Ensuring Trustworthiness Using an Inductive Approach in Qualitative Educational Research: An Autoethnographic Investigation of Two Early Career Researchers Reflecting on PhD Data Analysis

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Abstract: Ensuring the trustworthiness of qualitative research remains a critical challenge in educational research. However, early career researchers often lack structured guidance on enhancing the credibility of qualitative data analysis. A key issue is the limited discussion on inductive approaches that support systematic theme generation and theory development. To address this gap, this study examines how two early-career researchers employed a three-level inductive methodology during their PhD studies to strengthen the trustworthiness of their findings. Using an autoethnographic approach, the study finds that this methodology deepened their understanding of participants' experiences, facilitated the emergence of valid themes, and reinforced credibility, transferability, dependability, and confirmability. These findings offer concrete strategies for researchers undertaking similar approaches to ensure trustworthiness in their qualitative inquiry. This study also highlights the importance of equipping PhD researchers in education with strategies to navigate qualitative research rigorously, ultimately enhancing the quality of their studies.

Keywords: *Inductive, early career researchers, trustworthiness, methodology.*

Introduction

Entering a PhD program in education can be an exciting and challenging experience for new researchers. While these programs offer opportunities for advanced study and research, they can also be daunting for students who are unfamiliar with the research methodologies and methods that are commonly used in academic research (Chowdhury, 2019; Fan et al., 2023; Li et al., 2023). One of the most significant challenges that new PhD students in education face is understanding the difference between research methodologies and methods and how to maintain the quality of their research.

Educational research thrives on exploring complex questions and problems related to teaching, learning, and the everyday educational experience (Li & Chakma, 2024). To navigate this landscape, many PhD students and researchers rely on two primary approaches: deductive and inductive approaches (Punch, 2014). Each approach offers distinct strengths and guides the research process in unique ways. Deductive research, which is more commonly utilised in educational research, follows a top-down approach and often begins with a well-established theory or existing body of research (Mertens, 2014). Researchers develop a hypothesis, a prediction about the relationship between variables (Creswell & Creswell, 2018). The core of this approach lies in testing this hypothesis through empirical research methods, such as controlled experiments or surveys. Data collection and analysis then focus on confirming or refuting the initial hypothesis (Preissle, 2006).

While deductive research is prevalent in some areas of educational research due to its clarity and precision in measurement (Fraenkel & Wallen, 2019), inductive research is becoming increasingly important with more educational researchers adopting this approach. This approach is data-driven, with theories and hypotheses developed from detailed observations and analyses of data (Liu, 2016; Thomas, 2006), rather than starting with a pre-existing theory and testing hypotheses derived from it. Researchers typically collect data through interviews, focus groups, or

observations, and then engage in in-depth analysis to identify emerging patterns, develop themes, and generate potential explanations for the phenomena under study (Creswell & Creswell, 2018). The findings from these analyses may lead to the development of new theories or the refinement of existing ones, thus providing deeper insights into complex educational issues. Inductive methodology will be discussed further in the literature review section.

Despite the advantages of inductive research, many new PhD students in education struggle to ensure the quality or trustworthiness of the research (Chowdhury, 2019). This can be attributed to a variety of factors, including a lack of prior experience with academic research (Chakma et al., 2021; Fan et al., 2023) or a general unfamiliarity with the strategies to ensure trustworthiness (Chowdhury, 2019). Particularly because data analysis is a fundamental aspect of the research process, identifying patterns and themes from raw data in a rigorous manner requires both a deep understanding of the content and a reliable, valid approach to analysis (Yan et al., 2024). The intricacies of coding, synthesising, and interpreting data demand a high level of meticulousness, which can be overwhelming for those new to academic research. Such a need to maintain trustworthiness throughout the analytical process makes it crucial for students to acquire a solid grasp of inductive qualitative analysis techniques.

However, although researchers have extensively discussed the methods to ensure trustworthiness in qualitative research, there remains a notable gap in specifically detailing strategies for *inductive* studies to safeguard the trustworthiness of their findings. Addressing this gap, this paper explores the experiences of two PhD graduates in maintaining the trustworthiness of their research findings throughout their analyses. It poses a critical question: How can trustworthiness be effectively maintained and ensured in inductive data analysis?

In this paper, we share a multi-level inductive data analysis approach that both authors utilised in their PhD research. It provides a systematic and methodologically robust approach suitable for analysing both single and multiple data sources. It is particularly advantageous for researchers aiming to develop new theories grounded in empirical data—a common expectation for PhD students to demonstrate their original contributions to knowledge in their field.

The paper begins by discussing the value of inductive methodology in educational research and how it ensures trustworthiness. We then outline our autoethnographic research method, followed by the presentation of our findings and discussion. It concludes with an exploration of limitations and recommendations for future PhD students and researchers.

Literature Review

This section explores the role of inductive methodology in qualitative research, which involves the derivation of theories and patterns directly from data, particularly the three levels of the inductive analysis approach. Following this, it moves to the discussion around the establishment of trustworthiness in qualitative research, including its four components credibility, transferability, dependability, and confirmability, drawing from a range of scholarly sources. It is argued that while inductive methodology is an essential contemporary approach for educational research to address the complexity of phenomena, it is imperative to ensure the trustworthiness of research throughout the research process.

The Use of Inductive Methodology

Educational research often grapples with intricate and multifaceted phenomena, demanding research methodologies that can delve into the nuances and depths of these issues (Denzin & Lincoln, 2017). Inductive research methodology emerges as a valuable tool in this context, offering a rigorous and systematic approach to exploring complex, in-depth, and nuanced phenomena and can lead to new and innovative theories and understandings (Liu, 2016; Thomas, 2006). This approach is well-suited to fields where there is a need to understand complex social phenomena and where traditional deductive research approaches may be insufficient.

Unlike the more prevalent deductive research, which starts with a hypothesis (Mertens, 2014) and seeks to confirm or refute it through testing, inductive research is a bottom-up approach (Punch, 2014), researchers embark on their inquiry with open-ended observations and data collection, allowing patterns and themes to emerge organically (Creswell & Creswell, 2018). This exploratory nature fosters a deeper understanding of the intricacies of social phenomena in education, such as student engagement or teacher-student interactions (Merriam, 2009). Inductive methodology allows researchers to capture the richness and multifaceted nature of educational experiences (Flick, 2014). This approach allows for a more exploratory and open-ended research process, which can lead to new and innovative insights.

The true strength of inductive research lies in its approach to data analysis. Here, researchers meticulously scrutinise the collected data, employing techniques like coding and thematic analysis to identify recurring patterns and relationships (Braun & Clarke, 2012). This iterative process allows for the continuous refinement of emerging themes and facilitates the development of new theories grounded in the data itself (Charmaz, 2014). This stands in stark contrast to deductive data analysis, which often focuses on confirming or refuting pre-existing theories, potentially stifling the discovery of unexpected insights (Denzin & Lincoln, 2017).

One of the key advantages of inductive data analysis in educational research is its capacity to reveal previously unrecognised connections and relationships (Bryman, 2016). By allowing themes and patterns to emerge organically from the data (Chakma, 2023), researchers can identify unexpected influences on educational phenomena, contrasting deductive research, which begins with pre-existing theory and tests hypotheses derived from it, potentially overlooking unexpected findings. This can lead to the formulation of new research questions and the exploration of novel areas of inquiry within the field of education (Merriam, 2009). For instance, an inductive analysis of student interviews might reveal unexpected connections between classroom environment and student motivation, prompting further research into environmental design and its impact on learning outcomes.

A Three- Level Approach to Data Analysis

This paper proposes a three-level data analysis process that ensures thorough exploration and interpretation of research findings, as demonstrated in Figure 1. Level One focuses on foundational analysis, laying the groundwork for deeper exploration. At this stage, data from various sources—such as interviews, focus groups, and documents—are manually organised. This process involves close reading and careful analysis of the texts to interpret their meanings (Thomas, 2006). A crucial aspect of this level is recognising that participants' responses, particularly in interviews, may not always follow a strict, linear structure (Thomas, 2006). Therefore, a detailed review and alignment of transcript sections with corresponding interview questions becomes essential. Importantly, researchers should also note and archive any additional information offered by participants that deviates from the interview questions. This seemingly tangential information may prove valuable in later stages of analysis.
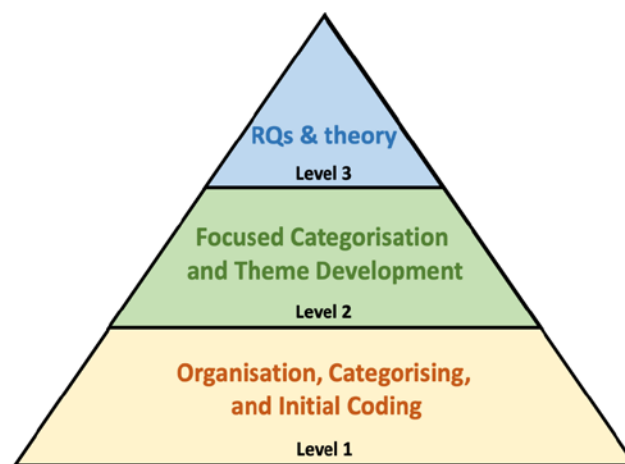

Figure 1. Three Levels of Inductive Analysis

The researcher highlights significant text segments, assigns them to different categories, and labels them accordingly. As more relevant segments are found, they are added to these categories. The researcher may draft initial descriptions of each category's meaning and create memos detailing their associations, connections, and implications. Level One analysis often begins with the development of initial codes, which are generated inductively through an iterative process to capture the depth and breadth of the data (Strauss & Corbin, 1990; Thomas, 2006). This stage is typically the most time-consuming, as it requires careful attention to detail and repeated engagement with the data. Categories may begin to emerge during this process and can be further organised based on relevant contextual factors such as age, gender, or years of teaching experience, allowing researchers to explore meaningful patterns and relationships within and across cases. This inductive approach, unlike deductive approach which begin with pre-determined categories, allows for unexpected findings and a deeper understanding of the data's complexities. While deductive analysis might be more efficient, it risks overlooking nuanced themes and patterns that emerge organically from the data.

Once the data is organised, the researcher moves to Level Two, where they delve deeper to identify consistent patterns, blocks, and themes. Building on the initial codes developed in Level One (through inductive coding – Strauss & Corbin, 1990), researchers compare codes to identify consistent patterns, contrasting blocks of information, and emerging themes within the data (Thomas, 2006). This level involves an iterative process of refinement, with researchers reaching data saturation, a point where no new significant information emerges. At this stage, initial categories are consolidated into broader themes, which are then further refined to reduce overlap and redundancy. This refinement process results in the identification of core themes and their subthemes.

Level Three focuses on synthesising the core themes identified in Level Two to pinpoint key answers to the research question/s. This final level delves into the theoretical implications of the findings. Researchers recognise connections to existing theories and relevant literature. Here, the analysis goes beyond simply aligning the data with existing theories;

it identifies gaps in current understanding and contributes new insights to existing theoretical frameworks. This focus on theoretical contribution is a hallmark of a strong PhD research project.

While both authors employed this three-level approach in the inductive data analysis, as detailed in the subsequent section, our focus extends beyond merely contrasting methodologies. We did not intend to engage in the debates over the superiority of deductive approach versus inductive approach or quantitative versus qualitative methods. Instead, this research is aimed at discussing how we used this three-level approach to ensure the quality of research, or the trustworthiness of the findings, as discussed in the following section.

Trustworthiness

In terms of evaluating research, quantitative methods have long established validity and reliability as cornerstone metrics. However, the direct application of these concepts to qualitative research is often believed to be problematic due to the fundamentally different epistemological assumptions (Adler, 2022). Whereas quantitative research often relies on a positivist framework, which assumes an objective reality that can be measured and generalised, qualitative research adopts a naturalistic approach, which prioritises understanding the subjective experiences and interpretations of participants within their specific contexts (Creswell & Creswell, 2018). Recognising this disconnect, the seminal work by Lincoln and Guba (1985) introduced the concept of trustworthiness as a framework tailored for evaluating the quality of qualitative research, aiming to bridge the divide. They argue that ensuring trustworthiness would guarantee that "the findings of an inquiry are worth paying attention to, worth taking account of" (p. 290). According to Elo et al. (2014), this is particularly important for inductive content analysis in qualitative research, as the categories, themes and theories directly emerge from the raw data, independent of any pre-determined categorisations.

Trustworthiness is a complex construct that must be considered from different aspects in qualitative data analysis as it reflects the overall quality and integrity of the research process. Lincoln and Guba (1985) outlined four key components essential to establishing trustworthiness: credibility, transferability, dependability, and confirmability. These components help ensure that the findings are not only grounded in the data but also meaningful and applicable beyond the immediate research context.

Credibility, which is identified to be the most important in establishing trustworthiness by Lincoln and Guba (1985), involves validating that the findings accurately reflect, interpret and present the participants' experiences. It sometimes serves as the counterpart to internal validity in quantitative research, which refers to the extent to the variables and the correlations are accurately measured (Merriam, 2009). Despite different fundamental ontological assumptions, credibility and internal validity underlie the importance the congruence of the research with reality.

Transferability usually denotes the extrapolation of the findings (Elo et al., 2014). While naturalistic researchers often question and are cautious of the generalisation of the findings given the specificity of the context, transferability could be critically facilitated by providing thick and nuanced descriptions of the context, which allows for further consideration of its applicability (Shenton, 2004).

Dependability focuses on the stability of the data over time and under different conditions (Lincoln & Guba, 1985). It is often considered to address the reliability issue in qualitative research, to show the possibility of repeating the research in same contexts, with same participants and using the same research method (Shenton, 2004). While this repetition could be hardly achieved in qualitative research, Janis (2022) interpreted dependability as consistency through a constructivist and interpretivist approach, proposing the key strategies for dependability is to establish the similar meanings and interpretations across different data collection methods through examinations and comparisons of the themes.

Confirmability refers to the objectivity or the potential for congruence among different researchers about the accuracy, relevance or meaning of the data (Shenton, 2004). Cope (2014) further explains that to ensure confirmability, researchers need to present the findings that are directly derived from the data but not the researchers' biases, motivation or interest.

In addressing these four components of trustworthiness, researchers have outlined various strategies that promote trustworthiness during the data analysis stage. For example, Anney (2015), Cope (2014), and Shenton (2004) agree that researchers could adopt *triangulation*, which involves the use of multiple data sources and methods to cross-check information and mitigate biases. These authors further highlight that triangulation enhances the depth and richness of qualitative findings by providing a more comprehensive understanding of the phenomenon under study. Additionally, they emphasise that triangulation can strengthen credibility by ensuring that findings are not solely reliant on a single perspective. *Member check* and *peer debriefing* could be other approaches where researchers either return the findings to the participants for confirmation or discuss with colleagues who are not involved in the study to probe the findings and challenge assumptions. Elo et al. (2014) specifically mentioned that for inductive qualitative analysis conducted by multiple researchers, intercoder reliability should be implemented so that the data is reviewed continuously to upload credibility.

However, it is important to remember that these four points of trustworthiness are cultural constructs. The concept of trustworthiness, as outlined by Lincoln and Guba (1985), is a cornerstone of qualitative research methodology. With regard to the four criteria for establishing trustworthiness, as explained above, many critiques have emerged regarding the cultural specificity of these criteria, particularly the notion that Western epistemological assumptions may not universally apply (Lincoln et al., 2018). The concept of "truth" can vary across cultures. Western perspectives often emphasise a singular, objective truth, whereas some cultures might acknowledge multiple truths based on individual or group perspectives (Kincheloe et al., 2017). Thus, while dependability might denote replicability, it might not resonate with cultures that value context-specific knowledge and the unique researcher-participant relationship (Lincoln et al., 2018). Again, while objectivity is prized in Western research, some cultures might view the researcher's role as a facilitator or co-constructor of knowledge alongside participants (Chakma, 2023; Creswell & Creswell, 2018; Mishler, 1986).

Methodology

This paper employs autoethnography, a research method that integrates the researcher's personal experiences with other data sources (Ellis & Bochner, 2000). Autoethnography allows researchers to narrate their personal experiences while also engaging in an ethnographic analysis of the cultural context and the significance of those experiences (Chakma et al., 2021). This qualitative approach provides a rich, layered understanding (Ellis & Bochner, 2000) by situating individual narratives within broader social, cultural, and institutional contexts. This approach acknowledges the subjectivity inherent in lived experiences while providing valuable insights into broader social phenomena (Chang, 2015). In this study, this method provides a distinct perspective on the intricate experiences and decisions of two PhD researchers who opted for an inductive approach and how it allowed them to delve more deeply into their participants' experiences, ensuring a richer and more nuanced understanding while simultaneously preserving the integrity and quality of their research.

Through self-reflection and narratives, we examine our data analysis process during our PhD journey, illustrating how we ensured trustworthiness in our research. As researchers, we are not *tabula rasa* (blank slates); we bring our own experiences, biases, and assumptions to the research table (Lincoln & Guba, 1985). Self-reflection allows us to critically examine these potential influences and how they might shape the way we interpret the data. We document our personal challenges, strategies, and reflections, offering an insider's perspective on the complexities and intricacies of PhD data analysis in educational research.

In this study, there are three key points we reflected on; a) the specific adoption of three levels of analysis, b) the strategies we employed to ensure trustworthiness, and c) the impact of these approaches and strategies. We also reflected on part of our reflective journals—maintained from 2019 to 2020 for Urmee and from 2022 to 2023 for Bingqing— during PhD and engaged in regular discussions to capture the evolving nature of our thoughts and experiences over a period of the data analysis. This methodology enables us to highlight the importance of trustworthiness in qualitative research, demonstrating how we employed various strategies such as triangulation, member checking and reflexivity to enhance the credibility of our findings and *do justice* to our data.

The two authors are Early Career Researchers (ECRs) working full time in an Australian university. Urmee completed her PhD in 2021 utilised an inductive approach for data analysis (see figure 1), while Bingqing, having recently completed her PhD in 2024, was inspired by Urmee's inductive data analysis process and incorporated similar methods into her analysis, integrating some deductive elements as well.

Urmee's PhD thesis investigated how the Chakma, a small Indigenous community from the Chittagong Hill Tracts (CHT) in Bangladesh, have utilised educational opportunities to migrate to a developed country like Australia. It explores the role these educational affordances have played in their efforts to retain, promote, and enrich their ethnic Chakma identity after immigration. To gather comprehensive data for this study, Urmee conducted two rounds of interviews with seven participants and facilitated a focus group discussion. This approach provided a nuanced understanding of the community's experiences and strategies in navigating their dual identities.

During her PhD research, Bingqing focused on the professional engagement of late-career teachers at two Chinese secondary schools. She adopted a methodology that combined case study and narrative inquiry approaches, centring on personal narratives from the teachers as well as stories told about them by key stakeholders, including students, colleagues, and school leaders. The research design included conducting two sets of interviews with the late-career teachers, with the in-between period dedicated to reflective writing to deepen the inquiry. Additionally, to capture diverse perspectives within each school, six focus group discussions were organised—one for each group of stakeholders in both schools.

In their studies, both Urmee and Bingqing focused on exploring the lived experiences of a particular cohort, seeking to co-construct knowledge with participants that sheds light on complex issues such as people's lifelong experiences and transitional phases, topics that had not been thoroughly investigated previously. Their objective was to develop new theories derived from the nuanced and detailed data they collected. Therefore, they chose the inductive approach as the most suitable method, enabling them to deeply engage with the data and systematically develop theoretical insights that are intimately connected to the real-world experiences of their participants.

Findings

This section explores the detailed process of inductive data analysis utilised to ensure trustworthiness at each stage of the three-tiered framework. It starts from the Level One analysis, where the codes are created from organising and categorising the raw data; and then progresses to the Level Two analysis, where the codes are synthesised into themes, and finally to answer the research questions and theory formation.

1. Level One Analysis: Organisation, Categorising, and Initial Coding

In Level One analysis, the authors began by segmenting and coding the raw data from interviews, focus group discussions, and reflective writing to capture the depth and breadth of participants' perspectives. This initial coding was conducted inductively, allowing categories to emerge organically from the data rather than being imposed by pre-existing frameworks.

Urmee segmented the data from two rounds of interviews and a focus group discussion, employing multiple coding methods to analyse the data (Saldaña, 2015; Thomas, 2006). She began with descriptive coding, assigning labels to data segments that simply described their content. For example, when a participant mentioned feeling overwhelmed by their workload, Urmee coded it as 'feeling overwhelmed'. In the initial coding phase, Urmee assigned tentative codes based on her first impressions, allowing her to explore various themes and ideas before settling on more specific categories. For instance, many of Urmee's PhD participants (during data collection) had just started studying part time while juggling full-time employment, primarily traditional 9-5 jobs. They frequently reported significant challenges in balancing these commitments. So, Urmee initially coded a participant's discussion about time management challenges as 'workload issues'. Urmee then used concept coding to group similar initial codes together, creating broader categories. For example, 'feeling overwhelmed' and 'workload issues' were combined under a concept code like 'work-life balance challenges'. During process coding, Urmee focused on identifying and coding the steps or stages within a process described by participants. For example, when a participant described their daily study routine, she coded the different steps involved, such as 'planning study time' and 'reviewing notes'.

Through her analysis, Urmee identified six main categories based on how participants responded to her core interview questions and the focus group discussion. This methodical approach allowed her to capture the complexities and nuances of the participants' experiences, ultimately contributing to a more robust and insightful analysis.

Member checking was employed by both authors in this level of analysis, with participants reviewing the transcriptions and initial codes as an approach to strengthen the data by incorporating different perspectives (Korstjens & Moser, 2018). By carefully categorising significant text segments, the authors ensured that the codes accurately reflected the participants' perspectives. Specifically, Urmee developed 41 codes directly from the participants' own words, grounding the analysis in the actual data and aligning it closely with the participants' narratives. Similarly, Bingqing re-organised the data according to the chronological sequence of participants' lived experiences and created timelines for participants to review the significant events and shifts in perceptions at different stages of their careers. This participant-driven approach minimised the risk of researcher bias influencing the interpretation of the data (Bryman, 2016).

Next, consistency of the participants' evaluation of the findings, interpretations, and recommendations was considered by the authors. Both of them read the data multiple times to understand what the data was saying to make sure that they avoided biases to the best of their knowledge. Both authors verified certain aspects of their interview data whenever they felt there was a potential misunderstanding or lack of clarity. Urmee discussed "with a group of fellow PhD researchers to ensure accurate interpretation of the data" to focus on ensuring that data patterns and interpretations are genuinely derived from the data rather than the researcher's [Urmee's] imagination, which is often a key concern.

Transferability was ensured by contextualising the analysis within the specific experiences of the participants. Urmee focused on how education influenced the participants' migration to Australia, their perspectives on various positions, efforts to preserve their culture, and maintaining contact with the participants' relatives and community in Bangladesh and other countries. By providing detailed descriptions of the participants' contexts and experiences, the authors allowed readers to understand how the findings could be applicable to similar contexts. Bingqing, particularly, mentioned that:

> I kept rich accounts of the macro (e.g., the historical underpinnings and educational systems for teachers in China), meso (the school setting and social relations that the participants have), and micro (the participants) contexts in the Level One analysis. This contextual information was picked up partly from the participants' narratives and also from my observations. I also noted if a few participants shared the same contexts (e.g., teaching in the same grade, or having started to teach in the same year).

The careful consideration of the context in which the data was collected and analysed ensured that the findings were relevant and could be transferred to other settings with similar conditions.

2. Level Two Analysis: Focused Coding, Focused Categorisation and Theme Development

Following the Level One analysis, where the initial codes were identified and organised from the raw data, the two authors progressed to Level Two inductive analysis. As we delved deeper into the theme generation, it became clear that several rigorous strategies were employed to ensure the trustworthiness of the findings, particularly by reflecting the participants' lived experiences with little influences from the researchers' biases and contextualising the themes so that its applicability will be clearer for other studies.

To fortify and validate the inductive analysis and enhance the integrity of the analysis, Urmee reflected in the narrative,

> While I share the same language, ethnicity, and cultural norms, I understand that such positioning is not flawless and could conceal biases in this partially ethnographic study of the Chakma community. To minimise this, I reflected on how my own values, experiences, beliefs, and social identities have shaped this research and also about how my involvement in this research may have affected and possibly changed me.

Bingqing's experience echoed with this, and she further explained that "The most important difference between this approach and others for me is that it will help researchers to keep objective more or less in the data analysis, being clear about what the participants said and how researchers interpreting it." By providing this transparent linkage between the data and our interpretative conclusions, we allowed other researchers to follow the reasoning behind our analytical judgments.

In addition, the two authors incorporated several robust verification techniques in the Level Two analysis. Similar to the Level One analysis, member checking was a key strategy for Urmee where she continued online or face-to-face discussions with the participants for their feedback. Yet, different from the member checking in Level One, she focused more on the comments on the themes so that she did not "miss out or misinterpreted something" and she could "develop a new theoretical framework based on the themes and patterns that emerged from the data, rather than trying to fit them into pre-existing theories". Bingqing also applied a similar strategy, but since she was working with the participants at the time of data collection, she directly involved the participants in the Level Two analysis, demonstrating and discussing the progression of analysis from codes to themes. She reported that "the participants appreciated participating the progress, which further facilitated the co-construction of the knowledge". Additionally, external scrutiny by regular sessions with supervisors provided another check on both authors' research process. The supervisors critically assessed the thematic development to ensure the systematic and transparent analysis.

In ensuring transferability during the Level Two inductive analysis, the detailed descriptions of contexts were provided in the stage of theme generation. When reflecting on how this approach was different from the others, Bingqing commented that:

> I believe that this systematic approach, which precisely traced the progression from original data to codes and then to themes, made it clearer to link the themes back to their original contexts. Often, the contextual nuances tend to be overshadowed during the data reduction process; however, this method ensured that the context remained a focal point of my analysis throughout.

From this reflection, it can be inferred that the consistent attention to context through the levels of analysis not only preserved the integrity of the data but also enriched the thematic development. Urmee also mentioned that her focus on the research setting, the characteristics of the participant population, and the conditions under which data were gathered was more clearly guided and presented in the three levels of analysis. It allowed for a deeper contextualised understanding of the underlying narratives and of the applicability of the findings to different settings or groups. This depth of detail supports what the methodologists' defined as external validity of the thematic analysis.

3. Level Three Analysis: Answering the Research Question/s and Theory Generation

Level Three analysis serves as the capstone analysis, helping the researcher answer the research questions comprehensively. At this stage, core themes are further synthesised to identify key insights that directly address the research questions. These themes are typically aligned with the study's objectives and, when integrated with the earlier codes and categories, contribute to a coherent and meaningful interpretation of the data. For some researchers, this stage may mark the conclusion of the data analysis, however, others may choose to advance to a more theoretical level. For Urmee, these final themes reflected participants' views and highlighted the crucial roles education played in the Chakma migration narrative. Here, Urmee connected, compared, and contrasted the data with existing theories, integrating the findings with the theoretical framework incorporated into her study, as she reflected:

> I believed that the data had led me to the three established theories that I had been exploring alongside others (for example, those of Kabeer and Spivak). However, these theories, while insightful and relevant could not completely explain my participants' lived experiences. Recognising this limitation, I incorporated concepts from other theories (such as Mignolo and Quijano) to create a more nuanced theoretical framework to fully capture the complexity and depth of my participants' narratives.

By integrating her findings with established theories, Urmee was able to offer new insights and expand the understanding of how educational opportunities impact migration and identity retention among Indigenous communities like the Chakma. This not only enhances the academic value of her research but also provides practical implications for policy and educational practices related to migration and cultural preservation. Through this process, the data moves from raw to abstract and theoretical. This thorough approach ensured a greater theoretical contribution, as making significant contributions from a PhD study is expected.

In Bingqing's case, in addition to the theory generation in the third level of analysis, she was able to more confidently compare and contrast her findings of the study with broader literature. Particularly when there are differences, she could "easily trace back to the data to find supporting evidence of what the participants did and said" to support her arguments. For instance, while existing literature often frames late-career teachers as resistant to change, one participant in her study described actively initiating curriculum innovation in her classroom. Bingqing returned to this teacher's narrative and classroom artefacts to demonstrate how her professional identity was shaped by a strong sense of responsibility to mentor younger colleagues—an insight that challenged stereotypical portrayals in the literature.

Discussion

This study highlights the critical role of trustworthiness in qualitative research, detailing the strategies we employed – such as triangulation, member checking and reflexivity to strengthen the credibility of our findings and *do justice* to the integrity of our data, as illustrated in Figure 2. central to the investigation in the research question: How can trustworthiness be effectively maintained and ensured in inductive data analysis? By addressing this question, we aim to provide a framework for researchers to enhance the overall trustworthiness of their inductive qualitative analysis.
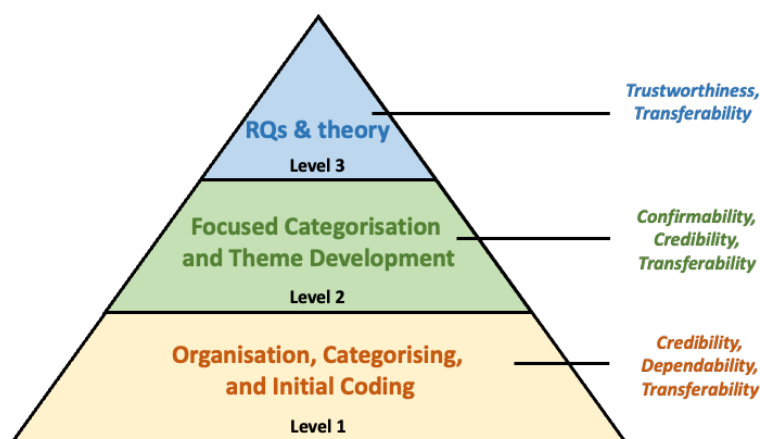

Figure 2. Trustworthiness of Three Levels of Inductive Analysis

As can be seen in Figure, 2, the trustworthiness of inductive analysis is addressed across three levels. In level 1 stage, the authors mainly focused on maintaining credibility, dependability, and transferability during the data analysis process. Credibility, equivalent to internal validity, is crucial for assessing the quality and integrity of a qualitative inquiry, ensuring the research findings accurately represent the participants' experiences and perspectives (Lincoln & Guba, 1985). The authors established credibility through a rigorous process. To achieve this, we employed well-established strategies, including prolonged engagement (Spencer et al., 2014), triangulation (Denzin & Lincoln, 2017), and member checking (Birt et al., 2016). These approaches allowed for an iterative exploration of the data, ensuring that emerging patterns and themes were grounded in the participants' narratives and accurately reflected their lived experiences.

Dependability, which ensures the consistency and transparency of the inductive analytical process, was enhanced by maintaining a detailed audit trail of all coding and theme development decisions (Nowell et al., 2017). This documentation included the progression from initial open coding to the refinement of themes, providing a clear account of how interpretations evolved directly from the data. Peer debriefing (Lincoln et al., 2018) further supported dependability, allowing for external scrutiny of the analysis and mitigating potential researcher bias during the iterative coding process.

Transferability, reflecting the applicability of findings beyond the immediate study context, was achieved by producing rich, thick descriptions of the research setting, participants, and analytical process (Geertz, 1973; Merriam & Tisdell, 2015). These descriptions enabled readers to judge the relevance of the inductively derived themes to other contexts. Additionally, purposive sampling (Patton, 2002) facilitated the inclusion of diverse participant perspectives, ensuring that the inductive analysis captured the complexity of the phenomena under investigation.

By systematically applying these strategies throughout the inductive analytical process, we reinforced the trustworthiness of the study and demonstrated the robustness of qualitative methodologies in generating meaningful

and credible insights. Level 2 stage analysis is critical for generating more concise and manageable themes and sub-themes from comparing and clustering the patterns from the codes (Saldaña, 2015); thus confirmability, credibility and transferability were the three aspects that were addressed by the two authors. Particularly, credibility was maintained by maintaining a clear, detailed audit trail of all decisions made during the research process, which aligns with the literature (see, e.g., Bryman, 2016; Cohen et al., 2017). This documentation includes records of how data were initially coded (Level One analysis), and how these codes were combined into themes (Level Two analysis), with details about the contexts and how these themes were interpreted. This process ensures that our findings were firmly grounded in the data, rather than being influenced by our subjective bias or predispositions.

Consistent with the approach used in Level 1, the authors employed member checking and external scrutiny during the Level 2 analysis to ensure the credibility of the findings. This approach closely aligns with established literature (see, e.g., Creswell & Creswell, 2018; Lincoln & Guba, 1985), where these two strategies are often cited as key approaches to verify the accuracy and resonance of the identified themes with their experiences. Yet, it should be noted that given the clear procedure from Level One to Level Two analysis, particularly the organised way of showing from which data the codes emerged and then the themes, Bingqing believed it was "so much easier to do the auditing with supervisors".

The emphasis on detailed contextual awareness that both authors reported in Level 2 analysis aligns with the concept of external validity in thematic analysis, as described by methodologists like Shenton (2004), who argue that such depth and precision in depicting research contexts significantly contribute to the transferability of findings. Similarly, Creswell (2007) also asserts that understanding and documenting the conditions and interactions within the study setting enhances the transferability, making the conclusions more applicable and relevant to other contexts. However, what has not been thoroughly discussed in the literature is the potential of enhancing transferability through a structured, context-based approach in inductive analysis. Based on the experiences of the two authors, this three-level approach appears promising in achieving this goal.

The last stage of the third capstone analysis reflects the culmination of trustworthiness process, ensuring that the findings are "worth paying attention to, worth taking account of" (Lincoln & Guba, 1985, p. 290), as embedded in the theory generation process. This overarching notion integrates the four key components of trustworthiness. - credibility, transferability, dependability, and confirmability – into a cohesive framework.

Through a systematic and iterative approach to addressing each of these elements throughout the analysis, we have enhanced the integrity and reliability of our findings. This rigorous process contributes to a solid foundation for qualitative inquiry, ensuring that the findings not only reflect the participants' lived experiences but also align with established criteria for trustworthiness in qualitative research (Lincoln & Guba, 1985; Shenton, 2004).

Conclusion

The journey of a PhD student in education can be intellectually stimulating yet daunting. One of the most significant challenges encountered by these aspiring researchers often lies in grasping the intricacies of research methodologies and methods (Creswell & Creswell, 2018). This paper has demonstrated how, through a three-level inductive analysis, the two authors meticulously ensured various aspects of trustworthiness in their research. At each level of analysis—from initial data coding, through the organisation and categorisation of codes, to the final thematic synthesis—the researchers applied rigorous methods to enhance the credibility, transferability, dependability, and confirmability of their findings. These structured levels allowed for a comprehensive examination and validation of the data, ensuring that the themes developed were robustly supported by the evidence and resonated accurately with the original contexts. Some of these would not have been achieved through a traditional (and perhaps easier/safer) deductive approach because a deductive approach would have constrained the researchers to pre-existing theoretical frameworks, potentially limiting the emergence of unexpected findings and rich insights. The inductive approach allowed for the exploration of the data without preconceived notions, leading to a more authentic and grounded understanding of the phenomenon under investigation.

Recommendations

The findings of this study suggest that for PhD students to effectively guarantee the trustworthiness of qualitative research, particularly in inductive data analysis, it is essential to engage with the four components of trustworthiness. Additionally, students may benefit from the three-level analysis procedure outlined in the previous section. We recommend integrating this framework into PhD training sessions, such as courses and workshops, to provide students with practical strategies for navigating the complexities and nuances of applying trustworthiness strategies. This integration is especially crucial in a research landscape that predominantly favours deductive approaches. To cultivate a confident new generation of educational researchers, PhD programs need to implement comprehensive training strategies that explicitly support inductive reasoning and qualitative inquiry.

A cornerstone of this strategy should be a robust curriculum that offers a broad range of courses in research design, statistics, and data analysis (Mertens, 2014). By enrolling in courses on research design, students gain valuable knowledge on formulating research questions, selecting appropriate research methods, and developing a sound

research plan (Preissle, 2006). Statistical training equips them with the skills to analyse quantitative data effectively, allowing them to draw meaningful conclusions from their research. Additionally, data analysis courses provide practical guidance on utilising various analytical tools and software to interpret qualitative and quantitative data sets (Flick, 2014).

Furthermore, supplementing these core courses with workshops and seminars focused on specific research methods can be immensely beneficial. These targeted sessions can delve deeper into qualitative research methods such as interviews, focus groups, and ethnography (Creswell & Creswell, 2018), or quantitative methods like surveys and experiments (Trochim & Donnelly, 2006). This hands-on approach allows students to not only gain a theoretical understanding of these methods but also practice applying them in simulated research scenarios, fostering practical research skills. Unlike deductive approaches, which start with a pre-existing theory, these workshops can emphasise the inductive process of deriving theories from data, a skill crucial for researchers seeking to uncover new insights and develop innovative research questions.

Complementing this classroom learning, mentorship provided by experienced researchers can be invaluable for new PhD students (Chakma et al., 2021). Mentors can particularly support PhD students in embracing an inductive approach to research. By encouraging students to explore their data without preconceived notions, mentors can help them discover emergent themes and develop grounded theories. They can also guide students in refining their inductive analysis techniques, such as through iterative coding and thematic development (Thomas, 2006). This mentorship can empower students to become confident and skilled inductive researchers, capable of making original contributions to their fields. Future research could explore how different mentoring approaches impact students' development of inductive research skills across disciplines. Additionally, examining the role of digital mentoring platforms in fostering qualitative research expertise would provide valuable insights into evolving mentorship practices.

Limitations

We acknowledge that this study has its limitations in a sense that it comes from two authors' own experiences and the strategies and inductive approach we employed may not be universally applicable considering the differences of the research context. Also, we did not intend to argue that the three-levels of analysis is flawless for researchers. We acknowledge the time-consuming nature of the process, particularly considering that it requires thorough and repeated reading of the data to identify emerging themes and detailed and systematic organisation of the data, which can be labour-intensive and demanding. This could be particularly true for PhD students, because they have tight timelines, and often are involved in other teaching, research responsibilities (Braun & Clarke, 2012). Additionally, managing large volumes of qualitative data can be overwhelming for novice researchers. The iterative process of coding and re-coding data requires significant skill and organisation, which can be daunting for those new to qualitative research (Saldaña, 2015).

Generative AI Statement

No generative AI tools (such as ChatGPT or similar language models) were used in the writing, data analysis, or interpretation of this manuscript. All content reflects the authors' original work, insights, and academic judgement.

Authorship Contribution Statement

Chakma: Conceptualization, design, analysis, writing, editing/reviewing, supervision. Li: Conceptualization, design, analysis, writing, editing/reviewing.

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