher make agriculture be more productive? Researchers can find the problem of what makes it low productive. For example, in rice crops, research can develop more effective tools, such as mobile applications and tracking and monitoring crop health. Just scan their crop and tell the farmer what the problem is that they face.
- **Marketing**
  - Marketing research aims to understand consumer behavior so their businesses can sell products and services more effectively. We observe that local coffee brands like Tube Café, Coffee Corner, and Brown Coffee are expanding quickly in Cambodia. They could look into what's causing this trend. The study "What marketing strategies are most effective in building brand loyalty among young adult coffee consumers in Phnom Penh?" is one possible question. Researchers could compare elements like store atmosphere, loyalty promotion schemes, and product quality using surveys, focus groups, and social media campaign analysis

to find the answer to this question. The results would give local businesses important information.

- **Game Industry**
    - A game is a structured form of play or activity with rules. Goals and challenges. Typically undertaken for entertainment but also sometimes for education. For in education, games can be applied for teaching students. In 1968, Harvard Professor **Ivan Sutherland**, with the help of his students, including **Bob Sproull,** created what was widely considered to be the first hand-mounted display system for use in immersive simulation applications.

      For in Cambodia right now, we can apply VR games to education. To make our students more efficient in study, because VR games make reality like we are in the world. Make students able to understand phenomena more than traditional teaching methods.
- **Transportation**
    - For the transportation field, this involves studying how people and goods move with the goal of making travel safer, faster, and more efficient. Like in a major city like Phnom Penh. Notices server traffic congestion on a key route, like Monivong Boulevard, during peak morning and evening hours. This increases travel time, pollution, and public frustration. Phnom Penh needs a data-driven solution. Researchers are tasked with identifying the problem of why it makes traffic jams. They can use the formulation of a hypothesis that the traffic light system, which used a fixed timer, is inefficient. Their hypothesis is “A smart traffic light system that adjusts signal timing based on real-time traffic flow will reduce commute time by at least 20%.” How can a researcher do this? They can use the **simulation approach** first. Creating a computer model of the boulevard to test their hypothesis virtually.

4. **During your study, have you ever met any empirical research? If yes, please explain.**

Yes, of course, during my study, I have met empirical research. Empirical research is a data-based approach that relies on experience or observation alone, where the core process involves collecting data or 'facts' to prove or disprove a hypothesis. For my bachelor's degree, I used this method when I conducted surveys with junior students about their study habits.

Additionally, in my robotics lab, we performed an experiment to test the hypothesis that 'changing the robot's wheel material from plastic to rubber will increase its grip and allow it to climb a 20-degree incline without slipping.

5. **Why are quantitative and qualitative approaches important?**

Quantitative and **qualitative** approaches are both important because they provide different kinds of data. Quantitative deals with numbers and statistics, while qualitative deals with word and meaning

- **Quantitative:** is expressed in numbers and graphs. It is used to test or confirm theories and assumptions. This type of research can be used to establish generalizable facts about a topic.
- **Qualitative**: It is expressed in words, and it is used to understand concepts, thoughts, or experiences. This type of research enables you to gather in-depth insights on topics that are not well understood.