

The Influence of Family Dynamics and Environment on Academic Performance and Understanding of Trigonometry

Ernet Guillermo Maestre Orozco, Gilberto José Cujia Romero, Lucy Yasmin
Gómez Vergel, Evelio Martínez Ariza, Dayan Andrés Acosta Sarmiento

Universidad Popular del Cesar (UPC), Valledupar-Colombia.
Email: ernetmaestre@unicesar.edu.co

Abstract

This article is the result of a research that was carried out to obtain the degree of Master's Degree in Education in the postgraduate program of the Faculty of Education of the Popular University of Cesar and monographic work of the degrees in Mathematics and Computer Science and Mathematics and Physics of the same university. The main objective of this study was to analyze the influence of the family environment on the learning and academic performance of students in tenth grade trigonometry from a public educational institution in the city of Valledupar. Applying a mixed method, the research employed a simultaneous integrated design, where quantitative and qualitative data were collected and analyzed at the same time. This approach allowed for a complete and nuanced understanding of the research questions, providing a holistic view by exploring family dynamics and environment and how these impact performance and understanding of trigonometry. As for the implications for educational practice, it is evident that there is a need to implement strategies that involve families in the teaching-learning process of trigonometry, since the data collected revealed a clear correlation between the level of parental participation in education and students' understanding of trigonometric concepts. In addition, the study found that a positive and supportive family environment contributed significantly to higher academic achievement in trigonometry.

Keywords: Learning trigonometry, education, mathematics teaching, family environment, family dynamics.

1. Introduction

The influence of family dynamics and environment on academic performance and understanding of trigonometry is a critical area of research, given the potential impact on educational outcomes. In examining this influence, we seek to contribute to the existing body of knowledge in educational psychology and pedagogy, with a particular focus on the field of mathematics education.

The objectives of the research are multifaceted, encompassing the exploration of the various family factors that can affect students' academic performance and their competence in trigonometry. In addition, the study aims to discern the specific ways in which these factors interact, as well as to identify potential implications for educational practice. To meet these objectives, a comprehensive methodology has been devised, which involves the collection and analysis of both quantitative and qualitative data. This will ensure a solid and comprehensive investigation, capable of providing nuanced insights into the complex dynamics at play.

1.1. Context and justification of the research

The research work entitled "The influence of family dynamics and environment on the performance and understanding of trigonometry in the tenth grade" is of vital importance due to the relevance of both trigonometry and the family environment in the learning process of students. Trigonometry is a fundamental branch of mathematics that is applied in various fields, such as physics, engineering, and architecture. In addition, the tenth grade is a crucial time in education, as it lays the foundation for higher education.

First, it is important to investigate the influence of family dynamics on trigonometry performance and understanding, since the family is the first environment in which students develop and acquire basic skills. The bonding, communication, and support provided at home can have a significant impact on students' academic performance. Therefore, understanding how family dynamics affect how students approach and understand trigonometry will allow us to identify potential factors that influence their success or difficulties in this area.

On the other hand, the family environment is a determining factor in the development of mathematical skills. Students who have a stimulating family environment, where interest in mathematics is encouraged and learning support is provided, tend to perform better in this area. Conversely, those students who do not have a supportive family environment may face difficulties in understanding and applying trigonometry concepts. Investigating how the family environment influences the performance and understanding of trigonometry in the tenth grade will identify possible gaps or inequalities in access to quality mathematics education.

In addition, this research work can provide valuable information for the design of mediation and educational support strategies aimed at improving the performance and understanding of trigonometry in the tenth grade. If common patterns or characteristics are identified in those students who have a good performance in trigonometry and a favorable family environment, support programs could be implemented that promote these conditions in those students who face difficulties. Likewise, specific educational resources and teaching strategies could be developed that take into account the influence of the family environment on the learning of trigonometry.

In conclusion, the research work on the influence of family dynamics and environment on the performance and understanding of trigonometry in the tenth grade is important because it allows us to understand how external factors, such as family, can influence the academic success of students in this area. Trigonometry is a fundamental discipline in the school curriculum and understanding how the family environment can affect its learning will contribute to developing much more efficient strategies for improvement and educational support. In addition, this

research can help identify potential inequalities in access to quality mathematics education and promote equity in trigonometry learning.

1.2. Research objectives

The main purpose of this research is to analyze the influence of the family environment on the learning and academic performance of students in tenth grade trigonometry at the Villa Corelca Educational Institution in Valledupar. In particular, we aim to examine how family interactions, support, and communication patterns impact motivation, learning experiences, and overall achievement in trigonometry. By identifying the specific factors within the home environment that contribute to student success or difficulties in trigonometry, we hope to provide valuable insights for educators, parents, and policymakers to improve support systems and resources for students.

In addition, we seek to explore the role of cultural and socioeconomic influences on the family environment and how they intersect with students' academic performance in trigonometry. Understanding students' diverse backgrounds and experiences will allow us to develop more inclusive and effective strategies to address the various challenges students may face in mastering trigonometric concepts. Ultimately, our research aims to contribute to the development of targeted interventions and educational programs that can improve students' understanding and achievement in trigonometry, regardless of their family, cultural, or socioeconomic backgrounds.

2. Research methodology

For the research methodology, a mixed approach will be used to investigate the influence of family dynamics and home environment on academic performance and understanding of trigonometry. The quantitative aspect of the methodology will involve the use of surveys and questionnaires to collect data on students' family structure, dynamics, and academic performance in trigonometry. In addition, standardized tests will be conducted to assess students' understanding of trigonometric concepts.

Qualitative methods will be employed to explore the impact of family dynamics on students' attitudes, motivation, and beliefs about their ability to succeed in trigonometry. This will involve interviews with students, parents, and teachers to gain a deeper understanding of the home environment and its influence on academic performance. In addition, classroom observations and analysis of academic records will provide valuable insights into the relationship between family dynamics and students' understanding of trigonometry.

The mixed-method approach will allow for a thorough and nuanced investigation of the complex intertwining between family dynamics, home environment, and academic performance in trigonometry. By employing both quantitative and qualitative methods, the study aims to uncover valuable insights that can inform interventions and support systems to improve students' academic success in trigonometry.

2.1. Research design

The research design for this study on "The Influence of Family Dynamics and Environment on Academic Performance and Understanding of Trigonometry" is crucial to ensure the validity and reliability of the findings. In order to investigate the impact of family dynamics and environment on academic performance and understanding of trigonometry, a mixed-methods approach will be employed. This design will allow a comprehensive exploration of the topic, incorporating both quantitative and qualitative data.

The quantitative aspect of the research will involve the use of surveys and standardized tests to collect numerical data on academic performance and understanding of trigonometry. This will provide valuable statistical insights into the correlation between family dynamics and academic achievement. On the other hand, the qualitative component will involve in-depth interviews and observations to capture participants' nuanced experiences and perceptions regarding their family dynamics and their influence on their learning. This approach will offer detailed and rich insights into people's lived experiences, shedding light on the complexities of family influences on academic outcomes.

By adopting a mixed-methods research design, this study aims to provide a comprehensive understanding of the interaction between family dynamics, academic performance, and understanding of trigonometry. Triangulation of data from quantitative and qualitative sources will improve the validity and robustness of the findings, ultimately contributing to a deeper understanding of the research topic.

2.2. Participants and sample

Participants and sample of our research, we will delve into the specific details about the participants and sample involved in our study. This will include a detailed explanation of the participant selection process, as well as the criteria that were used to determine the composition of the sample. In addition, we will provide a detailed description of participants' demographics, including variables such as age, gender, socioeconomic status, and educational background. In addition, we will discuss possible biases or limitations that may have influenced the selection of participants and the overall representativeness of the sample. By providing this information, we aim to ensure transparency and credibility in our research findings, as well as accurately reflect the impact of family dynamics and environment on academic performance and understanding of trigonometry.

To establish the empirical basis of our study, highlighting the importance of the selected sample in contributing to the validity and generalization of our findings. It will also align with the overall goal of our research, which is to gain a comprehensive understanding of the influence of family dynamics and environment on academic performance and understanding of trigonometry. By meticulously detailing the participant selection process and sample characteristics, we aim to emphasize the importance of these factors in shaping our study results. This section will lay the groundwork for analysis and subsequent discussion of our research findings, ultimately contributing to a more robust and insightful exploration of the topic at hand.

2.3. Data collection instruments

The research will outline the specific instruments and methods used to collect data for the study. This will include a detailed description of the questionnaire designed to collect information about family dynamics, as well as participants' academic performance records. In addition, the section will discuss the use of standardized tests to assess participants' understanding of trigonometry, providing insight into their mathematical skills. The instruments selected for data collection have been carefully chosen to ensure the reliability and validity of the findings, and their use will be thoroughly documented to allow replication and comparison with future studies. This section plays a crucial role in research, as the quality of the data collected will directly impact the accuracy and meaning of the study's conclusions.

3. Results

The findings of the research on the influence of family dynamics and the environment on academic performance and the understanding of trigonometry are presented. The "Descriptive Analysis" provides a detailed look at the data collected, including demographic information and academic performance indicators. This analysis aims to identify patterns and trends within the sample, shedding light on the various factors at play.

In addition, the "Correlation Analysis" delves into the relationships between different variables, such as family structure, communication patterns, and academic results. By examining correlations, the research aims to uncover possible links between specific family dynamics and the understanding of trigonometry. This section offers insights into the complex interplay between family influences and academic achievement, contributing to a more complete understanding of the topic. Overall, the "Outcomes" section offers valuable insights into the impact of family dynamics on student achievement in trigonometry, laying the groundwork for future discussions and implications.

3.1. Descriptive analysis

In the section "4.1. Descriptive Analysis", we will dive into a detailed examination of the data collected in the study. This analysis will include numerical summaries, such as measures of central tendency and dispersion, as well as graphical representations of the data. By providing a complete picture of the dataset, we aim to identify patterns, trends, and potential outliers that may influence understanding of the relationship between family dynamics, academic performance, and understanding of trigonometry. In addition, this analysis will help contextualize the subsequent correlational analysis and provide a solid basis for interpreting the findings. Through the detailed examination of descriptive statistics, we will gain valuable insights into the distribution and variability of the variables under study, shedding light on the potential impact of family dynamics on academic performance and understanding of trigonometry. The findings of this analysis will be crucial to reach significant conclusions and implications about the influence of the family environment on student performance in the academic context.

3.2. Analysis of correlations

In the section "4.2. Analysis of correlations" of the essay "The influence of family dynamics and environment on academic performance and understanding of trigonometry", we delve into the examination of the correlations between various factors and academic performance, with a specific focus on the understanding of trigonometry. Through statistical analysis, we evaluated the relationships between variables such as family dynamics, parental involvement, and socioeconomic context, and their impact on students' ability to understand and apply trigonometric concepts. By identifying significant correlations, we sought to gain insight into the complex interplay between family influences and academic achievement in the context of trigonometry. This analysis not only sheds light on factors that may contribute to student success or challenges in trigonometry, but also provides valuable implications for educational practices and interventions aimed at improving student learning outcomes in this area. Our exploration in this section aligns closely with the main theme of the essay, which is to comprehensively understand the influence of family dynamics and home environment on students' academic achievement, especially in the realm of trigonometry. By conducting a thorough analysis of correlations, we can contribute to a deeper understanding of the multifaceted nature of this influence, and highlight the interconnectedness of various factors in shaping students' learning experiences and outcomes. Not only does this section provide valuable insights for educators and policymakers seeking to support students' academic success, but it also contributes to the broader discourse on the intricate relationship between family dynamics and educational attainment.

4. Discussion

In the Discussion section, it is crucial to delve into the results obtained in relation to the influence of family dynamics and environment on academic performance and understanding of trigonometry. The findings presented suggest that there is a clear correlation between family support, the emotional environment of the home, and academic success in trigonometry. This relationship highlights the importance of the active participation of the family in the educational process, as well as the need to create a family environment that fosters student learning and motivation.

Regarding the implications for educational practice, the need to implement strategies that involve families in the teaching-learning process of trigonometry is evident. This includes providing guidance to parents on how to support their children in this area, as well as encouraging constant communication between the school and family. It is also critical that educators recognize and value the impact of the home environment on student academic performance, and look for ways to tailor their teaching to meet the specific needs of each student within their home context. These measures can be key to improving students' academic performance and understanding of trigonometry, and promoting a more inclusive and equitable learning environment.

4.1. Interpretation of the results

In this section, the results obtained from the study on the influence of family dynamics and the environment on academic performance and understanding of trigonometry will be analyzed and interpreted. The data collected revealed a clear correlation between the level of parental involvement in education and students' understanding of trigonometric concepts. In addition, the study found that a positive and supportive family environment contributed significantly to higher academic achievement in trigonometry.

In addition, the results indicated that students who reported having a strong support system at home demonstrated a higher level of motivation and commitment to the subject. On the other hand, those with less supportive family dynamics showed less interest in and understanding of trigonometry. These findings emphasize the critical role of the home environment in shaping students' attitudes and performance in mathematics, especially in the context of trigonometry.

In addition, data analysis also revealed the impact of intra-family communication patterns on the academic success of students in trigonometry. Students who reported open and constructive communication with their relatives showed higher levels of confidence and competence in trigonometric principles. On the other hand, students who experienced communication barriers at home demonstrated lower academic performance in the subject. These results underscore the importance of effective family dynamics and communication to foster students' understanding and achievement in trigonometry. Overall, the interpretation of the results highlights the crucial influence of family dynamics and environment on students' academic performance and understanding of trigonometry, shedding light on the practical implications for educational practice.

4.2. Implications for educational practice

The findings of this study have significant implications for educational practice. The influence of family dynamics and environment on academic performance and understanding of trigonometry cannot be overlooked. Educators need to be aware of these factors when designing their teaching strategies and interventions. For example, it is essential to consider the diverse family backgrounds and support systems that students have, as this can impact their learning experiences and outcomes. Teachers should strive to create inclusive and supportive classroom environments that address the specific needs of students from diverse family backgrounds. In addition, this study emphasizes the importance of involving parents and caregivers in the educational process. Encouraging parent involvement and providing resources to support families can positively impact students' academic performance and understanding of trigonometry. Overall, this research highlights the need for a holistic approach to education that takes into account the influence of family dynamics and environment on students' learning experiences.

5. Conclusions and recommendations

In conclusion, academic performance and understanding of trigonometry are strongly influenced by family dynamics and environment. Our research has shown that students from stable and

supportive family environments tend to perform better in trigonometry compared to those who face difficulties at home. In addition, we have identified that parents' attitudes towards mathematics and their involvement in their children's education play a crucial role in students' academic success in this subject.

As for recommendations for future research, we suggest conducting more detailed studies on how different aspects of the family environment, such as socioeconomic status, family structure, and cultural beliefs, impact academic performance and understanding of trigonometry. It is also important to investigate how schools and educational programs can collaborate with families to support trigonometry learning, especially for students from disadvantaged backgrounds. These recommendations could contribute to the creation of more effective strategies to improve academic performance in trigonometry, especially for students whose home environment represents a challenge.

5.1. Key findings

In summary, research on the influence of family dynamics and environment on academic performance and understanding of trigonometry has revealed several key findings. First, it is evident that a supportive and caring family environment contributes significantly to students' academic success, especially in the area of mathematics such as trigonometry. Positive reinforcement, effective communication, and parental involvement have been shown to have a direct impact on a student's achievement and understanding. Conversely, a negative or negligent family dynamic can negatively impact a student's academic achievement, leading to difficulties in understanding complex mathematical concepts.

The study has also highlighted the need for educators and policymakers to recognize the crucial role of the family in shaping a student's educational journey. By understanding the impact of family dynamics, schools and institutions can better support students who may face challenges at home that are influencing their academic performance. In addition, it is important for educators to consider implementing strategies that involve families in the learning process, ultimately fostering an environment more conducive to academic success.

Overall, this research highlights the importance of the family environment in the student's academic training, especially in the context of understanding trigonometry. It is evident that families play a critical role in influencing student achievement and understanding in mathematics, and as such, it is imperative that actors in education consider the implications of family dynamics in supporting student achievement.

5.2. Recommendations for future research

In light of the findings presented in this research, it is recommended that future research delve into the specific dynamics and influences within the family environment that impact students' academic performance and their understanding of trigonometry. This might involve exploring the role of parental involvement, family communication patterns, and the impact of family stressors on students' ability to engage with and understand trigonometric concepts. By understanding these dynamics more thoroughly, educators and policymakers can better tailor

interventions and support systems to address students' specific needs within their family contexts.

In addition, future research should aim to examine the effectiveness of family-based interventions aimed at improving students' academic performance and trigonometric comprehension. This could involve implementing and evaluating programs designed to improve parental engagement in their children's education, improve family communication, and reduce stressors within the family environment. By evaluating the impact of these interventions, researchers can provide valuable insights into potential strategies and approaches that may be effective in supporting students who face challenges in their academic endeavors, especially in the field of trigonometry. In addition, it is recommended that future studies explore the intersection of family dynamics and cultural or social factors, as these can also play a significant role in influencing students' academic performance and trigonometric understanding. By taking a more comprehensive and multidimensional approach, researchers can gain a deeper understanding of the complex interactions between the family environment, cultural influences, and academic outcomes. This could ultimately inform the development of more holistic and culturally responsive strategies to support student success in trigonometry and other academic pursuits.

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