

# A Study of the Structure of Discourse in the Methodology Section of Student-Written and Published English-Language Scientific Research Papers

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## Abstract

At present, the methodological part of English scientific research papers written by students and published by public is generally designed with an independent genre structure. Although it can achieve the expected discussion task, the direction is not clear, and the overall framework of the article is not rigorous and systematic, which leads to insufficient consistency in discussion. Based on this, this paper puts forward the design and practical analysis of the genre structure of the methodological part of English scientific research papers written by students and published by public. Taking the content of English subject discourses as the design guide of genre structure, the basic organizational structure of scientific papers is briefly described, and the basic strategy and thinking process of English papers are formulated in combination with the actual exposition requirements of article methodology. At the same time, the relevance problem is raised. Through the collection of multi-level data and the clarification of genre structure design methods, the limitations of traditional paper genre structure in data collection are broken, and the most authentic and reliable exposition data and information are obtained. On this basis, a comparative study of practice is carried out, and the final research results are obtained by analyzing and comparing the data of the papers, which further promotes the refinement of the research content of the papers, increases the relevance of each chapter, and realizes the integration and practice of the genre structure of English scientific research papers.

## Keywords

English Essays, Expository Orientation, Methodology, Discourse Structure, Thesis Framework, Scientific Research

## 1. Introduction

The methodology section is a very important and critical part of the English scientific research paper, whether it is written by students or published papers, the control of the methodology section requires multiple stages to assist in the formation of a complete and specific framework for filling in the content (Tulud & Mosquera, 2021). Compared with the abstract, introduction, and literature review, the methodology section of the thesis is more complex in terms of language structure, especially in the English-language scientific thesis, where the process of scientific experiments, the framework, the internal correlation structure, etc., need to be connected to form a concrete thesis model. Currently, the discourse structure of the methodology section of English scientific papers written by students and published in the public domain usually refers to the detailed description of the research methodology and the matching experimental design, which can be broadly categorized into the following aspects, namely, the English scientific research equipment and materials, the selection of the scientific-practical samples, the collection of data in real-time, the method of analysis, and the comparison and so on (Ono & Petri, 2022). Different phases, corresponding to the exposition of the links and content also have a big difference. The language structure of the methodology section of the traditional English-language scientific thesis is mostly set in a unidirectional form, which can realize the expected results of the thesis, but lacks stability and relevance, and the final results of the research will be more or less inaccurate when facing different objectives and targets of the thesis (Suwarni, 2021). For this reason, we propose an optimization analysis and practical validation study of the discourse structure of the methodology section of student-written and published English-language scientific research papers. First of all, based on the current needs and standards for the design of English scientific papers, the direction of the paper's coverage is clarified, the means and procedures of scientific exposition are determined, the experimental reproducibility and uncertainty are allowed, and the actual exposition is simplified to the greatest extent possible within a reasonable range according to the characteristics of student-written and published English scientific papers, to emphasize the linguistic features and rhetorical structure of the methodological part of the paper and facilitate the subsequent data collection as well as the practical validation of the methodology. The structure of the methodological part of the English scientific paper can be simplified to the greatest extent possible, highlighting the linguistic characteristics and rhetorical structure of the methodological part of the paper, facilitating the collection of subsequent data and the comparative study of the results, expanding the controllable scope of the language structure of the paper in the current exposition situation, designing a more flexible and variable language structure of the methodological part of the paper in combination with the actual situation, adjusting the directional structure of the paper from multiple perspectives, and laying a solid foundation for the analysis of the subsequent results and the auxiliary analyzing

conditions (Sun, 2021).

## 2. Analysis of the Basic Organizational Structure of the Scientific Paper

The design of a good English science thesis methodology thesis class structure needs to be supported by sufficient and effective arguments, and the central idea of the thesis is reached through logical analysis and the use of various methods. Taking the background of real English learning and the goal of the thesis as a guide, we conducted a practical research on the English scientific research papers written and published by students in some schools, and categorized, screened, processed, and eliminated the data obtained according to the requirements, which is the reference basis and theoretical reference for the subsequent research, as well as a more convincing evidence of the importance of the methodological part. Usually, most English scientific research papers have a more consistent language structure, and although the structure of the paper can be changed and adjusted according to different disciplines and research fields, generally speaking, the main structure of the common English scientific research paper can include the following types, one of which is the title. The topic of the English scientific research paper covers a wide range, not only to clarify the intention but also within the limited word count, a summary of the content so that readers can first catch the key content of the article (Chang, 2023). The second is the abstract section. This part is mainly to introduce the main thesis and research content of the English scientific research paper in a simple way, which can be divided into the actual purpose of the scientific research, the specific research methodology, the obtained results of the single research, and the conclusion (Rabadán, 2021).

The third is the introduction. The introduction part generally plays a certain role in guiding and supporting the introduction and is generally used to carry out the background of scientific research, the purpose and significance of the expected setting of the unfolding of the narrative, and through the way of comparison to summarize the relevant industry, the region of the current state of the English language scientific research, put forward the research questions and hypotheses (Alyousef, 2021). The fourth part is the literature review. It is usually to review and analyze the existing relevant studies, summarize the previous research results and shortcomings, and provide a theoretical basis for the study (Matmuratova, 2021). Fifth is the methodology section, which is also a very important and critical part of the paper, most of the papers in the methodology section of the language structure are more fixed, and will describe the research methodology and experimental design in detail, as shown in **Table 1**.

In conjunction with **Table 1**, the setting of the content of the structural links of the language categories in the methodology section is completed. Research methodology tries to choose an appropriate research methodology to answer the set research question. Ensure that the methodology can provide reliable data and

**Table 1.** Content setting table for the structural aspects of the language category in the methodology section.

<b>Content of link setting</b>	<b>First phase</b>	<b>Phase 2</b>
English Scientific Research Materials	Preparation materials for the research direction of the paper	Targeted Research Objective Supporting Materials
Sample Selection for Basic Research	Select a single research object or goal (with strong specificity)	Choose a group-based research formation or goal (with strong generality)
Data Collection Summary	Stage data acquisition	Total data acquisition
Clear analysis methods and practical application	Stage analysis process and content setting	Comprehensive analysis process and content setting

results and can support the argument. Whereas data collection and analysis is to collect enough data to support the current research. Use appropriate statistical methods and tools to analyze the data of English language science research and draw conclusions. It ends with the discourse structure results section, the discourse structure conclusion section, and the discourse structure discussion section. Presentation of the main results of the study, through text, tables, charts, etc., along with the interpretation and analysis of the results. Summarize the main findings and contributions of the study, answer the research questions, and emphasize the significance and value of the study. On this basis, in-depth analysis and interpretation of the results, comparison, and discussion with previous studies, exploration of the limitations and shortcomings of the study, as well as the direction and recommendations for future research are presented. This is an analysis of the basic organizational structure of a scientific paper.

### **3. Designing the Structure of Language Categories in the Methodology Section of an English Scientific Research Paper**

To some extent, there is a sharp contrast between the English scientific research papers written by students and those published in public. One is the comparison of professional level. Compared with the published papers, the papers written by students are relatively vague in content and structure, and the internal relevance is poor, which leads to problems such as excessive unnatural articles, unsatisfactory words or inconsistent contextual narrative goals. The second is that it is different for people who are academic. Publicly published papers have a large coverage and strong pertinence, while the papers written by students only cover

English majors, and the direction and depth of discussion are shallow. The third is the different scope. What students write refers to the basic English content and knowledge. However, the published English papers are generally professional English learning comments of graduate students or above, which have certain professionalism. Combined with the above analysis, the generic structure of the methodology part of English scientific research papers is designed.

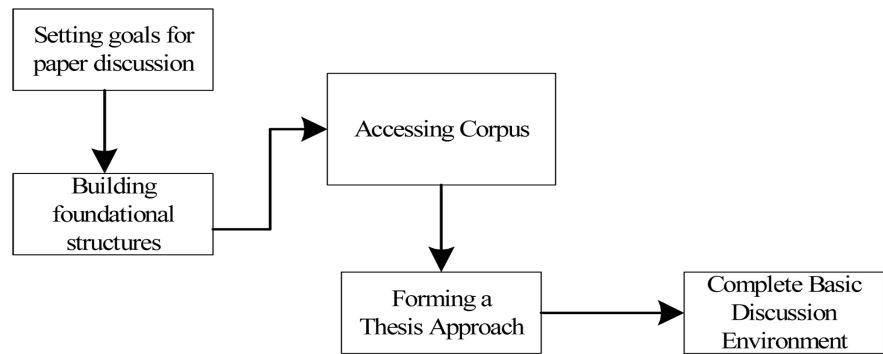
### 3.1. Developing Strategies and Ideas for the Foundation of an English-Language Science Paper

Whether it is a student-written paper or a publicly published English science research paper, the methodological part must be designed with coverage and controllability, and it can be implemented to synthesize, specify, and produce multidimensionally in different contextual environments to form a cyclic stage of the language class structure as a guide and support for the whole English science research paper. Therefore, before constructing a comprehensive discourse structure, it is necessary to formulate the basic strategies and ideas of English scientific papers. According to the actual expository needs and standards of the paper, the basic corpus should be collected and summarized first. Generally speaking, the corpus used in the process of researching scientific papers comes from the self-constructed information corpus of the group.

To ensure the reliability of the analyzed results and to reduce the negative impact of the subjective factors of the authors, the relevant personnel strictly followed the principle of scientific sampling in data collection. More representative, well-known, and accessible practical application materials were selected as the basic principles, but the principle of timeliness was also added in consideration of the changes and development of English scientific research. In addition, in the selection of the corpus, it is also necessary to adopt the random number method to select papers from the English corpus built by the group to ensure the richness and reliability of the reference materials in the experimental part of the article, but it is necessary to pay attention to, as far as possible, to eliminate the irrational and unpleasant information in the materials, and to discuss the truthfulness of the materials from multiple perspectives, to enhance the practical effect of the paper. Subsequently, based on the corpus of materials, design the foundational English scientific thesis idea, as shown in **Figure 1**.

In conjunction with **Figure 1**, the design and validation analysis of the structure of the ideas underlying the structure of the English-language scientific paper's language class is completed. Subsequently, based on this, an extended analysis is carried out to develop strategies for the practical application of the methodology at all stages, as shown below:

- 1) Begin by clarifying the objectives of the actual methodology section of the dissertation elaboration. This stage must first clarify the specific topic and content of this Ruben elaborated and analyzed, set a foundational direction, and delineate the upper and lower limits of the dissertation research, forming an



**Figure 1.** Illustration of the structure of ideas underlying the structure of the English scientific paper's language class.

elaboration of the closed loop, to help readers more accurately and quickly capture the main idea and focus of the article, is the initial stage of the analysis, laying the groundwork.

2) Subsequently, under the guidance of the dissertation's methodological discourse structure elaboration goals, the corresponding methodological framework is formulated in light of the actual direction of the dissertation and subordinate headings. This stage is a more flexible link, generally based on the set milestones to expand the extension, supplement the content and framework of the thesis, to build a refined, specific framework for the basic ideas of the English scientific research paper, which is the excessive, complementary stage of the middle stage.

3) Next, come the methodological data collection and practical analysis section. The corpus was utilized for data and information collection and replacement, and the selected topics and milestones of the study were processed to obtain basic analytical results for subsequent use.

4) Ultimately, it is the comparison of results in the methodology section that is carried out. In general, the current results are not the conclusion of the thesis, but partially or stage by stage for the results to reflect data. It is necessary to summarize and integrate the information and data mentioned above and form a general direction for the thesis, form methodological practice research ideas, and provide a reference basis for the subsequent thesis as well as the design of the language structure.

### 3.2. Ask the Relevance Question

Generally speaking, the questions raised in the methodology section of the English scientific research papers written and published by students are mostly fixed, and the relevance and correlation of the questions are relatively poor, which leads to the situation of a "mismatch between the questions and the arguments" in the process of later exposition, affecting the design and practical verification of the papers afterward. Therefore, this time, we take into account the actual points and characteristics of English scientific research papers and design the corresponding relevance of thesis questions. First of all, it is necessary to com-

bine the directions of English scientific research written and published by the students, and then construct the correlation objectives of the questions, as shown in **Table 2**.

In conjunction with **Table 2**, the goal of setting questions on the methodological relevance of student-written and published English science research papers was accomplished. Subsequently, on this basis, all the questions raised in the methodological phase of the current English science research papers were established as analytical correlations to form a cyclic basic research framework as a guideline for the applied research on the structure of the current discourse categories of English science research papers.

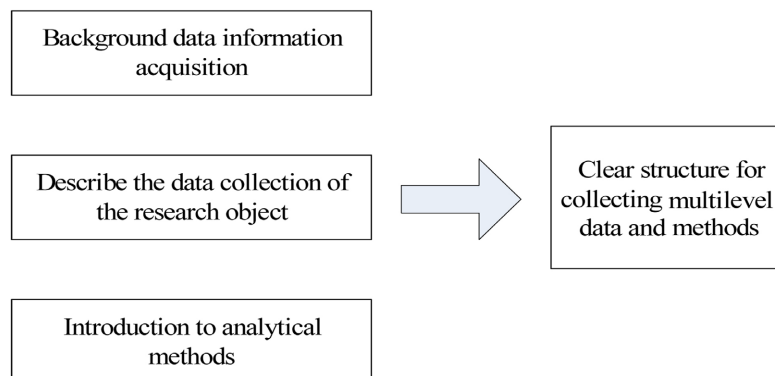
**Table 2.** Goal-setting table for questions on methodological relevance of student-written and published English-language scientific research papers.

Phased setting of goals for relevance issues	Initial association range	Actual association scope	Adjustable situation control
First stage direction goal	Determine the initial research direction of the paper	Clarify the direction of sub-research in the paper and develop research titles	Make appropriate adjustments to small-scale titles
Phase 2 Transition Objectives	Control and Natural Transition of Two Thesis Stages	Transformation from unidirectional discourse objectives to multi-directional discourse objectives	Transition within scope
Theoretical objectives of the third stage	Determination of Discussion Content	Clear knowledge of basic discourse	Adjust the edge title of the paper
Phase 4 Analysis Objectives	The scientific research and analysis stage of the paper	Conduct hierarchical division of scientific research and analysis in papers	Determination of practical direction for paper analysis
Phase 5 Practical Objectives	Experimental Practice Execution	All target execution	Collect data information
Phase 6 Application Objectives	Application Verification	Hierarchy application verification	Obtain paper validation data
Stage 7 Extension Objectives	Unidirectional extension of research direction in the paper	Bilateral extension of research direction in the paper	Extended Range Control

### 3.3. Clarification of the Collection of Multilevel Data and Methods

Unlike the traditional one-way data collection method, the multi-level data collection and methodology explicit method is more targeted and reliable, and the control effect for the paper in the methodology part will be better, so, first of all, based on the above-proposed problem of the relevance of the English scientific research paper, the data collection and aggregation and integration is carried out. SCI, SSCI, and A&HCI academic articles are collected in the connected corpus, and this part can be used to obtain and categorize the data by keyword searching, for example: for scientific research, applied science, life science, social science, humanities and so on can be taken as the keywords, combined with the two-step random method to obtain the corresponding information ordinal number. Based on this, fully considering the differences that exist in the structure of the disciplinary groups and disciplinary methods section, the current multi-level data acquisition is divided into the following stages, respectively, background data information acquisition, description of the research object data acquisition, and introduction of analysis methods. The specific structure is shown in **Figure 2**.

Combined with **Figure 2**, the design of the clear structure of collecting multi-level data and methodology is completed. The above, the acquired data and information of the dissertation are integrated and analyzed to clarify the authenticity and reliability of the data in the methodology section of the current English science research paper. This stage of methodological data collection must ensure that the acquired data and information are true, to provide a reliable practical research environment for the subsequent dissertation, and to ensure the authenticity of the results and conclusions drawn. In addition, it is also necessary to carry out the methodology of multi-level clarity and clear processing. Currently in the transitional stage of dissertation design, based on the full consideration of the differences in the structure of the methodological part of scientific research populations and disciplines, combined with the dissertation language structure classification framework, the methodological part of the language structure of English-language scientific research dissertations is processed



**Figure 2.** Illustration of the explicit structure of the collection of multilevel data and methods.



synergistically. It contains specific discourse items, introduces the object of study, classifies, introduces data collection criteria, describes the data collection process, establishes the analysis framework and criteria, introduces the classification of variables, and describes the analysis process. The more detailed division can enhance the authenticity and reliability of the data cited in the dissertation, and increase the degree of authenticity of the dissertation by processing and implementing the improvement of data information from multiple perspectives. In addition, it is also necessary to appropriately classify the data of the dissertation in the upper class, the classification system of the language structure of the scientific research paper is relatively complex, and the structure of the language step and a phrase should not be too much, so as not to affect the results of the later article between the various stages of the inter-comparison and analysis, and better reflect the distribution of the language step or phrase, which is of great value and significance.

### 3.4. Comparison of Dissertation Practices

The practical comparison of the dissertation mainly refers to the comprehensive comparison study for the obtained result data. This process is a figurative and detailed extension of the dissertation extension, which is an important support point for the subsequent comparison of conclusions. The combination of language steps is a diversified form of dissertation methodological treatment, a structure of language steps with a subsidiary nature, when carrying out the dissertation text construction, although it only has the function of auxiliary discourse, it can be used for the data and information for the practical verification of the scientific research dissertation language class structure, and it can separately constitute the dissertation practice comparison structure of the methodological part.

The practical comparison methods of the dissertation include a one-way stage comparison structure, dynamicized transformation comparison structure, and all macrostructure, etc. The practical comparison analysis of the dissertation uses the all macrostructure for the validation study. For example, the non-core language steps in pure science, applied science, and life science, which are only part of the method, need to be controlled in the macro-structure to form an independent language structure. However, it should be noted that the current design of the developed practice the lack relevance and stability of the language structure, you can first calculate the highest frequency of all macro-structures in the discourse, as shown in Equation (1) below:

$$A = \left( 1 - k + \sum_{u=1}^n gu - q^2 \right) \times ku \quad (1)$$

Equation (1): denotes the highest exposition frequency in all macro-structures, denotes the controllable exposition range, denotes the proportion of individual speech steps, denotes the number of macro-controls, and denotes the aggregate ratio. Combined with the current test, the calculation of the maximum exposition frequency in all macro-structures is completed, and the result-

ing maximum exposition frequency in all macro-structures is set as the controllable standard for thesis practice comparison. Next, based on the total macro-structure, the aggregate ratio of each stage is measured, and the “atypical” structure of the macro-structure of the methodological part of the English scientific research paper is established.

The fact that M2-M3 is the most frequently used combination of multilingual step macrostructures suggests that this “atypical” structure is the main component of the methodological part of the step macrostructure, and is also the main analytical research method in the practical comparison. However, it should be noted that in the process of practical analysis of English scientific research papers, in terms of practical validation of disciplinary clusters, pure sciences, and humanities, which are at the two ends of the disciplinary continuum, can be reflected in the use of the two main macro-structures (M3 and M2-M3), marking the differences between disciplinary clusters, studying the differences in the results of the practical analysis, and drawing the results of the analysis of papers and information on the directed data at the first stage of the research process. of the thesis analysis results and directed data information.

### **3.5. Data Analysis Comparison and Summary**

Data analysis comparison and summarization is the last analysis and practical verification part of English scientific research, as well as the final part of obtaining conclusions. Currently, in the correlation between discourse step analysis and determination, this dissertation study follows the initial proposed steps and principles of discourse structure, i.e., searching for relevant information through the context of the discourse, referring to the corresponding discourse feature information, comparing and verifying the resultant dissertation data, and defining the dissertation fixed objectives. Taking the discourse theme as the main reference basis, the effect of the discourse step attribution analysis of the dissertation result data is determined according to the principle of significance. In addition, in the process of discourse step analysis and conclusion summarization, it is also necessary to identify the relevant vocabulary markers as the discourse step reference for the subsequent dissertation practice analysis. For the methodology part of the dissertation, a specific language step based on the multi-level analysis form, combined with the overall content and research objectives of the methodology part of the dissertation, to obtain the final research results data, to conclude the methodology part of the research, for the subsequent conclusions of the practical validation and analysis of the laying of reference.

## **4. Concluding Remarks**

Synthesizing the above analysis, it is a design and validation study of the discourse structure of the methodological part of the English scientific research papers written and published by students. In fact, in the current process of designing the discourse structure of the dissertation, although the fixed structure can

realize the expected results of the dissertation research, it lacks relevance and stability. This paper optimizes and improves the discourse structure of the methodology part of the English scientific research paper, to a certain extent, it can further expand the actual coverage of the paper, expand the direction of the paper's exposition from multiple perspectives, and form a complete and specific article vein, which can help the readers catch the main content of the article at the first time, and the innovation and reset of the discourse structure of the methodology also enhance the depth of the article. Different forms or different structures lead to a more diversified mode of writing in the methodology part of the paper, and to a certain extent also determines the diversity and innovativeness of the macro-exposition structure of the part, which breaks the fixed limitations and constraints of the structure of the traditional student-written and published English scientific research paper methodology part of the discourse structure and provides a certain reference to the future research, and can help English learners and paper. It can help English learners and writers to improve the writing level of academic papers, to realize internationalized, all-round and high-quality academic communication.

### Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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