**Assignment #3: Instructor Assignment Essay**

**SR 958-42: Research Design and Methodology II**

**(Fall 2024, Subterm A)**

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**Assignment #3: Instructor Assignment Essay**

1) Compose hypotheses for a quantitative study Based on the Research Questions you developed in Core 3 and a real or hypothetical validated survey instrument. Hypotheses should be formatted as follows: 'H01: No statistically significant difference exists in [dependent variable] between [group 1] and [group 2] among [participants]' for quasi-experimental and causal-comparative designs, or 'H01: No statistically significant relationship exists between [variable] and [variable] among [participants]' for correlational designs. Formatting hypotheses correctly is important to establish a robust research design.

2) The null hypothesis is a formality and a crucial element in your research. It is a vital part of the scientific method, serving as a benchmark against which the alternative hypothesis is tested. Understanding its necessity and the implications of rejecting it will significantly enhance your research and keep you engaged and interested in the process.

3) What are the criteria for rejecting a null hypothesis? How does the alpha level (typically .05) relate to the p-value (probability) when deciding whether or not you can reject your null hypothesis based on statistical tests?

4) Your Literature Review (Chapter 2) is not just a theoretical exercise but a practical tool that should inform your research design and methodology in Chapter 3. The connection between theoretical/conceptual frameworks from literature and research questions, instrumentation, variables, and hypotheses is not just a theoretical concept but a practical guide that will give you confidence in your research journey.

5) Thematic analysis in qualitative research is not just a method but a powerful tool that can help answer your research questions. It is a structured approach to understanding your participants' perspectives. When used effectively, it can provide profound insights into your research, inspiring and motivating you to delve deeper into it.

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 **Introduction**

 Research Design and Methodology are crucial sections of a doctoral research paper where you outline the specific strategies and techniques you will employ (Tomaszewski et al., 2020; Streiner et al., 2024) to investigate your research question. It is the blueprint for your study. This study re-captures the essence of drafting a thesis or a dissertation based on critical components, including the Research Design and Paradigm, which involves the positivist objective and mixed methods. It includes the qualitative-textual and thematic analysis and the quantitative, numerical, and statistical framework (Wallwey & Kajfez, 2023), often required in the research study process. Moreover, some areas to investigate are the experimental and quasi-experiments and the manipulation of variables to observe effects. The student researcher will examine the comparative correlational relationship and data similarity (Yashaswi, 2024; Younas & Porr, 2024) through designated surveys, data collection, analysis, and application. This study process involving the research design and methodology will be clear, concise, and aligned with the research questions. It should justify one’s choices and explain how the methods will contribute to answering the research question. That is, through consultations, case studies, theory-developing, and the immersive study of conceptual models and contextualized precepts. Prominent in this study are the fundamental techniques of writing the action research project, thesis, and dissertation (Mertler, 2024; Zandee, 2024) involving collaborative research data observation and documents, including other fundamental statistical records and surveys, utilizing questionnaires and interviews, and exploring and incorporating the t-test, ANOVA, and linear regression, qualitative and quantitative methodologies.

**1)** Compose hypotheses for a quantitative study Based on the Research Questions you developed in Core 3 and a real or hypothetical validated survey instrument. Hypotheses should be formatted

As follows: 'H01: No statistically significant difference exists in [dependent variable] between

[group 1] and [group 2] among [participants]' for quasi-experimental and causal-comparative designs, or 'H01: No statistically significant relationship exists between [variable] and [variable] among [participants]' for correlational designs. Formatting hypotheses correctly is essential to establish a robust research design.

 Considering this Student Hypothetical Survey, the Research Question is: Does student satisfaction with online learning differ from that of traditional students? In the quasi-experimental design, the researcher does not randomly assign participants to groups (Gallagher, 2024; Kieu & Minh, 2024) but relies on pre-existing groups like online and traditional students.

This design is often used when random assignment is not feasible or ethical. In the process of study, the Quasi-Experimental Design exhibits the Null hypothesis. The Null hypotheses state that no significant difference exists between groups or conditions. In this case, the null hypotheses are designed to test the following:

Ho1: There is no difference in overall student satisfaction between online and traditional students.

Ho2: The two groups have no difference in satisfaction with course materials.

Ho3: The two groups have no difference in satisfaction with instructor support.

Ho4: The two groups have no difference in satisfaction with technical support.

Interpreting the Results is a crucial step in the research process. It is essential as it helps researchers draw meaningful conclusions from their data. The researcher will reject the null hypothesis if the statistical tests (e.g., t-tests, ANOVA) yield p-values less than the significance level (usually 0.05). This would suggest a significant difference between the two groups for that variable. In other words, if the probability of observing the data we have or more extreme data, given that the null hypothesis is true, is less than 5%, we can reject the null hypothesis. This means that we can be reasonably confident that there is a natural effect or relationship in the

Population, not just in our sample.

When it comes to Causation vs. Correlation, a quasi-experimental design plays a significant role. It can identify relationships between variables but cannot definitively prove

Causation. Factors such as differences in student demographics (age, gender, etc.) or prior

academic experiences, known as Confounding Variables, might influence the results. For instance, if online students are younger, they might be more tech-savvy and, hence, more satisfied with the online learning platform. However, the findings of a quasi-experimental study may not be generalizable to all populations, especially if the sample is not representative. By carefully analyzing the data and considering these factors, researchers can draw meaningful conclusions about the differences in student satisfaction between online and traditional learning.

**2)** Why is a null hypothesis necessary? Why is a null hypothesis rejected rather than the alternative hypothesis accepted? What does the null hypothesis say about the “prevailing knowledge” about the problem?

**Why is a null hypothesis necessary?** The null hypothesis is a crucial starting point in statistical hypothesis testing. It serves as a baseline assumption, stating that no significant difference or effect exists between the variables under study. In the context of this research, the question is: 'Does student satisfaction with online learning differ from that of traditional students? The answer is that the null hypothesis has no difference in satisfaction between the two groups. By establishing this default position, this researcher can gather evidence to support or reject it, guiding the research process.

**Why is a null hypothesis rejected rather than the alternative hypothesis accepted?** This researcher does not directly 'accept' the alternative hypothesis in statistical hypothesis testing.

Instead, the focus is on rejecting the null hypothesis. This approach is based on the principle of

proof by contradiction. This researcher can infer that the alternative hypothesis is more likely to be true if there is enough evidence to reject the null hypothesis convincingly. In other words, the student researcher does not prove the alternative hypothesis; he disproves the null hypothesis,

which indirectly supports the alternative hypothesis.

This approach is more rigorous because it avoids making definitive claims about the alternative hypothesis. Instead, it focuses on disproving the null hypothesis, which is a more objective and statistically sound method.

**What does the null hypothesis say about the “prevailing knowledge” about the problem?** The null hypothesis often reflects the current knowledge or the prevailing belief about a particular phenomenon. It is a statement of no effect or difference, a conservative assumption. This assumption is based on existing theories, previous research, or common sense. By challenging this null hypothesis, the researcher aims to introduce new evidence or insights (Leong, 2024; Steiner et al., 2024) that could overturn the established understanding. If the null hypothesis is rejected, the latest evidence is strong enough to warrant a shift in the prevailing knowledge.

**3)** What are the criteria for rejecting a null hypothesis? How does the alpha level (typically .05) relate to the p-value (probability) when deciding whether or not you can reject your null hypothesis based on statistical tests?

The criteria for rejecting a null hypothesis: The researcher typically uses a significance level (alpha, α) to reject a null hypothesis, often set at 0.05. This means he accepts a 5% chance (Zhang, 2024) of incorrectly rejecting the null hypothesis (as a type I error). Moreover, he compares this alpha level to the p-value, which is the probability of obtaining the observed results (or more extreme) if the null hypothesis were true. In the decision Rule, If the p-value is ≤

α, you reject the null hypothesis. This means the observed results are unlikely to have occurred by chance alone, and you have evidence to support the alternative hypothesis. However, if the p-value is > α, you do not reject the null hypothesis. This means there is insufficient evidence to

conclude that the alternative hypothesis is true. In principle, A low p-value suggests convincing evidence against the null hypothesis. A high p-value suggests weak evidence against the null hypothesis.

**Sampling Distribution for the Null Hypothesis Table 3.1**

|  |  |
| --- | --- |
|  | Rejection areas under the curves: **B**  **A**  |

**Sampling Distribution for the Null Hypothesis Table 3.2**

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| --- |
| Image of normal distribution curve with shaded regions representing the alpha level and pvalue |

**Note:**

* **Table 3.1** is from Frost, J. (2024) How Hypothesis Tests Work: Significance Levels (Alpha) and P values.
* **The sample Arrows A and B** illustrate the total rejection area of 0.025 under the curve.
* **In Table 3.1, the arrow signs A and B and the shaded areas in Table 3.2** represent where the null hypothesis would be rejected. The rejection areas are symmetrically placed around the distribution's mean, covering a total area of 0.025 under the curve. This indicates that the significance level of the test is 0.05. The vertical lines mark the z-scores of ±1.96, corresponding to the rejection regions' boundaries. Failing to reject the null hypothesis does not mean we accept it as accurate (Ashton, (2023); it simply means we do not have sufficient evidence to deny it. Even when quasi-experiment outcomes are not automatic (Yang, 2013), the choice of alpha level depends on the specific context and the desired confidence level. A lower alpha level (e.g., 0.01) is more stringent and reduces the risk of Type I error but also increases the risk of Type II error (failing to reject a false null hypothesis).

**4)** How should your Literature Review (Chapter 2) inform your research design and methodology in Chapter 3? What is the connection between theoretical/conceptual frameworks from literature and research questions, instrumentation, variables, and hypotheses?

The Interplay Between Literature Review and Research Design: The literature review, often presented as Chapter 2, is the foundation for the research design and methodology (Reichard, 2024; Robinson, 2018), detailed in Chapter 3. It establishes a strong connection between theoretical/conceptual frameworks from literature and the research questions, instrumentation, variables, and hypotheses. This implies pinpointing the unknown. By thoroughly reviewing existing literature, you can identify gaps in knowledge or areas where

additional research is required. These gaps directly inform your research questions. The literature review helps refine the research questions to be more specific, focused, and relevant to the existing body of knowledge.

Developing Theoretical Frameworks and Building a Conceptual Foundation: The

literature review allows you to identify relevant theories and concepts (Ose, 2016; Leung, 2011) that can be applied to your research. These theories provide a theoretical framework that guides your research design and helps you interpret your findings. By critically evaluating different theories, you can choose the most appropriate ones to underpin the research.

Informing Research Design and Methodology and Choosing Research Design: The literature review helps you determine the most suitable research design (e.g., quantitative, qualitative, or mixed methods (Privitera, 2024; Lim, 2024) based on the nature of the research questions and the existing literature. This guides you in selecting appropriate research methods (e.g., surveys, interviews, experiments) to collect data that addresses your research questions. The literature review can help to create or adapt valid and reliable research instruments (e.g., questionnaires and interview protocols). The literature review helps you identify the critical variables in the study and operationalize them clearly and measurably.

Formulating Hypotheses: The literature review helps you develop specific hypotheses that are grounded in theory and can be evaluated empirically. It provides the necessary context to interpret your findings. By comparing your results to the findings of previous studies, you can draw meaningful conclusions. Moreover, you can identify the implications of your findings, contribute to the existing body of knowledge, and suggest directions for future research.

In principle, the literature review bridges theory and practice as a step-by-step approach (Yang, 2013). It provides the intellectual foundation for the research, ensuring that the study is well-grounded and rigorous and contributes meaningfully to the field. By carefully reviewing the

literature, you can develop a robust research design that is both theoretically sound and empirically grounded. This, in turn, will lead to high-quality research that advances knowledge and informs practice.

**5)** How does thematic analysis in qualitative research help answer research questions? How are themes abstracted from transcripts or written responses from participants in basic qualitative designs?

Thematic analysis is a widely used qualitative research method that involves identifying, analyzing, and interpreting patterns of meaning or themes (Braun et al., 2006; Kaiser, 2024) within a given dataset. This method is beneficial for exploring complex phenomena, such as human experiences, beliefs, and behaviors. By systematically examining qualitative data (Kumar, 2024; Kronthaler & Zöllner, 2021), researchers can gain valuable insights into the underlying meanings and structures of the data. This paper explores how thematic analysis helps answer research questions and how themes are abstracted from transcripts or written responses in basic qualitative designs. Thematic analysis is a flexible and versatile method that can be applied to various research questions. By identifying and analyzing patterns within the data, the researcher can uncover new insights and understandings and identify and explore themes, which researchers can develop in some rich and detailed description of the phenomenon under investigation. It can generate new theories, refine existing ones, and develop new conceptual frameworks by identifying patterns and relationships between themes (Tomaszewski et al., 2020). Thematic analysis can also be used to evaluate the impact of interventions, such as educational programs or therapeutic interventions, analyze participants' experiences and perceptions, and identify the strengths and weaknesses of the intervention.

Abstracting themes from qualitative data (Tomaszewski et al., 2020) involves several steps: Familiarization and Coding: The researcher immerses themselves in the data by reading and re-reading transcripts or written responses. The researcher identifies codes and labels text passages relevant to the research question. The researcher groups related codes, forming preliminary themes, and reviews the identified themes to ensure they are coherent, distinct, and relevant to

the research question. The researcher refines and names the themes, providing clear and concise definitions. The researcher writes up the findings, describing the themes in detail (Younas & Porr, 2024) and giving illustrative quotes from the data. It is important to note that thematic analysis is iterative and reflexive. The researcher's understanding of the themes may evolve as the researcher engages with the data. Therefore, it is essential to remain open to new insights and to be willing to revise the analysis as needed.

**Study Design: Stepwise Modified Delphi Method to Reach Consensus Table 5.1**

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**Basic Thematic Flow Chart Table 5.2**



**Key**

* **Table 5.1** is culled from Mavink/**https://mavink.com/post/092AC39DD733D590A9E59D**

**13716BC22AFBAM00A2F8/FF129B787422B27472FC5E96285B04AF77AMF7E37C**

* **Table 5.2** is culled from Researchgate.com/https://mavink.com/post/FF129B787422B27472F

C5E96285B04AF 77AMF7E37C/thematic-analysis-flowchart.

* The two tables show slightly different study approaches to illustrate the basic thematic flow chart containing descriptive, and qualitative procedures.

**Conclusion**

Research design and methodology constitute the foundation of quantitative and qualitative research studies. This study shows they rely on formulating hypotheses (Glaros, 2024; Hadfield et al., 2022) to guide the investigation process. In quantitative research, the null hypothesis (Ho) provides a baseline assumption that there is no significant difference or relationship between variables in some of this study. The alternative hypothesis (H1) proposes a specific difference or relationship, challenging the null hypothesis. By assessing these hypotheses using statistical methods, the researcher can conclude the validity of their claims. This study shows that a well-structured literature review shapes research design

and methodology. It provides a comprehensive overview of existing knowledge and identifies gaps the current research aims to fill. The researcher can refine the research questions, select appropriate research methods, and develop a robust theoretical framework by reviewing previous studies. This framework, which connects the literature review to the research questions, variables, and hypotheses (Privitera, 2024; Ravid, 2024), serves as a roadmap for the entire research process. While quantitative research relies on statistical analysis to evaluate hypotheses, qualitative research often employs thematic analysis (Reichard, 2024; Lim, 2024) to uncover patterns and meanings within the data. Researchers can gain a deeper understanding of participants' experiences, perceptions, and beliefs by systematically identifying, analyzing, and interpreting themes. The interplay between hypotheses, research design, and thematic analysis is essential for meaningful and validated research.

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