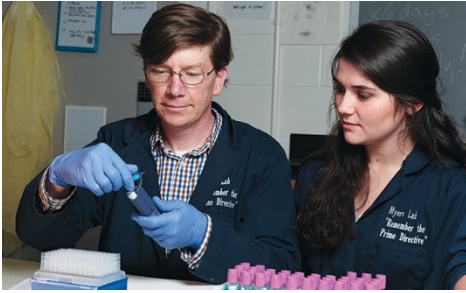# 8 STEPS GUIDE FOR AI-ASSISTED QUALITATIVE ANALYSIS

This guide is designed to assist beginners and seasoned professionals in conducting qualitative research using AI tools. It provides step-by-step instructions, best practices, and examples to analyze textual information efficiently. Additionally, it is a live document that we will regularly update to incorporate the most refined practices as our work progresses.

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1. Introduction to Qualitative Research with AI

Qualitative research explores underlying themes, sentiments, and patterns in textual data. Traditional methods are time-intensive and could lead to some bias. AI-powered tools, such as GPT models, streamline the process, enhance accuracy and efficiency, and provide scalable solutions. This guide has been designed by Bucknell University's Office of Institutional Research and Analytics (OIRA) to assist researchers at all levels.

Why Use AI for Qualitative Research?
Artificial intelligence (AI) provides researchers with innovative solutions to tackle the challenges of qualitative research. By automating repetitive tasks like coding, categorization, and sentiment analysis, AI reduces the time and effort needed to analyze large datasets. It enhances scalability, allowing institutions like Bucknell University to gain insights from thousands of responses in a fraction of the time required by traditional methods. Additionally, AI could minimize human bias by applying consistent and systematic coding rules across all data points, ensuring more objective results. However, researchers still play a central role in this process by examining the accuracy of the results since LLMs could still make mistakes and introduce bias.

2. Overview of Qualitative Research Methods

At Bucknell University, we leverage AI tools to enhance qualitative research, ensuring efficiency and accuracy in analyzing textual data.

Common Methods:
- **Thematic Analysis**: Identifies and interprets patterns or themes within a dataset.
- **Sentiment Analysis**: Measures emotional tone in text.
- **Grounded Theory**: Develops theories based on emerging data patterns.

Application of AI:
- **GPT-4o, Claude, and Gemini** are some of the most popular AI tools for theme identification and sentiment analysis. Please note that while we have experimented with Claude, Gemini and DeepSeek for us, ChatGPT generated the best outcomes.
- **LDA**: For topic modeling and clustering. (not discussed in detail in this guide)
- **VADER**: For sentiment scoring. (not discussed in detail in this guide)

Zhang, H. et al. have identified four stages in the workflow for applying ChatGPT to perform qualitative analysis (2023). Zhang, H. et al. (2023) explored a human-centric approach to create prompt engineering for qualitative analysis with ChatGPT. A framework that empowers qualitative researchers, especially those new to the field, has been developed to leverage ChatGPT's capabilities in their analysis workflows effectively.
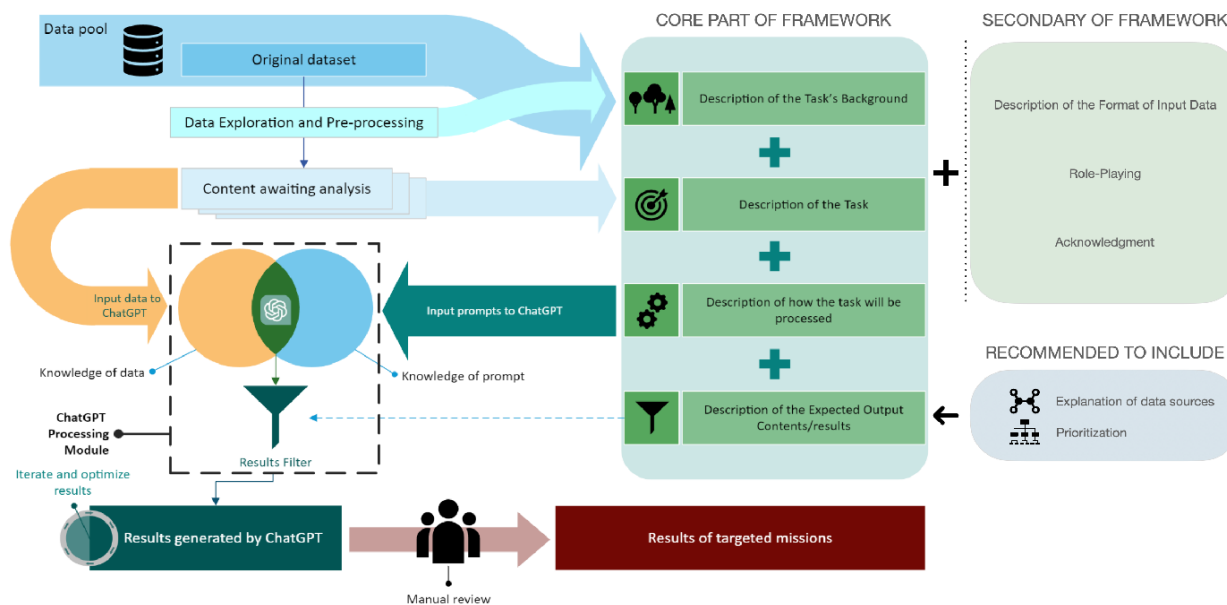
Figure. 1. A workflow (Zhang, H. et al., 2023) for applying ChatGPT to handle qualitative analysis tasks. The core of the (prompt design) framework includes descriptions of tasks (including methods), task backgrounds, and output format, enabling ChatGPT to analyze input data with strong robustness. The secondary part of the framework includes descriptions of data structure, role-playing, and friendly wording, which can further enhance the robustness of ChatGPT in task processing.

The framework includes four core parts as follows:

I) Description of the Task's Background. This part enables users to set the context and provide information that helps ChatGPT understand the input data's nature and structure.
II) Description of the Task. This part gives further instructions about the task that ChatGPT needs to execute with the input data and method.
III) Description of how the task will be processed. This part serves as methodological guidance to ensure that ChatGPT will complete the task following a specific procedure.
IV) Description of the expected output content. The framework will instruct ChatGPT to organize its responses in a reproducible and easily transferable format.

Following this framework, all requirements of qualitative analysis, individual feedback processing, and theme categorization can be combined into a singular, comprehensive prompt. In addition, this is a flexible framework that allows the integration of customized instructions such as role-playing and a pre-defined codebook. You can read more about the practical application of the framework in Section 5: Conducting Thematic Analysis.

3.0 Data Collection Methods and Preparing Data for Analysis

3.1 Data Collection Methods
- Surveys & Questionnaires: Open-ended questions allow respondents to express detailed opinions.
- Interviews & Focus Groups: Transcriptions from recorded sessions serve as raw text data.
- Social Media & Online Forums: AI can extract insights from public discussions
- Feedback from websites such as product reviews.

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3.2 Data Preprocessing
One of the key advantages of using ChatGPT is its ability to handle essential text preprocessing tasks seamlessly without requiring manual intervention or specialized coding. This includes tokenization—breaking content into words or phrases—alongside automated stop word removal, which filters out common yet non-informative terms like "the" or "and." Additionally, ChatGPT can lemmatize words, reducing them to their base forms (e.g., "running" becoming "run"), thus ensuring more consistent analysis. Finally, by anonymizing data to remove personal identifiers, the platform adheres to ethical standards while maintaining accuracy. Be sure to remove all personally identifiable information since ChatGPT will not do this automatically. However, researchers must still address certain data-cleaning steps, such as eliminating duplicate or irrelevant responses and standardizing text. All these steps occur behind the scenes, making the entire process effortless for the user.

Example Prompt for Preprocessing:
"Please clean the following dataset by removing duplicates, tokenizing sentences, and lemmatizing words. Return the preprocessed dataset."

4. Summarizing Open-Ended Answers
Provide concise summaries of responses to each question, highlighting major trends and unique insights.
Example: Survey Question: "Digital Transformation & Ethical AI."
Example prompt to summarize the main idea: "Please summarize the main ideas communicated in all the responses for the question "digital transformation & ethical AI."
Summary: Responses emphasized concerns about AI systems' transparency, bias, and privacy. Many advocated for educational initiatives and regulatory frameworks to ensure ethical AI development.

5. Conducting Thematic Analysis
Thematic analysis is a cornerstone of qualitative research. AI tools simplify the process while maintaining rigor.

We used the Zhang, H. et al. framework to create a process for using ChatGPT for qualitative analysis since it is flexible and allows the integration of customized instructions such as role-playing and pre-defined codebooks. We used our experiences with LLM and our specific needs to modify it.

Example 1: Initial Coding Without a Codebook
Prompt:
"Please review the responses and generate detailed codes for each sentence or part of a sentence. Each code should be between 2-5 words and reflect the essence of the text. Provide a table with codes and matching excerpts."

Output Example:

Code	Excerpt
Data Privacy	"AI must protect sensitive data."

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Ethical AI Education "Teach people about ethical AI usage."

Prompt: Identifying Themes
- **Prompt 1.a**: Create a Quick Summary Report (ranking the themes and frequencies). Note: The initial frequency count here may not be accurate, and the researchers will need to validate the coding results.

    You are an institutional researcher specializing in qualitative analysis. Your expertise lies in understanding student experiences and transitions, particularly during pivotal academic phases. This project focuses on exploring the first-year transition experience of students, a critical period that significantly influences their overall academic journey.

    This qualitative analysis aims to gain insights into students' perceptions and experiences during their first semester. To achieve this, I have collected student responses to the question: "My semester is going well because _____." [or customize here]. The responses have been compiled in an Excel file, serving as this analysis's primary dataset.

    Read the data file I provided in column A [or customize here] from row 2 [or customize here] to row 1,000 [or customize here]. You should review and interpret the data to identify the top 7 [or customize here, 5, 6, 7 or more] themes that emerge from the student responses systematically utilizing a six-phase thematic analysis approach.

    Please analyze the responses sentence by sentence. For each theme, provide a comprehensive definition that captures the essence of the theme, reflecting the students' diverse experiences. Additionally, include a text example of at least three [or customize here] sentences that best reflect the theme and list the theme with the most participants first. This analysis aims to enhance our understanding of first-year students' experiences and inform institutional practices to support their transition more effectively.
    Please present the results in table form [or customize here to have an Excel or Word form]. The first column should be the name of the main theme; the second column should include the definition of the theme (with at least three [or customize here] detailed sentences); the third column should consist of four [or customize here] quotes that belong to this theme, and the fourth column should contain its frequency.

    Prompt 1.b: Example 1b for Open Coding: Develop a Codebook (no ranking for themes and no frequencies)
    As a qualitative researcher, you received an Excel dataset for a survey sent to the [customize here to provide context]. This survey aims to [customize here to provide context]. Conduct the following analysis of survey responses to open-ended questions.

    Step One: Read the dataset and understand the meaning of survey responses
    a) Read the responses in column [customize here] from row [customize here] to row [customize here].
    b) Understand these survey responses in the context of the survey question [customize here].
    c) For each survey response, code the different ideas. Even though some ideas are mentioned only a couple of times, you still need to capture them because, as a

qualitative researcher, you want to capture a comprehensive list of ideas conveyed in these responses.

Step Two: Provide a rationale for these different ideas
a) Provide the reasoning for these codes.
Step Three: Output format
a) Provide a codebook in Excel Table [or Word document— customize here] based on your coding. The first column of the table lists the codes you identified in step one, the second column lists definitions, and the third column lists up to 5 examples.

Adjust as needed, for example, 1a and 1b. After you have your initial results, you can make adjustments, such as changing the number of themes, prioritizing themes, etc., to refine the summary report or codebook using the process above.

Example 2. Coding with a Codebook
If you have a pre-defined codebook, it needs to be organized in the following format, including theme/code and description and Keywords.

Theme/Code	Theme Description	Keywords
Dining and Food Options	Improving dining options and availability on campus.	food, dining, cafeteria, dining options, better food, healthy options, veggies, gluten-free, fruit, smoothie bar, cafe open weekends, flyson, restaurants, café, swipe, gluten-free
Academic Support and Resources	Enhanced academic support services, including tutoring and advising.	academic, classes, support, resources, struggling, tutoring, study, Moodle, homework, Math, calc, physics, study-group, foundation seminar, advising, faculty, professors, staff, engagement, advisors, workload, academic pressure, print, flexible workload, prerequisites, less work, better website, writing center, major, lab, mentor

Upload your codebook and data and use the following prompt:
Task: As a qualitative researcher, you received a dataset from a survey sent to [customize here]. Conduct the following analysis based on these student responses to the question [customize here].

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Step One: Identify Salient Themes
1. Read through survey responses in the Excel file "XXXX" In column A, "Survey responses." In this file, each row contains one survey response.
2. Read through the Excel document "XXX_ Codebook Final" for thematic categories in column A, Description for thematic categories in column B, and keywords in Column C.
3. Based on keywords, identify up to three salient themes [you can customize the number of themes] from the "Major theme" column for each survey response. The themes should highlight the most significant ideas in each survey response.

Step Two: Provide a rationale for these major themes
1. Provide reasons why these themes are considered significant ideas from these survey responses.
2. From your identified themes, pick the top five representative quotes for each major theme as supporting evidence.

Step Three: Response format
1. Code each survey response based on all the codes in the "Major theme/code" column.
2. Provide the coded survey responses in an Excel format, and I will download this file to my local desktop.
3. In this Excel file, the first column contains the original survey responses, and each survey response is in a separate row in the first column. The second column lists the first major theme; the third column lists the second theme; the fourth column lists the third theme; the fifth column lists the fourth theme and all the major themes in this way.
4. If the original survey response touches on a specific theme, put 1 in the intersection between the original response and the theme; otherwise, put 0. Provide the total count of each theme at the bottom of each theme column.

Step 6: Manual Validation of AI-Generated Themes and Coding

A manual validation step is crucial to ensure the reliability and accuracy of AI-generated themes and coding. We strongly advise pairing AI-generated insights with human judgment to ensure that any assigned themes accurately capture the underlying data.

6.1 Selecting Responses for Review
- Randomly select 10-15 responses per theme.
- Ensure that the selected responses provide diverse perspectives within each theme.

6.2 Confirming Alignment with Definitions
- Compare each response to the definition of the AI-generated themes or the preexisting codebook.
- Check whether the response meaningfully aligns with the assigned theme.
- If responses appear ambiguous or misclassified, reassess whether the theme's definition needs refinement.

6.3 Identifying and Adjusting Inconsistencies
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- If multiple inconsistencies appear within a theme, consider revising the AI-generated themes and keywords.
- Adjust the AI model's prompts and codebook to provide more precise theme descriptions and keywords.
- If necessary, manually recode responses that do not fit within the AI-generated themes and adjust the code book.

6.4 Reporting Validated Results
- Document the number of responses that required reclassification.
- Provide justifications for any adjustments made to the themes.
- Summarize findings in a structured report to ensure transparency.

7. Are you convinced by the analyses produced by ChatGPT?

Three things to keep in mind:

1. Transparency of analysis
It is challenging to understand how ChatGPT has formed the categories. The interviews in the formal study (Zhang, H. et al., 2023) confirmed that the lack of transparency is one of the main reasons users should be cautious about using ChatGPT for qualitative data analysis. Adding explanatory information, traceable sources and standardized output formats can increase users' trust in ChatGPT results. When using ChatGPT for qualitative text analysis, demanding better interpretability and higher transparency may require just a single sentence. In your prompt, please include the following sentence to improve the transparency:

Please analyze the responses/transcript sentence by sentence.
or
Please briefly explain each theme and how you arrived at the themes.

a. **Avoid giving ChatGPT too many instructions. Create your prompt as best as possible to provide a singular, comprehensive prompt.**

b. **Reliability: When you run the same prompts multiple times, you get slight variations in the results each time.** This is related to the right "temperature" of the LLM. As average users, you rely on the default temperature setting. GPT-4 was set to a temperature of 0.5. GPT temperature is a setting that controls the randomness responses, ranging from 0 to 1, with a higher temperature allowing for more varied and creative outputs, while a lower temperature results in more predictable and conservative answers (Liu, A., & Sun, M., 2023). Please perform a manual reliability check after you have ChatGPT output.

8. Best Practices for Prompt Engineering
a) **Set Context**:
   a. Example: "You are an institutional researcher analyzing student responses."
b) **Be Specific**:
   a. Example: "Group codes into 5-7 themes. Provide definitions, examples, and counts."

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c) **Iterate and Refine**:
- o Revisit prompts based on results to improve accuracy.

9. Conclusion and Limitations

Preliminary findings show that ChatGPT can effectively identify underlying themes when given thoughtful and effective prompts that follow the standard workflow. The shared examples in the summary applied prompt engineering techniques like Few-Shot and Zero-Shot Learning, Chain-of-Thought, and Role-Playing, which help improve ChatGPT's performance (Turobov, A., Coyle, D., & Harding, V., 2023). Few-Shot Learning gives ChatGPT a few examples to guide its responses, making them more contextually relevant. Chain-of-thought prompts help the model break down reasoning steps, leading to more thorough answers. Role-playing scenarios encourage ChatGPT to adopt specific perspectives, helping it produce responses aligned with particular viewpoints. In some cases, ChatGPT detected themes that human reviewers had overlooked. However, it also tended to overgeneralize broader themes due to a lack of domain-specific knowledge and an inability to prioritize themes selectively. Therefore, while this guide offers a general process and examples for crafting effective prompts, users should be prepared to conduct several rounds of iteration to refine prompts that best fit their specific needs. Manual review remains essential, especially when high-stakes decisions are involved, to ensure accuracy and relevance in a domain-specific context.

This resource reflects the innovative practices used for conducting thematic analysis by the Office of Institutional Research and Analytics.

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