Thematic analysis in qualitative research: Steps, benefits, and challenges

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Abstract. This study examines the methodological structure, benefits, and challenges of thematic analysis through a comparative exploration of three case studies. Guided by three research questions, the study first clarifies the fundamental steps of thematic analysis, highlighting their importance for rigor and transparency in qualitative research. It then identifies the main advantages of this approach, including its flexibility, capacity to organize large volumes of data, ability to detect recurring patterns, and contribution to generating meaningful and theoretically grounded insights. The study also addresses key challenges, such as coding subjectivity, ambiguity in theme definition, and the risk of oversimplifying complex data, emphasizing the need for reflexivity, systematic documentation, and iterative theme review to ensure validity and reliability. Integrating theoretical perspectives with practical examples from multiple case studies demonstrates that thematic analysis remains a robust and adaptable methodological tool across diverse research contexts. This integrative approach highlights the method's capacity to generate rich, nuanced insights while maintaining analytical rigor.

Keywords: Qualitative research, thematic analysis, research contexts, interpretive inquiry, theoretical perspectives, empirical insights

Introduction

Thematic analysis is a central approach in qualitative research, widely used to identify, analyze, and report patterns (themes) within textual or narrative data. This methodology is not limited to describing data, but allows for in-depth interpretation, offering insights into underlying meanings, relationships, and structures present in participants' experiences, perceptions, or practices (Braun & Clarke, 2021; Kiger & Varpio, 2020; Thomas & Harden, 2008). Nowell et al. (2017) add that one of the most valuable aspects of thematic analysis is its flexibility. Thematic analysis can be applied in various disciplinary contexts, from social sciences, psychology, education, and health to organizational and entrepreneurship studies (Byrne, 2022; Kushnir, 2025; Pepper et al., 2023; Raimi et al., 2023).

In the context of qualitative research, we can consider that thematic analysis plays multiple roles. First, it functions as a data organization tool. Researchers often deal with significant volumes of interviews, transcripts, documents, or field observations. Thematic analysis reduces this complexity by grouping information into meaningful categories. This not only facilitates understanding but also creates a structure that guides the interpretation and presentation of results. Second, Pearson et al. (2025) point out that thematic analysis serves as a means of revealing implicit meanings. By identifying recurring patterns, the researcher can infer cultural norms, shared values, or underlying social processes that would not be evident through simple quantitative or descriptive approaches. For example, in studies on entrepreneurship such as those conducted by Kurteshi & Almeida (2025), thematic analysis can reveal how personal experiences and collaborative networks shape collective or individual entrepreneurial identity. Third, Sundler et al. (2019) confirm that this approach contributes to the robustness and validity of qualitative research. Through rigorous and systematic data coding, thematic analysis ensures that emerging themes are not merely superficial interpretations but grounded representations of the data. In addition, thematic analysis allows for the triangulation of information from different sources, reinforcing the credibility of the findings (Ahmed, 2024; Carter et al., 2014; Farquhar et al., 2020; Jonsen & Jehn, 2009). Finally, the importance of thematic analysis in communication and transmission of results cannot

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be overlooked. Wilson (2025) notes that by structuring the results around clear and articulated themes, it becomes easier for the reader to understand the findings and relate them to the existing literature, facilitating the construction of theoretical knowledge.

This study is justified for several reasons related primarily to methodological gaps, scientific rigor, and the practical applicability of qualitative research. First, although thematic analysis is widely used, there is still a diversity of interpretations and applications of the methodology. Many researchers apply thematic analysis inconsistently, with varying levels of rigor, coding, and theme definition. This variability can compromise the credibility of empirical studies, making it difficult to establish clear methodological standards. Thus, conducting a systematic study on the steps, benefits, and challenges of thematic analysis contributes to standardizing practices. The aim is to provide clear, well-founded, and critically informed guidance for researchers across different fields, positioning the paper as a methodological contribution that strengthens analytical rigor rather than as a source of new theory. Second, there is a need for a critical understanding of the benefits and limitations of thematic analysis. Although valued for its flexibility and ability to extract meaning from complex qualitative data, the methodology also presents challenges, such as subjectivity in coding, the risk of oversimplifying data, and difficulties in defining themes. A study focused on this topic allows us to identify these limitations and propose mitigation strategies. Furthermore, qualitative research is rapidly expanding in various fields, and the data obtained is often complex and dense. In this context, understanding how to apply thematic analysis in a structured and systematic way is essential for transforming raw data into useful knowledge. Finally, the study is necessary to strengthen the methodological literacy of researchers, especially those who are new to qualitative research.

In the context of this study, three relevant research questions are formulated, each aligned with one of the central elements of the study: methodological procedures, advantages, and difficulties of thematic analysis. The research questions include:

RQ1: What are the fundamental steps of thematic analysis in qualitative research?

This question explores the methodological structure of thematic analysis, one of the central focuses of the study. Understanding the steps (e.g., from familiarization with the data, through coding, to the definition and revision of themes) is crucial to ensuring rigor and consistency in qualitative research. Clearly identifying these steps allows researchers to apply thematic analysis in a systematic and transparent manner, avoiding arbitrary interpretations of the data.

RQ2: What are the main benefits of using thematic analysis in qualitative studies?

This question investigates the advantages of thematic analysis, such as the ability to identify recurring patterns, organize large volumes of data, reveal underlying meanings, and contribute to the construction of theoretical knowledge. Exploring the benefits helps justify the methodological choice by showing how this approach adds value to the research.

RQ3: What challenges do researchers face when applying thematic analysis, and how can these be mitigated?

This question addresses a critical dimension of the study by examining the difficulties inherent in thematic analysis, such as subjectivity in coding, ambiguous definition of themes, or the risk of oversimplifying the data. Identifying these challenges and discussing mitigation strategies is essential to increase the validity and reliability of the results produced by applying thematic analysis.

The rest of this paper is organized as follows: it begins by presenting the methodology adopted in this study and presents the three case studies that are used as a reference for applying the three research questions. After that, the results are presented, organized according to the research questions. Next, the discussion of the results is explored, seeking to highlight the innovative and distinctive aspects of the

results found. Finally, the main results are summarized and suggestions for applying the thematic analysis are provided.

Methodology

This study sought to complement a solid theoretical approach based on an analysis of literature in the field with the inclusion of a qualitative methodological approach supported using multiple case studies and practical examples. This methodological option is particularly appropriate when the objective is to understand an analytical process in depth, as it is experienced in real research contexts, allowing us to capture the complexity, the decisions involved, and the variations in the application of the method (Bartlett & Vavrus, 2016; Ridder, 2017). Furthermore, the choice of case studies makes it possible to analyze thematic analysis as it occurs in concrete situations. For example, this analysis aims to include projects carried out in different disciplinary areas, studies with different types of data, or investigations conducted by teams with different levels of experience. This diversity aims to offer a comparative view of how the steps of thematic analysis are operationalized in practice, from familiarization with the data to the review and definition of themes. The aim is that by observing the process as it unfolds, it will be possible to identify nuances that are not explicitly stated in methodological manuals, such as adaptations made by researchers, difficulties encountered throughout the stages, and strategies used to ensure rigor and thematic consistency. At the same time, the use of practical examples from the selected cases adds an illustrative and pedagogical dimension to the study. These examples demonstrate how methodological decisions are made at different stages, clarifying how themes emerge, how codes are constructed, and how interpretations are articulated with empirical evidence. Furthermore, the examples make tangible the benefits associated with thematic analysis and also the mitigation strategies that have been adopted in practice.

Figure 1 summarizes the various phases of the project. In the first phase, a theoretical foundation for thematic analysis is established, considering seminal studies in this field to analytically characterize its model and identify methodological guidelines. After that, a qualitative methodology is applied, which involved the selection of multiple case studies involving various disciplinary areas, presenting real cases of thematic analysis application, and made available to the community under an open access license.
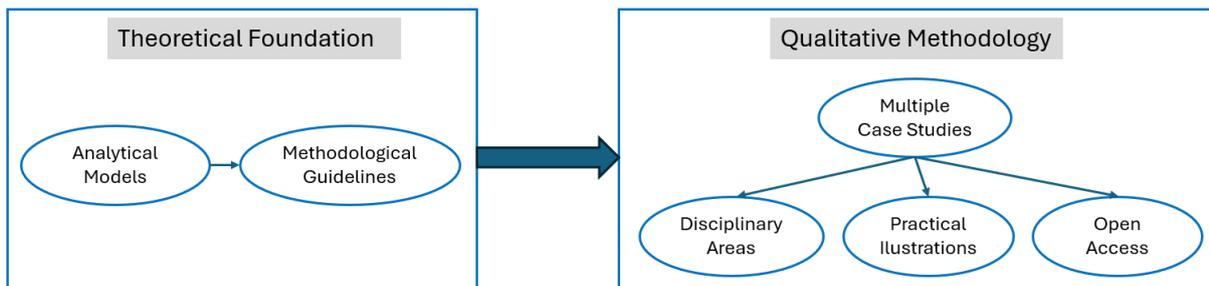

Figure 1. Phases of the methodological process

The identification and collection of case studies followed a structured strategy to ensure both sufficient analytical depth and empirical relevance. The choice of three areas (i.e., social sciences, education, and entrepreneurship) allows for different modes of thematic analysis to be captured, justified by their consolidated tradition of qualitative research and the diversity of phenomena they study, thus enriching the understanding of the steps, benefits, and challenges of the method. The strategy began with the definition of selection criteria to ensure comparability and, at the same time, the necessary variety. Each case must explicitly use thematic analysis, document the analytical process in detail, and have been developed recently, allowing current practices to be captured. Thus, only case studies published in the last three years (i.e., 2023 to 2025) were considered. In addition, each area should represent a distinct data production context, reflecting the breadth of applications of the method: in-depth interviews in the social sciences, student narratives or pedagogical practices in education, and reports from entrepreneurs,

institutional documents, or field diaries in entrepreneurship. This diversity ensures that thematic analysis is observed in heterogeneous scenarios, revealing both its potential and its limitations.

Finally, it is important to justify the three areas chosen for the case studies. The justification for including the industrial engineering and social sciences lies in the fact that they are a field where thematic analysis has a long tradition and where complex and subjective phenomena are often addressed (Anderson et al., 2021; Khan et al., 2021; Roopa et al., 2024; Zougris, 2025). This allows us to observe the method applied to topics such as identities, social relations, cultural practices, or individual perceptions, offering rich examples of interpretive coding. The field of education, in turn, presents contexts where thematic analysis is used to understand pedagogical experiences, learning processes, and school dynamics, allowing us to observe how the method adapts to institutional contexts and data from participants with different levels of reflective literacy (Ceylan & Çomoğlu, 2022; Kamran et al., 2024; Veres et al., 2025; Xu & Zammit, 2020). Finally, entrepreneurship is an emerging field in qualitative research, especially in the exploration of entrepreneurial narratives, identity creation processes, and team dynamics (Bürger & Volkmann, 2020; Duong et al., 2025; Toledano & Horie, 2025). Including it broadens the scope of the study and demonstrates the versatility of thematic analysis in applied and practice-oriented domains.

Table 1 provides a brief overview of the case studies included in this manuscript. Information was collected on the objectives, main results achieved, and contributions made by these studies. Sovacool et al. (2023) falls within the intersection of the fields of industrial engineering and social sciences; Cibu et al. (2025) is related to the field of education; while Sampaio & Sebastião (2024) focuses on the field of entrepreneurship.

Table 1.

Overview of the case studies included in this research

Study	Purpose	Findings	Contributions
Sovacool et al. (2023)	The study aims to synthesize theories and frameworks on industrial socio-technical change for a low-carbon future.	The study identifies 88 distinct theories related to industrial decarbonization and socio-technical change across approximately 71 years of literature.	The study provides a foundation for researchers addressing industrial decarbonization across theoretical traditions.
Cibu et al. (2025)	The study aims to provide a comprehensive, systematic review of scientific literature on the use of large language models (LLMs) in education.	The authors analyzed 507 documents from 322 sources, identifying dominant themes in LLM research in education through topic modeling and thematic mapping.	The main contribution is to offer a structured "map" of LLM applications in education, identifying which areas already have greater scientific output and which topics are emerging.
Sampaio & Sebastião (2024)	The article provides a thematic analysis of social innovation and entrepreneurship literature, examining publications, emerging themes, trends, and discourse over time.	The database used involved 6,646 publications (obtained via Web of Science) related to the topic during the period studied. Among the central themes identified were Sustainability, Social Enterprise, and Co-Creation.	The study offers a systematic, longitudinal overview of social innovation and entrepreneurship research since 2012, highlighting evolving themes.

Findings

RQ1: What are the fundamental steps of thematic analysis in qualitative research?

Table 2 provides a comparative table summarizing the phases of thematic analysis as applied in the three

referenced studies. Because each article structures its analysis slightly differently, the table synthesizes their methodological steps into comparable stages. In considering the phases of thematic analysis, we followed the proposal presented by Braun & Clarke (2006) and Maguire & Delahunt (2017), which are generally consistent and argue that the process begins with the researcher familiarizing themselves with the data, followed by an iterative process of generating initial codes and subsequently refining and stabilizing the themes, culminating in the production of the analytical report. This model follows the principles of continuous reflexivity as proposed by Pearson et al. (2025), which involves critically reflecting on analytical decisions, the researcher's position, interpretive coherence, and the impact of these factors on the construction of themes.

Table 2.

Phases of thematic analysis in the three studies

Phases	Sovacool et al. (2023)	Cibu et al. (2025)	Sampaio & Sebastião (2024)
1. Familiarization with the Data	Full review of conceptual frameworks and typologies on sociotechnical and low-carbon transitions; iterative reading of selected theoretical sources.	Comprehensive reading of studies included in the systematic review; initial annotation of how LLMs are used in education.	In-depth reading of the literature corpus on social innovation and social entrepreneurship, including historical and conceptual contributions.
2. Data Collection & Extraction	Extraction of definitions, model components, transition mechanisms, and assumptions from the frameworks and typologies.	Systematic extraction of metadata, methodological features, educational applications, and LLM use-cases.	Extraction of textual segments relating to themes, discourses, evolution of terminology, and research approaches.
3. Initial Coding	Coding of elements such as transition drivers, system components, innovation pathways, theoretical orientations.	Coding of educational purposes, LLM functions, learning outcomes, benefits, risks, and pedagogical implications.	Coding of themes such as social value creation, innovation processes, entrepreneurship models, actor roles, and contextual factors.
4. Searching for Themes	Grouping coded elements into higher-level categories: conceptual foundations, industrial transition mechanisms, typology patterns.	Clustering codes into topics (e.g., assessment, tutoring applications, content generation, ethical issues). Topic analysis complemented thematic grouping.	Categorizing codes into major themes: discursive evolution, recurring research topics, emerging trends in social innovation and entrepreneurship.
5. Reviewing & Refining Themes	Refinement to ensure coherence among frameworks; comparison of overlapping constructs and theoretical gaps.	Validation of topics/themes across included studies; merging overlapping categories and removing weak or inconsistent themes.	Refinement of themes to account for disciplinary overlaps; ensuring thematic patterns accurately represent discourse in the field.
6. Defining & Naming Themes	Final labeling of meta-themes (e.g., "industrial sociotechnical pathways," "low-carbon transition mechanisms," "framework typologies").	Naming final themes and subthemes that represent the types of educational applications and associated outcomes.	Naming core themes that capture the landscape of social innovation and social entrepreneurship scholarship.
7. Producing the Report	Integrating themes into a narrative describing how theories of sociotechnical change are structured and how they inform low-carbon transitions.	Reporting thematic/topic clusters, illustrating patterns in LLM educational use and research gaps.	Producing a thematic map of research evolution, highlighting discursive patterns, trends, and knowledge gaps.

Although the three studies share the overarching goal of using thematic analysis to analyze the data, each conceptualizes and applies thematic analysis in ways that reflect its epistemological stance and intended contribution.

In Sovacool et al. (2023), thematic analysis is conceptualized primarily as a method for synthesizing conceptual frameworks and typologies. The data are not empirical texts or interview transcripts, but theoretical models related to sociotechnical and low-carbon transitions. Consequently, thematic analysis functions as a tool for structuring the theoretical landscape, identifying recurring conceptual building blocks, and clarifying how frameworks approach transition mechanisms. The process is therefore more conceptual and integrative than interpretive. The authors use thematic analysis to group theoretical constructs, detect overlaps, and reveal inconsistencies across industrial transition theories. Themes emerge from comparing underlying assumptions, mechanisms, and structural elements of existing frameworks. Thematic analysis becomes a way to industrialize theories, which is a method of turning fragmented conceptual contributions into a coherent meta-perspective. It is more deductive than inductive because the analytical units (e.g., framework structures, definitions, mechanisms) are already conceptually articulated in the literature.

In Cibu et al. (2025), thematic analysis is embedded within a systematic review workflow and is combined with topic modeling. Here, thematic analysis is conceptualized as a dual-purpose technique: (i) to qualitatively interpret the patterns generated by computational topic analysis, and (ii) to frame emerging categories of how LLMs are used in educational contexts. This hybrid approach reflects a more method-driven and exploratory conceptualization of thematic analysis. The authors treat themes as patterns of application, benefit, concern, or pedagogical role across the reviewed studies. The analysis is semi-inductive: themes arise from the reviewed corpus but are guided by research questions about educational uses and implications. Thematic analysis in this context is also descriptive and classificatory. Its function is to map the field, rather than to interpret deeply or theorize.

Sampaio & Sebastião (2024) use thematic analysis in a more interpretive and discourse-oriented way. The focus is not only on identifying major research themes but also on tracing the discursive evolution of concepts within social innovation and social entrepreneurship. Here, thematic analysis is conceptualized as a method for uncovering how ideas, narratives, and theoretical constructs evolve over time. The process is more inductive and interpretatively rich compared to the previous case studies. The authors treat the literature corpus almost like a qualitative dataset, analyzing how different streams of thought have shaped the field. Themes represent discourses, conceptual trajectories, and research perspectives, making thematic analysis a tool for interpreting meaning and justifying discursive positioning. Thus, the analysis is closer to qualitative interpretivism than the structured synthesis of Sovacool et al. (2023) or the exploratory mapping of Cibu et al. (2025).

RQ2: What are the main benefits of using thematic analysis in qualitative studies?

Table 3 provides a comparative table summarizing the main benefits of using thematic analysis in each of the three referenced studies. The three case studies demonstrate the versatility and utility of thematic analysis in different contexts and with different analytical goals.

Table 3.

Main benefits of thematic analysis in the three studies

Study	Main Benefits of Thematic Analysis
Sovacool et al. (2023)	- It allowed for the systematization and comparison of various scattered theoretical frameworks on socio-technical transition. - It facilitated the identification of recurring conceptual patterns among models and typologies. - It made it possible to map gaps, inconsistencies, and overlaps between approaches. - It contributed to organizing the theoretical field and providing an integrated view of theories on low-carbon industrial change.

	- It helped clarify mechanisms and structural components of existing theories.
Cibu et al. (2025)	- Assisted in the qualitative interpretation of patterns identified by automatic topic analysis. - Enabled the grouping of educational uses of LLMs in a coherent and understandable way. - Facilitated the synthesis of an emerging field, still poorly structured in the literature. - Enabled the identification of benefits, challenges, risks, and pedagogical opportunities associated with the use of LLMs. - Increased the clarity and interpretive depth of the mapping carried out by the study.
Sampaio & Sebastião (2024)	- It enabled the exploration of the discursive and conceptual evolution of the field over time. - It allowed the identification of trends, currents of thought, and dominant discourses in social innovation and social entrepreneurship. - It contributed to a deeper understanding of how ideas are articulated and transformed in literature. - It helped reveal relationships between themes, highlighting theoretical tensions and convergences. - It provided a solid foundation for building a holistic and critical view of the field.

In Sovacool et al. (2023), thematic analysis is primarily leveraged to systematize and organize theoretical frameworks related to sociotechnical change and low-carbon transitions. The method allows the authors to identify recurring conceptual elements across diverse models, clarify the mechanisms and components of each framework, and map overlaps and gaps. In this context, the benefit lies in providing a cohesive and integrative overview of a fragmented theoretical landscape, enabling scholars to see patterns and inconsistencies across existing frameworks.

In Cibu et al. (2025), thematic analysis functions as a bridge between quantitative topic modeling and qualitative interpretation. Here, its benefits are more exploratory and classificatory: it enables the grouping of different educational applications of large language models (LLMs) into meaningful categories, identifies pedagogical benefits and risks, and synthesizes insights from a rapidly evolving research field. Thematic analysis enhances the clarity and interpretability of computational patterns, making complex data accessible for conceptual discussion and practical recommendations.

In Sampaio & Sebastião (2024), thematic analysis is applied in a more interpretive and discourse-oriented manner. It facilitates the identification of evolving themes and discourses in literature, helping to trace the development of ideas, highlight trends, and reveal tensions and convergences in research perspectives. The primary benefit here is the ability to construct a deep, holistic understanding of how the field has developed conceptually and discursively. Furthermore, it provides insights into both the substance and trajectory of scholarly debate.

RQ3: What challenges do researchers face when applying thematic analysis, and how can these be mitigated?

Table 4 summarizes the main challenges of applying thematic analysis in the three case studies and suggests mitigation strategies for each. The challenges are based on how thematic analysis was used in different contexts (e.g., theoretical, empirical, and discourse-based).

Table 4.

Challenges and mitigation strategies of thematic analysis

Study	Main Challenges	Mitigation Strategies
Sovacool et al. (2023)	- Difficulty in comparing complex theoretical frameworks due to the diversity of concepts and terminology. - Risk of oversimplifying theoretical nuances. - Possible bias on the part of the researcher when interpreting and grouping conceptual elements.	- Develop clear coding and categorization criteria prior to analysis. - Use multiple reviewers to validate the interpretation of themes. - Maintain detailed documentation of analytical decisions to ensure traceability.

Cibu et al. (2025)	- High volume of data from systematic reviews, making manual coding difficult. - Risk of subjective interpretation of patterns identified by topic analysis. - Difficulty in integrating qualitative and quantitative results.	- Apply digital support tools to organize and code data (qualitative analysis software). - Perform triangulation between codes, topics, and authors to increase reliability. - Establish clear operational definitions for each theme before interpretive analysis.
Sampaio & Sebastião (2024)	- Topics may be vague or overlapping, making it difficult to clearly define them. - Investigator's interpretive bias when analyzing discourses and trends. - Rapid evolution of the field may quickly render topics outdated.	- Implement iterative review and refinement of themes throughout the process. - Use codes and themes defined reflectively, documenting analytical decisions. - Complement analysis with recent literature and multiple sources to maintain relevance.

In Sovacool et al. (2023), the thematic analysis dealt with complex and varied theoretical frameworks, which posed challenges in comparing heterogeneous concepts and terminologies. A significant risk is the oversimplification of theoretical elements, which can lead to the loss of important nuances in the different approaches. In addition, the interpretation and grouping of conceptual elements may reflect the researcher's bias, influencing the way themes are constructed. To mitigate these challenges, the authors applied clear criteria for coding and categorization, involved multiple reviewers in validating interpretations, and documented all analytical decisions in detail, ensuring traceability and consistency.

In Cibu et al. (2025), challenges arise from the high volume of data from a systematic review and integration with automatic topic analysis. Manual coding becomes more laborious, and there is a risk of subjective interpretation of the patterns extracted by quantitative methods. In addition, integrating qualitative and quantitative results in a coherent manner can be complex. To reduce these risks, researchers used digital qualitative analysis tools, operationally defined the themes before interpretation, and applied triangulation by crossing codes, topics, and authors, increasing reliability and interpretive clarity.

In Sampaio & Sebastião (2024), the main challenges relate to the interpretative and discursive nature of the data. Themes can be diffused or overlapping, and researchers run the risk of interpretative bias when analyzing discourses and research trends. Furthermore, the field is dynamic and rapidly evolving, which can quickly render themes outdated. Mitigating these challenges includes iterative review and continuous refinement of themes, reflective and documented definition of codes and categories, and incorporation of recent literature and multiple sources, ensuring relevance and rigor.

Discussion

Thematic analysis emerges as a versatile and widely applicable methodological tool in scientific research. It has stood out for its usefulness in organizing, interpreting, and synthesizing complex qualitative data, whether empirical or theoretical. In the three case studies analyzed, it is clear that the application of this approach provides significant benefits, although the nature of these benefits varies according to the type of data and the objective of the research. An area common to all studies is the ability of thematic analysis to identify recurring patterns and structure knowledge in a coherent manner, which is in line with studies in the field such as Ayre & McCaffery (2022) and Fryer (2022). In Sovacool et al. (2023), this benefit manifests itself in the systematization of dispersed theoretical frameworks, allowing for an integrated understanding of different approaches to the low-carbon socio-technical transition. In Cibu et al. (2025), thematic analysis enables the organization of educational applications of LLMs, transforming complex data into interpretable categories. In Sampaio & Sebastião (2024), thematic analysis allows the tracking of discursive evolution and the identification of emerging trends in the field of social innovation and social entrepreneurship.

Another important convergence across the reviewed studies lies in the capacity of thematic analysis to systematically identify conceptual gaps and underexplored domains within complex research fields. Sovacool et al. (2023) illustrate this potential by mapping overlaps and omissions across competing theoretical models, thereby clarifying areas of conceptual redundancy and fragmentation. Similarly, Cibu et al. (2025) employ thematic analysis to expose research blind spots in the application of large language models in education, highlighting uneven thematic coverage and emerging but insufficiently theorized topics. Sampaio and Sebastião (2024) further demonstrate the method's value by uncovering dominant narratives, latent tensions, and shifts in academic discourse over time. Taken together, these studies show that thematic analysis functions not only as a descriptive synthesis tool but also as an interpretive mechanism that enables theory refinement and agenda-setting. This convergence is consistent with recent methodological literature, which increasingly recognizes thematic analysis as a rigorous and flexible approach for synthesizing large volumes of qualitative data, facilitating cross-study comparison, and advancing cumulative knowledge development (Cotton et al., 2024).

Despite the convergences, there are also significant divergences related to the nature of the data analyzed and the degree of interpretation involved. In Sovacool et al. (2023), the analysis is mainly deductive and conceptual, centered on existing theoretical structures, while in Cibu et al. (2025), it is semi-inductive, combining quantitative methods (i.e., topic modeling) with qualitative interpretation. In Sampaio & Sebastião (2024), the approach is clearly inductive and interpretive, focused on discursive analysis and the identification of emerging trends. These differences reflect an intrinsic flexibility of thematic analysis but also point to distinct challenges: the need for clear criteria and multiple validation in Sovacool et al. (2023), the integration of qualitative and quantitative data in Cibu et al. (2025), and the risk of interpretive subjectivity in Sampaio & Sebastião (2024). These disciplinary differences help explain why varying levels of interpretive richness are not only present but necessary. In more theory-driven domains such as entrepreneurship and sustainability studies, interpretive richness is often constrained in favor of conceptual precision and comparability, placing greater emphasis on reflexive rigor through transparent coding rules, cross-validation, and systematic justification of thematic boundaries. In educational and discursive contexts, however, richer interpretation is required to account for contextual nuance, evolving meanings, and actor perspectives, making reflexive rigor less about limiting interpretation and more about critically engaging with the researcher's positionality, assumptions, and interpretive choices throughout the analytical process.

Regarding the challenges of applying thematic analysis, all three case studies confront issues that may affect methodological rigor and analytical reliability, particularly in relation to interpretive bias, reflexivity, and consistency in coding decisions. Interpretive bias is inherent to thematic analysis, as researchers must make successive judgments about what constitutes a relevant code or theme, how categories are constructed and refined, and how patterns are ultimately endowed with meaning. However, what differentiates a merely descriptive application of thematic analysis from a theoretically grounded one is the extent to which this interpretive process is made explicit and critically reflected upon.

In Sovacool et al. (2023), this challenge is especially salient given the analysis of complex and heterogeneous theoretical frameworks. Concepts that appear similar across models often carry distinct epistemological assumptions and normative implications, requiring a reflexive analytical stance to avoid premature aggregation or conceptual flattening. The transition from textual comparison to higher-order theoretical insight thus depends on the researchers' ongoing negotiation between abstraction and contextual sensitivity, a process that is not fully transparent but is central to the credibility of the findings.

In Cibu et al. (2025), the reflexive challenge emerges at the intersection of automated and human-led analysis. While quantitative topic modeling provides an initial structuring of the data, the subsequent qualitative interpretation of these outputs requires the researcher to actively mediate between algorithmic patterns and theoretical relevance. This interpretive layer introduces subjectivity, as decisions about how to label, merge, or prioritize topics inevitably reflect the researchers' assumptions

about what constitutes meaningful educational innovation. A more explicit discussion of how these interpretive choices were interrogated, validated, or revised would strengthen the analytical depth and transparency of the study.

In Sampaio and Sebastião (2024), where thematic analysis is embedded in a discursive and interpretive research tradition, reflexivity becomes even more central. Themes emerge through iterative and critical readings of texts, and judgments regarding relevance, salience, and tension are closely tied to the researchers' positionality and theoretical orientation. Here, the analytical journey from data to insight is less linear and more dialogical, underscoring the need to explicitly articulate how interpretive decisions evolved over time and how alternative readings were considered or bracketed.

These three cases illustrate that the core methodological challenge of thematic analysis lies not only in coding consistency but in making reflexive processes visible through which raw data are transformed into meaningful and theoretically grounded insights. Addressing this challenge requires greater emphasis on reflexive practices (e.g., documenting analytical iterations, justifying thematic boundaries, and critically engaging with one's own assumptions) thereby enhancing the explanatory power and transparency of thematic analysis in complex research contexts.

Finally, current literature such as Finlay (2021) and Fuchs (2023) emphasizes that the reliability of thematic analysis strongly depends on the adoption of methodological strategies that increase transparency, consistency, and reflective rigor. Among these strategies, detailed documentation of the process is essential: recording how codes were defined, how themes were formed, what decisions were made, and for what reasons allows for traceability and analytical justification, serving as a basis for peer review and partial replicability of the study. Iterative review of themes is another essential practice according to Williams & Moser (2019). By repeatedly reviewing the data and themes, the researcher ensures that the themes consistently reflect the content of the dataset, avoiding the formation of superficial or incoherent categories. Moreover, validation by multiple reviewers, when applied, reduces the risk of subjective interpretation, as it allows different perspectives on codes and themes to be compared. The aim is to promote consensus or identify differences that can enrich the analysis.

Conclusion

Thematic analysis proves to be a flexible and effective methodological approach in qualitative research, adaptable to different types of data and research objectives. The comparison between the three case studies shows that, despite epistemological differences, all studies follow similar phases: familiarization with the data, initial coding, identification and refinement of themes, definition and naming, and production of the analytical report. This process is aligned with theoretical models in the field and incorporates continuous reflexivity, allowing researchers to critically evaluate their interpretive decisions. The benefits of thematic analysis include the organization and systematization of knowledge, the identification of recurring patterns and gaps in literature, and the production of interpretable categories.

Recommendations

The comparative analysis of the three case studies provides more than general advice on thematic analysis. Effectively, it offers concrete, empirically grounded guidance that enhances methodological literacy across disciplines. Furthermore, this study highlights not only the procedural steps but also the reflexive reasoning and interpretive choices necessary for robust application.

First, structured planning of coding schemes emerges as a critical skill for researchers seeking methodological rigor. Sovacool et al. (2023) demonstrate that in highly conceptual or theory-heavy datasets, developing detailed coding tables and pre-defined yet flexible categories allows analysts to preserve conceptual nuance while enabling cross-framework comparison. In Cibu et al. (2025), initial coding had to accommodate patterns identified through automated topic modeling, illustrating the

importance of balancing deductive structure with inductive responsiveness. These examples translate into a practical lesson for methodological literacy: researchers must cultivate the ability to anticipate data complexity and design coding strategies that are both systematic and adaptable.

Second, iterative theme review is shown to be an essential analytical competency. In Sampaio & Sebastião (2024), repeated engagement with the literature allowed the identification of emerging, central, and declining themes over time, while in Sovacool et al. (2023), iterative comparison ensured conceptual consistency across overlapping theoretical models. These processes exemplify a core aspect of methodological literacy: understanding that theme refinement is not a mechanical step but an interpretive skill requiring judgment, attention to nuance, and alignment with research objectives.

Third, methodological literacy involves mastering triangulation and collaborative validation. Cibu et al. (2025) highlight the integration of automated and human-coded analysis, demonstrating how cross-validation strengthens the credibility of findings. Similarly, the scale and diversity of datasets in the other two studies suggest the value of involving multiple reviewers to manage interpretive bias. These examples underscore that methodological literacy encompasses both the technical ability to implement analytic procedures and the critical awareness of how researcher choices influence outcomes.

Finally, reflexivity is emphasized across all cases as a foundational competence. Sampaio & Sebastião (2024) show that reflexive engagement enables analysts to navigate interpretive subjectivity in discursive data, while Sovacool et al. (2023) illustrate how transparency in framework selection and synthesis supports conceptual coherence. The lesson for researchers is that methodological literacy includes cultivating an explicit, ongoing reflective stance, which includes several phases such as documenting decisions, revisiting assumptions, and situating interpretations within both theoretical and disciplinary contexts.

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Conflicts of interest

No conflicts of interest are declared by the author.

Author Contribution

Corresponding author Fernando Almeida: Conceptualization, data refinement, research, methodology, original drafting, review, and editing

Conflict of Interest Statement

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Ethics Approval

In the writing process of the study titled **" Thematic analysis in qualitative research: Steps, benefits, and challenges**", scientific, ethical and citation rules were followed; It is committed by the author of this study that no falsification has been done on the data collected. It accepts that "Journal of Action Qualitative &; Mixed Methods Research and Editor" has no responsibility for all ethical violations that may be encountered, that all responsibility belongs to the author and that the study has not been submitted to any other academic publication environment for evaluation.

Institutional review board (IRB) approval

Institutional Review Board (IRB) approval is not required for this research.

Data Availability Statement

Anonymized data from this study can be used upon request almd@fe.up.pt