

Crafting a Strong Research Design: A Step-by-Step Journey in Academic Writing

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Abstract

This study provides a comprehensive guide for researchers aiming to formulate a robust research design in academic writing. By addressing the definition, significance, and components of research design, this study aims to bridge the knowledge gap and equip researchers with the necessary tools to enhance the quality and reliability of their research. The originality of this study lies in its holistic approach, offering a step-by-step journey that covers various research methods and their suitability for different contexts, as well as crucial components of research design such as sampling strategies, data collection instruments, and data analysis techniques. By enhancing researchers' understanding of research design, this study aims to empower them to produce high-quality research and make meaningful contributions to their fields of study.

Keywords: Academic writing; data collection instruments; data analysis techniques; research design; reliability; robust methodology; sampling strategies; validity

1. Introduction

In the realm of academic writing, the formulation of a robust research design plays a critical role in ensuring the validity and reliability of a study. Research design is crucial in academic writing, providing a structure that guides the research process and ensures the study's validity and reliability (Arabian, 2014; Adebisi & Abayomi, 2016). The choice of statistical design and analysis is also vital, with clear objectives essential (Salkind, 2010). In academic writing, the research design is a crucial component, influencing the structure and content of the research article (Candlin et al., 2015). A research design serves as the blueprint, providing a systematic structure and methodology to guide researchers in collecting and analyzing data. It encompasses various elements such as selecting research methods, sampling strategy, data collection instruments, and data analysis techniques. Roy (2021) states that research design is a crucial aspect of academic writing, encompassing various types and characteristics.

However, scholars often need help comprehending the concept and purpose of a research design and its impact on the effectiveness of their scholarly work. Marshall and Newton (2013) highlight the need for a new epistemology of practice, emphasizing the importance of scholarly design in practice-based research. Schwartz-Shea and Yanow (2011) underscore the role of interpretive research design, which needs to be addressed in positivist-centered training. Gschwend and Schimmelfennig (2007) emphasize the need for a clear plan in research design, while Kuenen and Redström (2013) call for a focus on the methodological structures of design research practices.

Addressing these challenges is crucial because a robust research design can uphold the credibility and rigor of a study, leading to accurate results and reliable conclusions. A poor research design leads to missed opportunities for problem-solving and a limited understanding of essential issues (Harwell, 2011). A weak study design can lead to poor-quality data, compromising validity (Damato, 2013). Additionally, the plethora of literature on research design needs to be clarified, necessitating a clear understanding of the various approaches (Abutabenjeh & Jaradat, 2018). Many researchers need a comprehensive understanding of how to develop and implement a research design that aligns with the objectives of their study. This

knowledge gap can hinder their ability to produce high-quality research and contribute meaningfully to their field of study.

Previous studies have touched upon research design, but their coverage has been limited and fragmented. While some studies have explored specific aspects of research design, such as sampling techniques or data analysis methods, comprehensive guides still need to be developed to holistically address formulating a robust research design. Consequently, researchers often struggle to synthesize and apply the fragmented knowledge, resulting in suboptimal research designs and compromised study outcomes.

The primary research question guiding this study is: **How can researchers formulate a robust research design in academic writing?**

Our study aims to achieve the following objectives to address this research question:

To provide a clear and comprehensive definition of research design and its significance in academic writing.

To explore various research methods and their suitability for different research objectives and contexts.

To identify critical components of a robust research design, including sampling strategies, data collection instruments, and data analysis techniques.

This study holds considerable significance for the academic community, as it will provide a comprehensive and accessible guide for researchers to develop robust research designs. By bridging the knowledge gap and equipping researchers with the necessary tools and understanding, this study aims to enhance the quality and reliability of academic research across disciplines. Consequently, it will enable researchers to contribute meaningfully to their fields and facilitate the progress of scientific knowledge.

This paper is organized as follows: following this introduction, the second section will provide a thorough definition and overview of research design, highlighting its pivotal role in academic writing. The third section will delve into a detailed discussion of various research methods and their suitability in different research contexts. In the fourth section, we will analyze the critical components of a robust research design, including sampling strategies, data collection instruments, and data analysis techniques. Finally, the paper will conclude with a summary of the main findings and recommendations for future research in the field of research design.

2. Research design: Definition and significance in academic writing

The research design is a crucial aspect of academic writing in research, providing a systematic plan to study a scientific problem (Indu & Vidhukumar, 2020). It is the conceptual blueprint for research, guiding data collection, measurement, and analysis (Akhtar, 2016). The choice of the research design is influenced by the type of evidence needed to answer the research question (Akhtar, 2016), and it can be qualitative, quantitative, or a combination of both (Adebiyi & Abayomi, 2016). The selection of an appropriate research design is guided by a careful analysis of the research problem, questions, theoretical framework, and relevant literature (Asenahabi, 2019).

Furthermore, the research design serves as the foundation of a study, determining the overall structure and methodology for conducting research. It encompasses the planning, organizing, and executing a research project, providing a structured framework for researchers to collect, analyze, and interpret data. A comprehensive definition of research design is crucial for researchers to understand its significance in academic writing and its impact on the validity and reliability of their study (Godin & Zahedi, 2014).

Moreover, the research design refers to the systematic approach researchers employ to address a research question or hypothesis, ensuring that relevant data is collected, analyzed, and interpreted in an organized and rigorous manner. It involves making strategic choices regarding various elements of the research process, including selecting appropriate research methods, formulating research objectives and questions, determining the study population and sample, choosing data collection tools, and adopting proper data analysis techniques.

The significance of research design in academic writing cannot be overstated. A well-designed research study provides a strong foundation for generating reliable and valid results. The research design plays a crucial role in the outcome of a study, as it determines the rigor and appropriateness of the method used (Van Haselen, 2004). It enables researchers to gather relevant and robust evidence to support their claims and contributes to advancing scientific knowledge. By following a systematic research design, researchers can ensure that their study design aligns with the research objectives and enhances their findings' internal and external validity.

The research design plays a crucial role in the research process, serving as a framework for the study and guiding data collection and analysis (Bannan-Ritland, 2003). It is essential for establishing cause-and-effect relationships between variables and controlling for extraneous factors (Jang, 1980). Through careful selection and manipulation of variables, researchers can investigate how changes in one variable affect another. It enables researchers to draw meaningful conclusions and make causal inferences, crucial in influencing policy, theory, and practice.

Additionally, the research design serves as a roadmap for researchers, guiding them through each step of the research process. It helps researchers anticipate potential challenges and pitfalls, allowing them to mitigate potential biases and limitations. A well-designed research study also enhances the replicability and generalizability of findings. By clearly documenting the research design, researchers enable others to replicate their study, verify their results, and build upon their findings, ultimately fostering scientific progress.

In academic writing, a robust research design adds credibility to a study and enhances its impact. Journals and academic reviewers rigorously evaluate the research design to assess the validity and reliability of the study. A well-designed research study is more likely to be published in reputable academic journals (Damato, 2013), increasing its visibility and influence within the scholarly community.

In summary, a comprehensive understanding of the research design is essential for researchers. It plays a vital role in underpinning the structure and methodology of their study, determining the quality and reliability of the research findings. A well-designed research study enables researchers to generate valid and reliable results, make causal inferences, guide policy and practice, and contribute to advancing scientific knowledge. In academic writing, a robust research design enhances the credibility and impact of a study, increasing its chances of publication and recognition within the scholarly community.

3. Research methods for different objectives and contexts

Selecting the appropriate research method is crucial to designing a robust research study. The choice of a research method depends on the research objectives, the nature of the research question, and the specific context in which the study is conducted. Understanding the different research methods and their suitability for various research objectives and contexts is essential for researchers to ensure the validity and reliability of their findings.

3.1. Experimental research method

Experimental research is a valuable method in various fields, including innovation (Sørensen et al., 2010), market research (Ryals & Wilson, 2005), the economics of education (Keskin & Yilmaz, 2020), and design science research (Kamplung et al., 2016). Sørensen et al. (2010) and Ryals and Wilson (2005) both highlight the potential of experimental methods in generating applicable knowledge and insights. Keskin and Yilmaz (2020) emphasize the importance of experimental methods in educational interventions. Kamplung et al. (2016) underscore the need for more cumulative research in design science, suggesting that experimental research can contribute to theory development.

The experimental research method involves manipulating independent variables to observe the effects on dependent variables. This method is well-suited for establishing cause-and-effect relationships and testing hypotheses. It is often used in controlled laboratory settings, where researchers can tightly control variables and minimize external influences. Experimental research is beneficial for investigating interventions, treatments, and impact evaluations.

3.2. Survey research method

Survey research is a valuable method for gathering information on a large scale (Alderman & Salem, 2010). It is beneficial in communication research, providing insight into respondents' views and opinions (Senam & Akpan, 2014). However, the success of a survey depends on the precision of its objectives, questions, and response choices, as well as the selection of respondents and the reliability and validity of the instrument (Fink, 2010). Despite its benefits, survey research has limitations, such as potential biases and the need for careful interpretation of the findings (Abbott, 1971).

The survey research method involves collecting data from a sample of respondents through structured questionnaires or interviews. Surveys can be conducted through various modes, such as face-to-face, online, and telephone interviews. This method is suitable for exploring individuals' or groups' attitudes, beliefs,

opinions, and behaviors. Surveys provide researchers with quantitative data that can be analyzed statistically to reach conclusions. They are widely used in social sciences, market research, and opinion polls.

3.3. Qualitative research method

Qualitative research is valuable for exploring complex social and behavioral issues, particularly in public health (Dongre et al., 2010; Isaacs, 2014). It provides an in-depth understanding and can be used alongside quantitative methods to enrich data analysis (Camic et al., 2003). The methodology involves systematic study of phenomena, with a focus on understanding the "why" rather than the "what" (Walker, 1987). It is handy for exploring the experiences and perspectives of individuals and can be applied in various settings and scenarios.

Qualitative research is focused on understanding the meaning, experiences, and perspectives of individuals or groups. This method involves collecting detailed and in-depth data through interviews, observations, and document analysis. Qualitative research is beneficial for exploring complex phenomena, uncovering subjective experiences, and generating rich and contextualized data. It is often employed in anthropology, sociology, psychology, and education.

3.4. Case study research method

Case study research is a widely recognized and robust method, particularly in social science studies, due to its ability to provide in-depth explanations of complex issues (Zainal, 2007; M-zaidah, 2007; Soy, 2015). It is precious in exploring and understanding social and behavioral problems and fields such as education, law, and medicine (Soy, 2015).

The case study research method involves an in-depth examination of a particular case or phenomenon within its real-life context. It aims to provide a comprehensive understanding of a complex issue or situation. Case studies often utilize multiple data collection methods, such as interviews, observations, and document analysis, to gather rich and detailed information. This method is suitable when exploring unique or rare cases, studying causal mechanisms, or conducting exploratory research in specific contexts.

3.5. Action research method

Action research, a method rooted in post-positivist assumptions, has gained significance in information systems research (Baskerville, 1999). It is characterized by a participatory approach and a five-step model and is often used in healthcare research to generate new knowledge and improve practice (Vallenga et al., 2009). The method's potential for theory development in health care delivery has also been highlighted (Huxham, 2003). Webb (1989) further emphasizes the importance of the action researcher's personal experiences and feelings in the research process and the need for reflexive analysis.

Action research is a collaborative and iterative approach involving researchers and practitioners working to identify and solve practical problems. It aims to generate knowledge that can directly inform and improve practice. Action research follows a cyclical process of planning, action, observation, and reflection, with continuous feedback and adaptation. This method is highly relevant in education, healthcare, and organizational development.

3.6. Mixed methods research

Mixed methods research integrates quantitative and qualitative research methods within a single study. Hai-fei (2009) emphasizes the interdependence of these methods, with qualitative research serving as the foundation for quantitative research. Abuhamda et al. (2021) underscore the importance of using both methods in tandem, particularly in education, to enhance the quality of research outcomes. This approach allows researchers to combine the strengths of both techniques, providing a more comprehensive understanding of the research question. Mixed methods research is appropriate when triangulating data, evaluating complex interventions, or exploring multiple facets of a research problem.

In sum, researchers need to consider the research objectives, questions, and the nature of the research problem when selecting the appropriate research method. Each research method has strengths and limitations and is best suited for specific research objectives and contexts. Careful consideration of these factors will ensure that the research method aligns with the study's aims and enhances the validity and reliability of the research findings.

In the next section, we will delve into the critical components of research design, including sampling strategies, data collection instruments, and data analysis techniques, to further enhance the quality and rigor of the study.

4. Components of a robust research design: Sampling, instruments, analysis

The research design encompasses a range of elements, including problem-solving, data interpretation, and ethical considerations (Salkind, 2010). The qualitative tradition, particularly in fields like nursing, emphasizes the importance of the research question, data collection, and analysis (Deslauriers, 2001). A robust research design comprises several vital components that work together to ensure the validity and reliability of research findings. These components include sampling strategies, data collection instruments, and data analysis techniques.

Sampling strategies, mainly qualitative research, are crucial to research design (Omona, 2013). They are significant in ensuring the reliability, validity, and generalizability of study results, especially in tourism and hospitality (Teeroovengadam & Nunkoo, 2018). The selection of an appropriate sampling method, whether probability or non-probability, is also essential, depending on the research question and the desired level of detail (Setia, 2016). Sampling from a population is often more practical and cost-effective. But understanding how the data arrived in the database is essential for drawing accurate conclusions (Turner, 2020).

Several scholars underscore the importance of collection instruments in research design. Kozinetz (1992) emphasizes the role of data collection forms in defining necessary variables and ensuring reliable data. Souza et al. (2014) further highlight the need for instrument selection to prioritize validity, reliability, and comparability with previous studies. Makbul and Buijs (2021) underscore the significance of appropriate data collection methods and instruments in ensuring the representativeness and accuracy of research findings. McLaren (2011) extends this discussion to information systems research, advocating for a design science approach that emphasizes the practical utility of research instruments.

Data analysis techniques are crucial in research design, particularly in the behavioral and social sciences (Keppel & Zedeck, 1990). While there is a growing trend toward using sophisticated multivariate techniques, basic procedures such as mean, t-test, ANOVA, and correlation remain powerful tools (Khan & Adil, 2013). Data analysis is essential for generating new knowledge and solving existing problems and can be applied qualitatively and quantitatively (Alem, 2020). The selection of appropriate research design and data analysis procedures is a critical aspect of post-graduate research and can significantly impact the quality of the study (Orluwene & Ajala, 2020).

Carefully considering and selecting the above components is vital for researchers to generate accurate and meaningful results.

4.1. Sampling strategies

Sampling refers to selecting a subset of individuals or units from a larger population for study. The choice of sampling strategy depends on the research objectives, the target population, and the available resources. Different sampling strategies include:

- **Probability sampling**

It involves randomly selecting participants from the target population, ensuring that everyone is equally likely to be included in the study. Standard probability sampling methods include simple random, stratified, cluster, and systematic sampling. Probability sampling provides a higher degree of representativeness and allows for statistical generalization.

- **Non-probability sampling**

It involves selecting participants based on non-random criteria, such as convenience, judgment, or quota. Non-probability sampling methods include purposive sampling, snowball sampling, and convenience sampling. While non-probability sampling may lack statistical generalizability, it can be helpful in qualitative research or studies with limited resources.

- **Mixed methods sampling**

Probability and non-probability sampling techniques may be employed in mixed methods research to gather diverse perspectives and complement quantitative and qualitative data collection.

4.2. Data collection instruments

Data collection instruments are tools used to collect data from research participants. The selection of appropriate instruments depends on the research question, research objectives, and the type of data needed. Commonly used data collection instruments include:

- Questionnaires

Structured surveys or questionnaires help collect quantitative data from large samples. They typically comprise standardized questions with predetermined response options, allowing for efficient data collection.

- Interviews

Depending on the research goals, interviews can be structured, semi-structured, or unstructured. Interviews enable researchers to gather in-depth and nuanced information, allowing for a more thorough exploration of research topics.

- Observations

Observations involve systematically watching and recording behaviors, interactions, or events in a natural or controlled setting. Observations can be a participant (the researcher is engaged) or non-participant (the researcher remains detached).

- Document analysis

It involves examining existing documents, records, or texts to extract relevant data. Documents can include written materials, archives, speeches, policies, or social media content.

- Psychometric instruments

These instruments measure psychological constructs, such as personality traits, attitudes, or mental health. They often employ scales, questionnaires, or inventories with established reliability and validity.

4.3. Data analysis techniques

Data analysis techniques involve processing, organizing, summarizing, and interpreting collected data to draw meaningful conclusions. The appropriate data analysis techniques depend on the research objectives, research design, and data collection type. Standard data analysis techniques include:

- Quantitative analysis

It involves numerical analysis of collected data, typically using statistical techniques. Quantitative analysis allows for examining patterns, relationships, and statistical significance. Statistical methods may include descriptive statistics, inferential statistics, regression analysis, factor analysis, or multivariate analysis.

- Qualitative analysis

Qualitative analysis involves interpreting and making sense of non-numerical data, such as interview transcripts, observation notes, or textual documents. Common qualitative analysis techniques include thematic analysis, content analysis, grounded theory, or discourse analysis.

- Mixed methods analysis

In mixed methods research, data from both quantitative and qualitative sources are analyzed separately and then integrated to provide a comprehensive understanding of the research question or objectives. Integration methods include merging data sets, embedding, or linking quantitative and qualitative data.

A robust research design ensures that sampling strategies, data collection instruments, and data analysis techniques align with the research objectives and questions. Each component enhances the validity, reliability, and generalizability of research findings. By thoughtfully selecting and implementing these key components, researchers can strengthen the quality and impact of their study.

5. Conclusion

This study has provided a comprehensive guide to formulating a robust research design in academic writing. By exploring the definition and significance of research design, discussing various research methods and their suitability for different objectives and contexts, and analyzing the critical components of a research design, including sampling strategies, data collection instruments, and data analysis techniques, this study aims to enhance the quality and reliability of academic research across disciplines.

However, it is essential to acknowledge the limitations of this study. While we have presented a broad overview of research design, it is only possible to cover some aspects in-depth due to the vastness and complexity of the topic. Additionally, the context and applicability of research design may vary across

different academic disciplines and research domains. Researchers are encouraged to explore discipline-specific research design textbooks and consult experts in their respective fields for detailed guidance. Further research is warranted to delve deeper into specific aspects of research design, such as advanced sampling techniques, innovative data collection instruments, and emerging data analysis methods. Additionally, studies focusing on applying research design principles in specific disciplines or research areas would be valuable. Investigating the impact of different research design choices on study outcomes and exploring strategies to mitigate potential biases and limitations would also contribute to advancing research design methodologies.

By continuously refining and expanding our understanding of research design, researchers can elevate the quality of their scholarly work, foster scientific progress, and make meaningful contributions to their fields of study.

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