Analyzing Cooperative Learning Thematically: An Exploratory Case Study With a Composite Qualitative Model

Zhidong Zhang[1] & Liza Romos[1]

[1] The College of Education and P-16 Integration, The University of Texas-Rio Grande Valley, Texas, USA

Correspondence: Zhidong Zhang, The College of Education and P-16 Integration, The University of Texas-Rio Grande Valley, Texas, USA. E-mail: zhidong.zhang@utrgv.edu

Abstract

This study explores how educators implement Cooperative Learning (CL) in their teaching methods through an exploratory case study using Saldana's model (2016) as the initial coding framework. Thematic coding, guided by Segev's semantic analysis techniques (2022), uncovered diverse perspectives among participants, highlighting various themes supporting CL models. Nevertheless, a consistent theme that emerged was the central concept of CL within the semantic analysis graph. The amalgamation of semantic analysis and thematic coding combined open and theoretical coding for a comprehensive understanding of the data. Furthermore, the incorporation of semantic discourse evidence strengthened the analysis, resulting in a theoretical representation of CL.

Keywords: cooperative learning, semantic analysis, thematic analysis, exploratory case study

1. Introduction

Cooperative learning (CL) stands as an encompassing framework, bestowing educators with the tools to enrich the landscape of education, especially within the realm of science instruction. Within this educational domain, educators relentlessly endeavor to refine the learning experience, teaching methodologies, students' progress, the acquisition of knowledge, and honing problem-solving abilities. Notably, hands-on activities emerge as a cornerstone in facilitating students' profound grasp of scientific principles.

To illuminate the depth of this topic, a comprehensive study was conducted, harnessing data from a group of science educators hailing from a South Texas school district. The study's primary aim was to delve into their perspectives and insights regarding science pedagogy and the art of learning. The findings resoundingly underscore the pivotal role of integrating Cooperative Learning into the field of science education. As outlined by Ramos in the year 2023, science educators face formidable challenges when they endeavor to overhaul their pedagogical strategies. Conventional methods fall short in significantly bolstering the educational outcomes of elementary students. Consequently, alternative pedagogical paradigms like cooperative learning have become indispensable in the dynamic landscape of modern education.

The successful implementation of cooperative learning strategies in elementary education is undoubtedly beneficial, but it's not without its share of challenges. One of the significant hindrances faced by teachers is the lack of resources required to support group work activities effectively. Without access to essential materials and tools, teachers find it difficult to harness the full potential of cooperative learning, which can hinder the educational experience for students.

To address this issue, educators have to be resourceful and proactive in overcoming these challenges. One strategy involves seeking support from local businesses, which can provide donations or sponsorships for classroom materials. Teachers can also invest their own time and resources in acquiring the necessary materials to facilitate cooperative learning. In doing so, they not only enrich the learning experience for their students but also showcase their dedication to fostering a collaborative and engaging educational environment.

In short, while the promise of cooperative learning in elementary education is substantial, the lack of available resources often poses a significant obstacle. However, educators exhibit great resilience in their efforts to surmount these challenges, employing innovative solutions to ensure the successful implementation of cooperative learning strategies that benefit both teachers and students alike. Through determination and resourcefulness, they continue to unlock the full potential of cooperative learning.

2. Perspectives

Numerous scholars have offered invaluable insights into the significance of cooperative learning. One such notable academic, Smith (1979), emphasized the pivotal role of cooperative skills in achieving long-term academic success. According to Smith, students who dedicate time to acquire cooperative skills and demonstrate a commitment to overcoming challenges while working collaboratively are the ones who ultimately excel (p. 25). Furthermore, Smith highlighted that the ability of all students to collaborate with others lays the foundation for establishing and nurturing stable families, attaining success in their careers, actively participating in communities, upholding essential values and beliefs, cultivating friendships, and making substantial contributions to society. Smith's argument underscores the idea that knowledge and skills bear little value if students cannot effectively apply them through cooperative interactions with others. These insights not only highlight the academic advantages but also underscore the broader societal and personal benefits of cooperative learning (Smith, 1979).

To attain technical knowledge and skills in a practical context, the integration of cooperative learning into various academic activities is not just advisable but essential (Smith, 1979). Involving students in collaborative endeavors with their peers not only promotes a profound comprehension of the subject matter but also nurtures crucial interpersonal aptitudes. Cooperative learning equips students to proficiently navigate the intricacies of working together, preparing them for real-world situations, a perspective advocated by Smith (1979).

In line with this viewpoint, Yoruk (2016) conducted a study that underscored the favorable impact of cooperative learning on students. The research demonstrated that the incorporation of cooperative learning methodologies heightened students' awareness of their learning environment and courses, augmented their self-efficacy and self-confidence, and facilitated their social integration. This, in turn, molded them into analytical thinkers within their community. Consequently, cooperative learning not only fosters academic growth but also equips students with the necessary skills to thrive in both social and intellectual settings.

Moreover, the significance of cooperative learning reaches beyond the classroom walls, extending to broader societal implications. As students develop into analytical thinkers, they are better prepared to address real-world challenges and contribute positively to the larger community. Thus, the incorporation of cooperative learning methods into education is paramount for holistic student development (Smith, 1979; Yoruk, 2016).

Prominent figures, Piaget and Vygotsky, have made substantial contributions to the field of cooperative learning, as pointed out by Dat-Tran in 2013 and 2014. Both of these scholars recognized the pivotal role of social interactions in the context of cooperative learning activities, and their insights have significantly shaped our understanding of this pedagogical approach.

Jean Piaget's developmental theory places great emphasis on the active involvement and participation of learners in the learning and thinking process. According to Piaget, students construct and reconstruct knowledge through their own agency. This concept underscores the idea that learners are not passive recipients of information but rather active agents in their cognitive development. Piaget's work has illuminated the dynamic nature of cooperative learning, where students engage with their peers, collaboratively constructing their understanding of the subject matter. Such interactions stimulate critical thinking and problem-solving skills, fostering academic growth.

Lev Vygotsky's perspective, as highlighted by Dat-Tran, is another pillar of cooperative learning theory. He introduced the Zone of Proximal Development (ZPD), which refers to the range of tasks that learners can perform with the help of a more knowledgeable peer or teacher. Vygotsky stressed the significance of cooperative activities within the ZPD, which not only leads to active learning but also surpasses the effectiveness of individual work. This is a crucial point for educators, as it implies that students can achieve higher levels of competence when they work together, with one another's guidance, compared to working in isolation.

Albert Bandura's social learning theory, discussed by Dat-Tran in 2013, provides an additional dimension to cooperative learning. Bandura's theory centers on observational learning and the reciprocal influence of individuals within their social environment. According to Bandura, learning occurs through observing and imitating the behaviors of others, leading to the retention of acquired skills. Schunk, as cited in Dat-Tran's work, further supports Bandura's theory by demonstrating that learners can enhance their knowledge and retention by observing and modeling desired behaviors, attitudes, and reactions exhibited by others. This insight is especially important in the context of cooperative learning, where students are exposed to a diverse range of peers, each with their unique strengths and abilities, offering a rich environment for observational learning.

In summary, these influential scholars, including Piaget, Vygotsky, and Bandura, have significantly contributed to our comprehensive understanding of cooperative learning in education. They underscore the importance of

social interactions, cognitive development, and observational learning in fostering academic growth. By acknowledging the dynamic nature of learning and the power of collaborative efforts, educators can leverage these insights to equip students with the necessary skills to succeed in various domains of life.

3. Modes of Inquiry

Inquiry is a fundamental process, a core facet in the quest for knowledge and understanding, accomplished through the art of questioning. It is a guiding light in the realm of educational studies, a potent tool that empowers researchers to dissect research problems, challenge existing notions, and unearth novel insights. Inquiry is intricately interwoven with research questions and data collection methodologies, forming the bedrock of academic exploration.

To hone in on the research problem, the authors posit a set of crucial research questions. In this study, the focal point revolves around unraveling the intricate relationship between cooperative learning and teachers' instructional beliefs in the field of education. The research questions that steer this scholarly expedition are enumerated below:

What are the various perspectives held by teachers concerning cooperative learning theories and practices?

How do these perspectives wield their influence over the teaching and learning processes, thereby shaping the educational landscape?

Delving into these research inquiries, the study aspires to offer profound insights into the dynamic interplay between pedagogical strategies, instructional beliefs, and their consequential impact on teaching practices. The significance of this research lies in its potential to enrich the educational sphere with empirical evidence and a deeper understanding of the forces at play.

In pursuit of maintaining the research's validity and consistency, the author has chosen to employ the interview mode as the primary method of data collection (Zhang & Garcia, 2023). This approach provides the space and depth necessary for a comprehensive exploration of the participants' perspectives, allowing for an in-depth immersion in their experiences, thoughts, and insights. It is a method that seeks to draw forth the richness of human experiences and lay bare the intricacies of the educational landscape, contributing valuable data to the broader realm of knowledge. In adopting this approach, the study not only embraces the spirit of inquiry but also solidifies its commitment to robust research.

4. Research Methods

This study employed a mixed qualitative research approach that seamlessly combined exploratory case studies and semantic analysis methods (Alazwari, 2022; Otte, 2006; Rossman & Marshall, 2016; Zhang, 2022a; Zhang, 2022b; Zhang & Ramos, 2023). By integrating these two methodological approaches, the researchers aimed to achieve a comprehensive and multifaceted understanding of the research topic. The incorporation of exploratory case studies facilitated an in-depth exploration of specific instances (Hunter, McCallum & Howes, 2019), while the utilization of semantic analysis methods enabled the researchers to delve into the underlying meanings and patterns present within the collected data (Ranse, Yates, & Coyer, 2012; Yin, 1984).

This mixed-method approach offered a robust foundation for a detailed and nuanced exploration of the research phenomenon. Exploratory case studies allowed for the examination of the unique attributes and intricacies of individual cases, offering valuable insights into specific scenarios and their contextual significance. Simultaneously, semantic analysis methods provided a means to uncover broader themes and implications, going beyond the surface to discern the deeper layers of meaning inherent in the data. This comprehensive approach ensured that the research encompassed both the distinct qualities of individual cases and the overarching semantic themes and implications, resulting in a rich and multifaceted examination of the subject matter.

In a nutshell, the researchers successfully merged exploratory case studies and semantic analysis methods, harnessing the strengths of each to create a research design that effectively explored the specific and general aspects of the research phenomenon. This methodological fusion enabled a holistic understanding of the topic and ensured that the study provided a nuanced and thorough examination of the subject matter.

5. Opening Coding and Thematic Coding

The open coding method represents a pragmatic and invaluable approach employed during qualitative data analysis. Its primary purpose is to effectively categorize and derive meaningful insights from the wealth of information and experiences gathered. Through the process of open coding, data is meticulously deconstructed into discrete and meaningful units, each described with precise and specific terminology. This meticulous

categorization creates a streamlined and organized sequence of keywords, which serves as a foundation for in-depth analysis (Saldana. 2016).

In the context of our current case study, the application of open coding proved instrumental in illuminating the responses of participants obtained during interviews. By assigning coded words or phrases to segments of the data, the researcher was empowered to systematically scrutinize and evaluate the findings. This method not only facilitates a structured examination of the collected information but also helps in drawing out nuanced insights and connections that might otherwise remain concealed.

Thematic analysis, on the other hand, is a qualitative data analysis method commonly employed in research studies to unearth the inherent themes and patterns within a dataset. This technique goes beyond mere data categorization; it involves the comprehensive organization and interpretation of data to unveil the underlying structures or constructs that contribute to the development of advanced themes or theoretical frameworks. In the process of thematic analysis, the researcher's subjective experience plays a pivotal role in extracting meaning from the data, making it a highly engaging and insightful approach.

Context, in the realm of qualitative research, pertains to the circumstances that envelop an event or statement, ultimately providing a crucial framework for a deeper comprehension of the text's significance. In studies that are descriptive and exploratory in nature, data is often collected through interviews, which capture the natural language and the contextual factors that influence individuals or groups. This method is particularly useful in gaining a comprehensive understanding of real-world issues, such as cooperative learning in science pedagogy.

As such, in thematic analysis, the consideration of context becomes indispensable for analyzing experiences, practices, and perceptions. It allows researchers to not only identify themes and patterns within the data but also to elucidate how these elements are influenced and shaped by the context in which they occur. This holistic approach ensures that the analysis is not only comprehensive but also deeply rooted in the real-life situations and experiences of the participants, contributing to a richer and more nuanced understanding of the research subject.

6. Results

Thematic analysis showcased cooperative learning's key themes using three interview cases as illustrative examples.

6.1 Case One

Illustrated in Figure 1, Cooperative Learning, as an educational concept and theory, comes to play a pivotal role in this case. This observation is particularly noteworthy and will be done through an analysis of the details of the multiple elements in the network. It underscores the interconnection between Cooperative Learning and Professional Development. The alignment between Cooperative Learning and teachers' pedagogical practices suggests that investing in this approach can augment instructional quality.

There are three nodes in the network which are connected to each other and are highlighted as the central concepts. For Cooperative Learning, there are six directedly connected notes: Professional Development, Cooperative Learning, Students, Students Get Ideas, Materials from the Staffs, and Science Lab. For the Professional Development, there are three notes being connected to Professional Development, "Research I Have Done," and Teaching Concepts. The Professional Development provides the chance for the interviewee to do Collaborative Learning of Reading; enrich Teaching Concepts further supports Professional Development; and the interviewee also attributed the "Research I Have Done" to Professional Development.

For Cooperative Learning Strategies, there are eight notes related to it: Students, Learning, Comfortable, "The Student Learned by Speaking to Each Other," In Science, and Time Consuming. The student felt very comfortable with Cooperative Learning Strategies, which also guided the node, "The Student Learned by Speaking to Each Other," which further motivated students the express their thoughts. In addition, Cooperative Learning Strategies are also applied to Science and in Classrooms. However, the only negative comment was that it was Time Consuming. In brief, Cooperative Learning (Theories), Cooperative Learning Strategies, and Professional Development were represented as the elements in the central camp of Case One discourse resources.
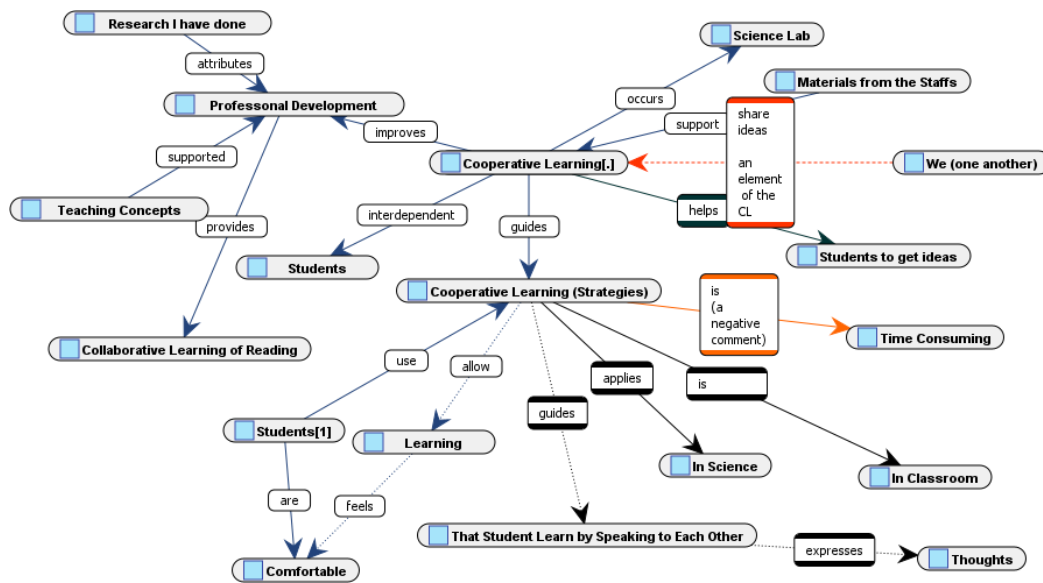
Figure 1. A Summary of the Thematic Graphs for Case One

6.2 Case Two

As shown in Figure 2, Cooperative Learning takes center stage as a pivotal concept, boasting strong associations with several other critical educational concepts.

As a first level of the central concept in Case Two, it directly connected to the nodes of Science, Science Learning, Hands-On Science Learning, and Student-Centered Learning. The network of Case Two represented an enriched and complex graph. Science as the second level central concept of Cooperative Learning, it is associated with Course Content, Student Life, Experience, Training and Strategies, where the latter two concepts were are directly related to Cooperative Learning Strategies.

Science learning, as the second-level central concept of Cooperative Learning, is associated with materials, the need for sufficient hours, and hands-on science learning.

Hands-On Science Learning, as the second-level central concept of Cooperative Learning, it connects to Science and A Great Tool, which suggests that the Hands-On Learning is a good strategy for students to science taking Hands-On as a learning tool.

Student-Centered Learning, as the second-level central concept of Cooperative Learning, is associated with students. Furthermore, the concept of students connects with the lower-grade concepts, such as within a group, learning groups, experience and knowledge, other students' input, and social skills.

In a nutshell, Cooperative Learning (Theory) is strongly associated with four important concepts: Science, Science Learning, Hands-On Science Learning, and Student-Centered Learning. The network of Case Two provides a potential network of Cooperative Learning. There is still room for the researcher to explore the further relationships among these concepts at different levels (Zhang & Guanzon, 2023; Zhang & Ramos, 2023).
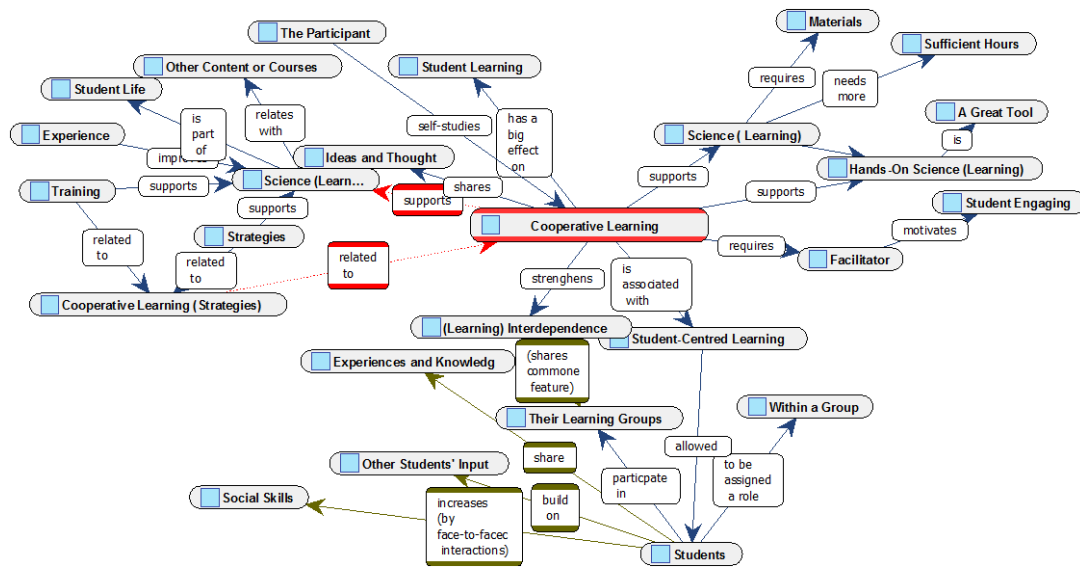
Figure 2. A Summary of the Thematic Graphs for Case Two

6.3 Case Three

As illustrated in Figure 3, Cooperative Learning takes center stage as a pivotal concept, boasting strong associations with several other critical educational concepts.

As a first level of the central concept in Case Three, Cooperative Learning is highlighted in the thematic network. Cooperative Learning is connected to as many as six concepts directly without considering them as the second central concepts. These concepts are To Group Learners, Being Challenged Students, Learning Concepts, Students Making Efforts, Student Learning Successful, Science, and Interaction and Discussion. Furthermore, there are two second-level centered concepts: Science Teaching and Science Learning.

There are three connectors to Science Teaching: Science Learning Resources, Teaching Experience, and Learning Strategies. For Science Learning, there are a group of connectors: Planning Activities, Science Lab Teachers, Supplies and Effective Activities. All of these concepts can be further analyzed with details.

In brief. Cooperative Learning, Student-Centered Learning, Science and Science Learning as central concepts were highlighted in Case Three.
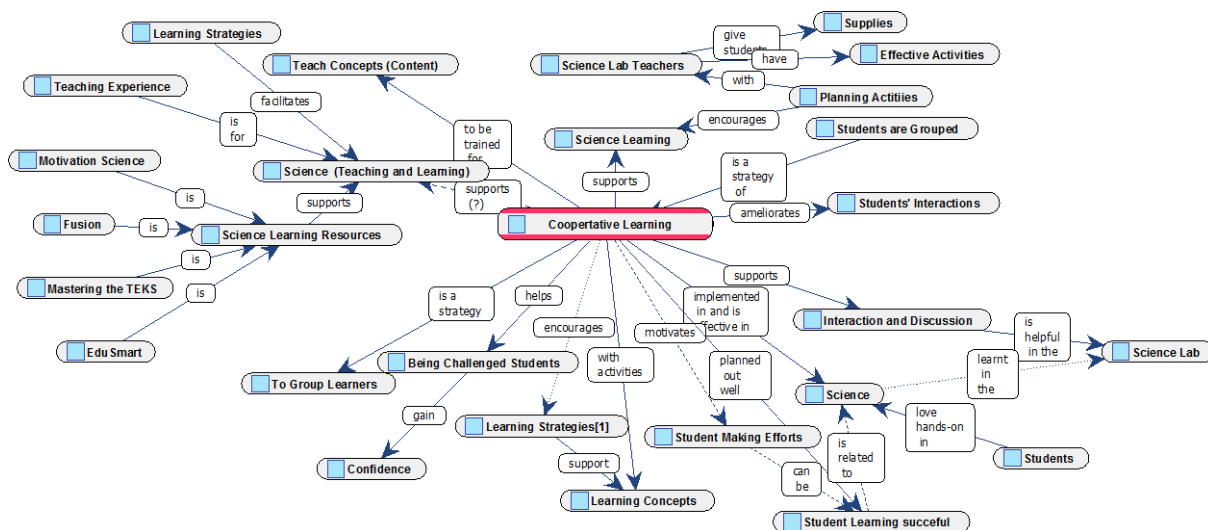

Figure 3. A Summary of the Thematic Graphs for Case Three

7. Discussion

An analysis of considerable depth and breadth yielded outcomes, the creation of a specialized thematic network graph exclusively tailored for three cases. The graphical representations stand as a testament to the complexity and richness of the cases, unveiling an intricate network of themes and connections that are unique to the given specific contexts.

We can see that the thematic distributions are subtle differences among these three cases even though we see that basically, Cooperative Learning is a central theme across these cases.

In Case One Cooperative Learning Strategies and Professional Development were highlighted except Cooperative Learning. In Case Two, Science Learning, Hands-On Science Learning, and Student-Centered Learning that were emphasized. In Case Three, Student-Centered Learning, Science and Science Learning are three concepts were highlighted except for Cooperative Learning.

The thematic network graph, meticulously crafted and designed, serves as a powerful tool to unlock the nuances and intricacies of the cases. Its unique features enable a comprehensive exploration of the specific characteristics and findings tied to three cases, opening up new vistas for data interpretation and analysis. By offering a visually enriched perspective, it adds a layer of clarity and depth that enhances the understanding of discourse data.

This dedicated thematic network graph isn't merely a visual representation; it is a dynamic key to unlocking the wealth of information embedded in three cases. Through its tailored design, it acts as a lens that magnifies and dissects the multifaceted elements at play within the cases. It reveals not just the surface-level insights but also delves deeper into the interconnected themes, relationships, and patterns that might have otherwise remained concealed. Some of these are waiting for further analysis from different angles and at different details levels embedded back in the context of the dialogue and discourse.

For researchers and stakeholders, this specialized graph provides invaluable perspectives and real the internal relationship about the semantic representation of these central concepts related to Cooperative Learning. It paves the way for a more granular and insightful examination of the cases. Statedly differently, it enables a deeper level of engagement with the data. Researchers can explore the complex network of themes and their interactions, shedding light on previously hidden dimensions of the subject matter. This, in turn, equips them to draw meaningful and data-driven insights that might inform future decisions or research directions.

Furthermore, the thematic network graph tailored for three cases is a bridge between data and interpretation. It not only organizes information but also offers a visual narrative, allowing researchers and stakeholders to grasp the story within the data. This capacity for storytelling is a potent tool for conveying the intricacies of the cases to diverse audiences, making it an essential asset for disseminating findings and insights effectively.

In sum, the creation of these specialized thematic network graphs for three cases marks a pivotal achievement in the analysis. It offers a gateway to a deeper and more nuanced understanding of the cases, facilitating the uncovering of hidden patterns and relationships of Cooperative Learning Data in Education. The researchers have found an alternative path to discover meaningful insights, enabling informed decisions, and serving as a powerful instrument for effective data communication.

8. Scholarly Significance of the Study

The extensive and meticulous analysis undertaken in this study has yielded a result of immense significance—a specialized thematic network graph, carefully crafted and exclusively tailored for case three. This graphical representation stands as a testament to the depth and complexity of the case, unraveling an intricate web of themes and connections that are inherently unique to this particular context. Such a graphical depiction becomes not just a tool but a visual narrative, unveiling layers of information that might otherwise remain concealed.

The thematic network graph, borne out of painstaking design and precision, assumes the role of a potent instrument for unlocking the subtle nuances and intricacies inherent to case three. Its distinctive attributes empower an exhaustive exploration of the specific characteristics and findings associated with this case, breathing life into the data and propelling it into the realm of meaningful interpretation and analysis. Its capacity to present information in a visually enriched manner provides an additional layer of clarity and depth, facilitating a more profound understanding of the subject matter at hand.

For the research community and stakeholders involved in case three, this specialized graph emerges as an invaluable asset. It paves the way for a granular and insightful examination of the case, enabling a more profound level of engagement with the data. Researchers are granted the opportunity to navigate through the intricate web of themes and their intricate interactions, shedding light on previously concealed dimensions of the

subject matter. This enhanced insight equips them to draw meaningful and data-driven conclusions, offering a solid foundation upon which to base future decisions or research directions.

Moreover, the thematic network graph designed explicitly for case three serves as a bridge between raw data and comprehensive interpretation. It does not merely arrange information; rather, it weaves a visual narrative that allows stakeholders to immerse themselves in the story embedded within the data. This storytelling capacity is a potent tool for conveying the intricacies of the case to diverse audiences, ensuring that the findings are communicated effectively and their implications are understood by those who rely on them.

In summary, the creation of these thematic network graphs for three cases marks a pivotal milestone in the analysis. It serves as a gateway to a deeper and more nuanced understanding of these cases, providing the means to uncover hidden patterns and relationships. This analytical method serves as a powerful instrument for effective data communication

9. Limitations

In this composite-mode case study, the researchers encountered data limitations. Despite the study's qualitative research approach, which predominantly focused on text-based or discourse data, the researchers sought to extract results and conduct analyses with a more substantial dataset.

References

Alazwari, A. (2022). A descriptive exploratory case study of University of Central Riyadh collaboration with public schools in preparing teachers. *Doctoral dissertation*, USF Tampa Graduate. USF Tampa Theses and Dissertations Archive. Retrieved from https://digitalcommons.usf.edu/etd/9282

Dat-Tran, V. (2013). Theoretical perspectives underlying the application of cooperative learning in classrooms. *International Journal of Higher Education, 2*(4), 101-115. https://doi.org/10.5430/ijhe.v2n4p101

Dat-Tran, V. (2014). The effects of cooperative learning on the academic achievement and knowledge retention. *International Journal of Higher Education, 3*(2), 131-140. https://doi.org/10.5430/ijhe.v3n2p131

Hunter, D., McCallum, J., & Howes, D. (2019). Defining exploratory-descriptive qualitative (EDQ) research and considering its application to healthcare. *Journal of Nursing and Health Care, 4*(1), 1-7.

Otte, J. L. (2006). Real language for real people: A descriptive and exploratory case study of the outcomes of aural authentic texts on the listening comprehension of adult English-as-a-second language students enrolled in an advanced ESL listening course (Publication No. 3212979). *Doctoral dissertation*, Loyola University Chicago. Retrieved from https://www.proquest.com/openview/57ab26d31f608153530b2616ffee1ec2/1?pq-origsite=gscholar&cbl=18750&diss=y

Ramos, L. (2023). Fifth grade teachers use of cooperative learning in science. *Unpublished doctoral dissertation,* University of Texas—Rio Grande Valley.

Ranse, K., Yates, P., & Coyer, F. (2012). End-of-life care in the intensive care setting: A descriptive exploratory qualitative study of nurses' beliefs and practices, *Australian Critical Care, 25*(1), 4-12. https://doi.org/10.1016/j.aucc.2011.04.004

Rossman, G. B., & Marshall, C. (2016). *Designing qualitative research.* Sage.

Saldana, J. (2016). *The coding manual for qualitative researcher.* London, UK: Sage.

Segev, E. (2022). *Semantic network analysis in social sciences.* Routledge. https://doi.org/10.4324/9781003120100

Smith, K. (1979). Learning together and alone: Cooperation, competition, and individualization. *NACTA Journal*, 23-26.

Yin, R. K. (1984). *Case Study Research: Design and Methods.* Beverly Hills, Calif: Sage Publications.

Yoruk, A. (2016). Students' ideas on cooperative learning method. *Universal Journal of Educational Research*, *4*(5), 1231-1235. https://doi.org/10.13189/ujer.2016.040537

Zhang, Z. (2022a). A mixed methods design for assessing physics learning in the online learning environment. *Journal of Education and Development*, *6*(2), 1-8. https://doi.org/10.20849/jed.v6i2.1142

Zhang, Z. (2022b). Diagnostically cognitive assessment of complex semantic explanations and learning: A Bayesian network approach. *Journal of Education and Development*, *6*(4), 1-14. https://doi.org/10.20849/jed.v6i4.1255

Zhang, Z., & Garcia, L. (2023). Examining dimensionality and validity of the academic integrity survey instrument. *Journal of Education and Development, 7*(1), 46-51. https://doi.org/10.20849/jed.v7i1.1326

Zhang, Z., & Guanzon, A. (2022). A mixed assessment for the science learning via a Bayesian network Representation. *Journal of Education and Development, 6*(5), 1-7. https://doi.org/10.20849/jed.v6i5.1309

Zhang, Z., & Ramos, L. (2023). The exploratory sequential design with generalized linear models for the learning strategy analysis. *Journal of Education and Development, 7*(2), 12-18. https://doi.org/10.20849/jed.v7i2.1341