DEVELOPING A HYPOTHESIS

SchYPAR PowerPoint Link:
☐ Developing a Hypothesis

Lesson adapted from:

LEARNING STANDARDS

Lesson Description:
YPAR collaborators will learn about quantitative research and its importance in formulating hypotheses for surveys. Collaborators will explore how to develop clear and testable hypotheses that guide their survey design and data collection process. By the end of the lesson, collaborators will have a solid understanding of the role of hypotheses in quantitative research and be prepared to create their own hypotheses for future YPAR projects.

YPAR Learning Standard:

- Understand the purpose of quantitative research and how it applies to YPAR.
- Be able to differentiate between research questions and hypotheses.
- Formulate clear and testable hypotheses for survey-based research.
- Identify the key components of a well-structured hypothesis.

MATERIALS

☐ Process journal

☐ Pencils/Pens
☐ Display screen
☐ White board or butcher paper

LESSON (20 minutes)

Introduction (15 minutes)

> _Note on the structure of the lessons:_ The lessons situate the teacher as the leader or facilitator, but feel free to engage students as leaders/facilitators in preparing the lesson or the lesson itself. You can rotate students to be co-leaders/facilitators throughout the various sessions. They can co-lead with you by preparing beforehand a "mini-lesson" on one of the topics or guiding the conversations during group discussions. We are working on structuring these lesson plans, which engage all research collaborators in the teaching/learning process.

1. Begin the lesson by explaining the importance of quantitative research in YPAR projects. Emphasize that quantitative research involves gathering numerical data and using statistical analysis to draw conclusions.
2. Discuss how hypotheses play a crucial role in guiding the research process, helping to focus the survey and determine what data to collect.

Difference Between Research Questions and Hypotheses (5 minutes)

Clarify the difference between research questions and hypotheses. Explain that research questions are broad and open-ended inquiries, while hypotheses are specific, testable statements that predict the relationship between variables.

Provide examples of research questions and help the students transform them into hypotheses.

Characteristics of a Good Hypothesis (5 minutes)

1. Present the key components of a well-structured hypothesis: the independent variable, the dependent variable, and the expected relationship between them.

The key components of a well-structured hypothesis are:

Independent Variable: The independent variable is the factor or condition that the researcher manipulates or categorizes in an experiment or study. It is the presumed cause or predictor that may have an effect on the dependent variable. In other words, it is the variable that the researcher believes will influence or affect the outcome of the study. The independent variable is often denoted as "X" in a hypothesis.

Example: In a study investigating the effect of study time on test scores, the independent variable is "study time" because researchers are interested in examining how changes in study time may influence test scores.

Dependent Variable: The dependent variable is the outcome or response that the researcher measures or observes during the study. It is the variable that is expected to change as a result of the manipulation of the independent variable. In other words, it is

the variable that the researcher wants to examine for changes or differences based on the manipulation of the independent variable. The dependent variable is often denoted as "Y" in a hypothesis.

Example: In the same study mentioned above, the dependent variable is "test scores" because researchers are interested in measuring how test scores may change based on different levels of study time.

> **Expected Relationship:** The expected relationship, also known as the research hypothesis, describes the presumed connection between the independent and dependent variables. It predicts the direction and nature of the relationship or effect between the two variables. The expected relationship can be either positive, negative, or non-existent (null hypothesis). It is based on existing knowledge, previous research findings, or logical reasoning.

Example: Continuing with the previous study, the expected relationship in the hypothesis could be: "Increased study time is positively correlated with higher test scores." This means that the researchers predict that as study time increases, test scores are expected to increase as well.

2. Show examples of well-structured hypotheses to illustrate these. components clearly.

Example 1:

Research Question: How many students at our school participate in recycling programs?

Transformed Hypothesis: The number of students participating in recycling programs at our school is positively correlated with the availability of recycling bins in classrooms and common areas.

Explanation: In the transformed hypothesis, we have identified the

independent variable as the "availability of recycling bins in classrooms and common areas" and the dependent variable as the "number of students participating in recycling programs." The hypothesis predicts a positive correlation, suggesting that an increase in the availability of recycling bins will result in more students participating in recycling programs.

Example 2:

Research Question: What are the factors that influence students' choice of transportation to school?

Transformed Hypothesis: The mode of transportation chosen by students to get to school is significantly affected by the distance of their home from the school campus.

Explanation: In this transformed hypothesis, the independent variable is the "distance of home from the school campus," and the dependent variable is the "mode of transportation chosen by students to get to school." The hypothesis predicts that there is a significant relationship between the distance of students' homes from the school and their choice of transportation.

Activity - Developing Hypotheses for Surveys (10 minutes)

1. Divide the students into small groups and provide them with a research topic related to their YPAR project.
2. Instruct each group to brainstorm potential research questions for their topic.
3. Guide the groups in transforming their research questions into testable hypotheses by identifying the variables and predicting the relationship between them.
4. Circulate among the groups to offer support and feedback.

SUMMARY (10 Minutes)

1. Review the main points covered in the lesson: the purpose of quantitative research, the difference between research questions and hypotheses, and the key components of a well-structured hypothesis.
2. Emphasize the importance of hypotheses in guiding the survey design and data collection process.
3. **YPAR Learning Standard:**
   ○ Understand the purpose of quantitative research and how it applies to YPAR.
   ○ Be able to differentiate between research questions and hypotheses.
   ○ Formulate clear and testable hypotheses for survey-based research.
   ○ Identify the key components of a well-structured hypothesis.

Assessment:

For assessment, the students will submit their formulated hypotheses and a brief explanation of how they arrived at those hypotheses for their YPAR project's research topic. Evaluate their work based on the following criteria:

- Clarity and specificity of the hypotheses.
- Correct identification of the independent and dependent variables.
- Appropriateness of the predicted relationship between variables.
- Overall understanding of the role of hypotheses in quantitative research and their application to YPAR projects.