**CARING BEHAVIOR OF TEACHERS AS MEDIATOR ON LEARNERS’ AUTONOMY AND NUMERICAL INQUISITIVENESS**

****

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

*A THESIS*

Presented to

the Faculty of Graduate School

**RIZAL MEMORIAL COLLEGES**

**Davao City**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

In Partial Fulfillment

of the Requirements for the degree

**MASTER OF ARTS IN EDUCATIONAL MANAGEMENT**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**MERCY S. COQUILLA**

OCTOBER 2023

*Abstract*

*The main purpose of this study is to evaluate whether caring behavior of teachers have significant mediating effect on the relationship between learners’ autonomy and numerical inquisitiveness. In this study, the researcher selected the 215 public elementary school teachers in Bunawan District in Davao City as the respondents of the study. Stratified random sampling technique was utilized in the selection of the respondents. Non-experimental quantitative research design using descriptive-correlational method was employed. The data collected were subjected on the following statistical tools: Mean, Partial Correlation, and Multiple Regression Analysis. Descriptive analysis showed that learners’ numerical inquisitiveness and caring behavior of teachers were described as moderately extensive, while, learners’ autonomy in Bunawan District in Davao City was rated as extensive. Further, correlation analysis demonstrated that there is a significant relationship among learners’ autonomy, numerical inquisitiveness and caring behavior of teachers. Evidently, Multiple Regression Analysis proved that caring behavior of teachers partially mediated the relationship between learners’ autonomy and numerical inquisitiveness. In other words, caring behavior of teachers is a significant mediator on the relationship between learners’ autonomy and numerical inquisitiveness. The study, therefore, was conducted for further utilization of findings through publication in reputable research journal.*

***Keywords:*** *Educational management, learners’ autonomy, numerical inquisitiveness, caring behavior of teachers, Philippines*

|  |
| --- |
| *Table of Content* |
|  |  |  | Page |
| Title Page |  |  | i |
| Approval Sheet |  |  | ii |
| Abstract |  |  | iii |
| Acknowledgement |  |  | iv |
| Dedication |  |  | v |
| Ethics Compliance Certificate |  |  | vi |
| Table of Contents |  |  | vii |
| List of Tables |  |  | ix |
| List of Figures |  |  | x |

|  |  |  |  |
| --- | --- | --- | --- |
| **CHAPTER** |  |  |  |
| **1** | **The Problem and its Scope** | **1** |
|  |  | *Review of Significant Literature* | 4 |
|  |  | *Theoretical/Conceptual Framework* | 27 |
|  |  | *Statement of the Problem* | 30 |
| **2** | **Method** | **34** |
|  |  | *Research Design* | 34 |
|  |  | *Research Respondents* | 35 |
|  |  | *Research Instruments* | 36 |
|  |  | *Data Gathering Procedure* | 37 |
|  |  | *Ethical Consideration* | 39 |
|  |  | *Data Analysis* | 43 |
| **3** | **Results and Discussions** | **45** |
| 4 | **Conclusions and Recommendations** | **64** |
| **REFERENCES** | **69** |
| **APPENDICES** |  |
| **A** |  | *Research Instrument* |  |
| **B** |  | *Endorsement Letter* |  |
| **C** |  | *Permit to Conduct* |  |
| **D** |  | *Letter to the Principal* |  |
| **E** |  | *Certificate of Appearance* |  |
| **F** |  | *Sample Assent Form* |  |
| **G** |  | *Validation Sheet* |  |
| **H** |  | *Curriculum Vitae* |  |

|  |
| --- |
| List of Tables |
| **Table** | **Description** | **Page No.** |
| **1** | *Learners’ Autonomy in Terms of Willingness to Learn* | 46 |
| **2** | *Learners’ Autonomy in Terms of Learning Accountability* | 47 |
| **3** | *Learners’ Autonomy in Terms of Impulsement* | 48 |
| **4** | *Learners’ Autonomy in Terms of Ability to Plan Learning* | 49 |
| **5** | *Summary on Learners’ Autonomy in Bunawan District, Davao City* | 50 |
| **6** | *Learners’ Numerical Inquisitiveness in Terms of Emotion* | 52 |
| **7** | *Learners’ Numerical Inquisitiveness in Terms of Engagement* | 53 |
| **8** | *Learners’ Numerical Inquisitiveness in Terms of Knowledge* | 54 |
| **9** | *Learners’ Numerical Inquisitiveness in Terms of Value* | 55 |
| **10** | *Summary on Learners’ Numerical Inquisitiveness in Bunawan District, Davao City* | 56 |
| **11** | *Caring Behavior of Teachers in Bunawan District, Davao City* | 57 |
| **12** | *Relationship among Learners’ Autonomy, Numerical Inquisitiveness, and Caring Behavior of Teachers* | 58 |
| **13** | *Mediating Effect of Caring Behavior of Teachers on the Relationship Between Learners’ Autonomy and Numerical Inquisitiveness* | 61 |

|  |
| --- |
| **List of Figures** |
| **Figure** |  | **Title** | **Page** |
| 1 |  | *The Conceptual Framework of the Study* | 29 |
| 2 |  | *Mediation Model* | 63 |

**CHAPTER 1**

**The Problem and its Scope**

A teacher's caring and supportive approach plays a crucial role in shaping students' attitudes, motivation, and performance in math. When teachers exhibit caring behavior, they create a positive and nurturing learning environment in the math classroom. This environment fosters a sense of belonging and emotional safety, which allows students to feel comfortable taking risks, asking questions, and making mistakes in their math learning journey. When teachers demonstrate empathy, understanding, and support, they create an environment where students feel valued, motivated, and confident in their math abilities. This, in turn, enhances students' numerical inquisitiveness, positively influences their academic performance, and contributes to their overall growth and development as learners.

Meanwhile, Kim et al. (2015) highlighted when learners lack of numerical inquisitiveness, they are less likely to invest time and effort into learning the subject. As a result, their performance in math may suffer, leading to lower grades and academic achievement. Illiyas (2017) reported that a lack of numerical inqusitiveness can lead to negative attitudes and beliefs about the subject. Students may develop a mindset that math is difficult, boring, or irrelevant, which can further discourage their engagement and motivation in learning math. In addition, Acharya (2017) reported that lack of interest to learn math resulted to lack of students’ labor in learning mathematics. They are engage in unnecessary task in the classroom during learning process.

In contrary, Skolverket (2011) asserted that inquisitiveness serves as a powerful motivator for students to actively engage in learning. When learners are genuinely interested in the subject, they are more likely to invest time and effort in understanding mathematical concepts, solving problems, and exploring mathematical ideas.. Ainley (2012) pointed out that inquisitiveness is an important motivational factor that increases numerical inquisitiveness of learners. Moreover, Otoo et al. (2018) concluded that inquisitveness promotes active learning. Students with a genuine interest in the subject are more likely to take an active role in their learning, asking questions, seeking clarification, and actively participating in mathematical activities and discussions.. Likewise, Davadas and Lay (2017) indicated that learners who are interested in math are more likely to embrace challenges, think critically, and apply problem-solving strategies, which are essential skills not only in mathematics but also in various other domains.

On one hand, Benson (2011) described learners’ autonomy as the ability and freedom of learners to take control of their own learning process, make decisions, and actively engage in self-regulated learning. It involves learners' capacity to set goals, select learning strategies, monitor their progress, and reflect on their learning experiences. González (2017) noted that autonomous learners are motivated, self-directed, and capable of making informed choices about their learning. They have the ability to identify their learning needs, set objectives, and choose appropriate learning resources and strategies. Reinders (2012) asserted that promoting autonomy supports learners' engagement, motivation, and deep learning. Learners with autonomy are more likely to take responsibility for their learning, develop critical thinking skills, and become lifelong learners.

On the other hand, Kang (2016) described caring behavior as the adversarial relationship between teachers and students may also be due to teachers' tendency to define caring in warm, fuzzy terms. Imna and Hassan (2015) noted that the caring behavior reflects the type of people who compose the organization, the work processes, means of communication and the exercise of authority within the individual organization. More so, Zhu et al. (2013) noted that in a learning institution where teachers addressed the different needs and characteristics of students, the students were able to reveal their creativity in learning processes. Likewise, Putter (2010) explained that supportive school environment, especially a supportive relationship with teachers, encourages the innovativeness among teachers.

Previous investigations showed that learners’ autonomy and caring behavior of teachers are linked to numerical inquisitiveness of learners. However, those studies were conducted in foreign setting and only examined the direct influence of these variables. For instance, the exploratory study conducted by Voss (2016) concluded that improving learners’ autonomy is thought in several researches as a process that contributes in increasing students’ interest in learning mathematics. Also, the phenomenological study conducted by Khoo (2018) found that autonomy coupled with mathematical tools and real-world application was found to significantly influence students’ interest in mathematics. In addition, Lawrence and Vimala (2013) argued that there exists a significant relationship between caring behavior and learners’ numerical inquisitiveness.

Much of the studies on the relationship among these variables were conducted on foreign setting, and only focused on direct linkage. Thus, it is on this context that the researcher felt the need to fill-in the research gap of conducting a study in the Philippine setting, particularly in Bunawan District, Davao City using a quantitative approach. Specifically, the researcher made use of path analysis through mediation approach to have a better understanding of the learners’ numerical inquisitiveness as determined by learners’ autonomy and mediated by caring behavior of teachers which is found to be scarce.

*Review of Significant Literature*

This section provides the discussions of variable and its indicators. The discussions of the concepts, ideas and viewpoints from various authors were taken from different books, journal and electronic.

*Learners’ Autonomy*

Learners' autonomy in learning as defined by Ayyildiz and Tarhan (2015) as the ability and willingness of students to take control of their own learning processes. It involves self-directedness, independence, and the capacity to make informed decisions about one's learning goals, strategies, and evaluation of progress. Autonomy is often associated with intrinsic motivation. Students who possess a high level of autonomy find personal satisfaction and joy in the learning process itself, driving them to excel. According to Dam (2019), high autonomy leads to self-regulated learning. Students at this level proactively make decisions about what, when, and how to study, tailoring their learning approach to their individual needs. Autonomous learners at high levels set clear and achievable goals. They understand their learning objectives, breaking them down into manageable tasks, which contributes to focused and purposeful study.

As pointed out by Benson (2011), high autonomy allows students to adapt their learning styles. They explore various methods, techniques, and resources to find what works best for them, leading to a more personalized and effective learning experience. Learners with high autonomy develop strong metacognitive skills. They engage in critical thinking, reflecting on their learning processes, identifying strengths and areas for improvement, and adjusting their strategies accordingly. More so, Hall (2011) noted that high autonomy implies active involvement in the learning process. Students take ownership of their education, seeking out opportunities for enrichment, and showing a genuine interest in the subject matter. They allocate time efficiently, balancing various learning tasks and ensuring that they dedicate sufficient time to understand and master each concept.

As mentioned by González (2017), high autonomy fosters a mindset of continuous learning. Students exhibit curiosity and a willingness to explore beyond the prescribed curriculum, developing a passion for learning that extends beyond formal education. The active engagement characteristic of autonomy contributes to enhanced memory retention. Learners at high autonomy levels often remember and understand concepts more deeply due to their immersive learning experiences. According to Reinders (2012), high levels of autonomy correlate with consistent academic excellence. Students who actively manage their learning tend to perform well not only in individual assignments but also over the long term. Learners' autonomy at high levels is associated with self-regulated learning, intrinsic motivation, effective goal setting, adaptability to diverse learning styles, critical thinking and reflection, ownership of the learning process, efficient time management, continuous learning, enhanced memory retention, and consistent academic excellence.

Moreover, Tang and Tseng (2013) proposed that learners' autonomy encourages intrinsic motivation. When students have a say in what and how they learn, they are more likely to develop a genuine interest in the subject matter, leading to sustained motivation. According to Archana and Chamundeswari (2013), autonomy allows for personalized and individualized learning experiences. Students can choose learning methods that align with their preferences, pace, and styles, catering to diverse needs within a classroom. Autonomous learners often engage in critical thinking and reflective practices. They analyze information, make connections between concepts, and develop a deeper understanding of the subject matter. As pointed out by Kalaivani and Rajeswar (2016), autonomy fosters a mindset of continuous learning beyond formal education. Students who actively participate in decision-making regarding their education are more likely to develop habits that support lifelong learning.

In addition, Izuchi and Onyekuru (2017) proposed that learners' autonomy promotes a sense of responsibility and accountability. Students take ownership of their learning outcomes, which can lead to increased diligence and commitment to academic success. Adding more Lao (2015) asserted that autonomous learners develop problem-solving skills by navigating challenges independently. They learn to adapt their strategies, seek solutions, and approach difficulties with a proactive mindset. Autonomy is closely tied to self-regulated learning. Students set goals, monitor their progress, and adjust their study strategies, leading to more effective and efficient learning. Likewise, Subramanian (2016) noted that autonomy encourages active engagement. When students have a sense of agency, they are more likely to participate in class discussions, ask questions, and contribute to a dynamic learning environment.

As highlighted by Sil (2017), learners' autonomy is closely linked to intrinsic motivation. When students have the freedom to make choices about what and how they learn, they are more likely to develop a genuine interest in the subject matter, leading to sustained motivation. Autonomy allows students to select topics and learning methods that are personally relevant and interesting to them. This personalization enhances the meaning and significance of the learning process, fostering motivation. Kabody (2013) asserted that autonomy gives students a sense of ownership over their education. This feeling of investment and control contributes to a positive attitude towards learning and increases the motivation to actively participate in educational activities.

Further, Varga (2017) found that autonomous learners often set their own learning goals. This process of goal-setting provides a clear sense of purpose, and the achievement of these goals becomes a source of motivation. Autonomy encourages active engagement in the learning process. Students who have a say in their education are more likely to participate in class discussions, ask questions, and explore topics beyond the basic requirements, leading to increased motivation. Maulana et al. (2013) pointed out autonomy contributes to the development of self-efficacy—the belief in one's own capabilities. When students take control of their learning, they gain confidence in their ability to tackle challenges, which positively influences motivation.

Furthermore, Rimm-Kaufman and Sandilos (2013) revealed that autonomous learners are more likely to explore and inquire. The freedom to pursue one's interests encourages curiosity, and the satisfaction derived from self-driven exploration serves as a powerful motivator. The ability to make choices and exercise autonomy in learning can be perceived as a reward in itself. This sense of control and freedom becomes a motivating factor for students. Also, Skipper and Douglas (2015) found that autonomy fosters a mindset of continual learning. Students who experience the motivation associated with autonomous learning are more likely to carry this enthusiasm into lifelong learning habits. Adding more, Pean (2014) noted that learners' autonomy contributes to a positive emotional connection to learning. When students find joy and satisfaction in their learning experiences, they are more motivated to continue their educational journey.

*Willingness To Learn.* The first indicator of learners’ autonomy in this study which refers to the ability and willingness of students to take charge of their own learning. It involves self-directedness, independence, and the capacity to make informed decisions about one's learning goals and strategies (Ayyildiz & Tarhan, 2015). Bray and McCLaskey (2015) viewed that a moderate level of willingness to learn can positively impact students' motivation. When students are moderately willing to learn, they are likely to be more engaged in their studies and exhibit a balanced level of intrinsic motivation. Also, Grant and Basye (2014) found that willingness to learn may contribute to the development of learners' autonomy. Students with a moderate level of willingness are often open to exploring various learning approaches, allowing them to gradually take more control over their learning processes.

Further, Ozerem and Akkoyunlu (2015) asserted that moderate willingness suggests a balanced level of effort and persistence. Students are likely to invest a reasonable amount of time and energy into their studies, fostering a consistent and sustainable approach to learning. More so, Basheer (2014) found that a moderate willingness to learn may enable students to adapt to challenges effectively. They are more likely to approach difficulties with a positive mindset, seeking solutions and alternative strategies for overcoming obstacles. Likewise, Fox and Schirrmacher (2012) concluded that the combination of a moderate willingness to learn and the development of learners' autonomy can contribute to improved academic performance. Students who actively engage in their learning process and take ownership of their educational journey are likely to perform well.

*Learning Accountability*. The second indicator of learners’ autonomy in this study which refers to the ability of students to take responsibility for their own learning processes, set meaningful goals, and assess their progress. It involves being proactive in monitoring and managing one's learning, making informed decisions about study strategies, and being accountable for the outcomes (Ayyildiz & Tarhan, 2015). Manavipour and Saeedian (2016) showed that students with a high level of autonomy are more likely to set ambitious and meaningful learning goals. They actively work towards achieving these goals, resulting in a higher likelihood of success and accomplishment. According to Soyogul (2015), they are often associated with strong self-regulation skills. Students take ownership of their schedules, allocate time efficiently for learning tasks, and demonstrate effective time management.

Likewise, Ng (2012) asserted that autonomous learners at high levels are adept at making informed decisions about their learning. This includes critical thinking about study materials, selecting appropriate resources, and evaluating the relevance of information to their educational goals. Abramovich et al. (2019) pointed out that learners with high autonomy levels are more likely to adapt to changing circumstances or challenges. They exhibit resilience in the face of difficulties, adjusting their strategies to overcome obstacles and maintain progress. Also, Norton (2017) noted that high autonomy implies active engagement in the learning process. Students take ownership of their education, seeking out opportunities for enrichment, exploring diverse perspectives, and demonstrating a continuous desire to learn.

*Impulsement.* The third indicator of learners’ autonomy in this study whichrefer to the capacity of students to make independent decisions and take actions in their learning process based on their immediate inclinations, instincts, or spontaneous reactions (Ayyildiz & Tarhan, 2015). Curtis (2017) reported that learners with moderate autonomy levels may demonstrate adaptive decision-making, combining their spontaneous responses with a consideration of their learning objectives and constraints. Moderate autonomy in impulsement might encourage learners to explore diverse learning paths, driven by their curiosity and immediate interests while still aligning with their broader educational goals. Horn and Staker (2013) pointed out that learners at moderate autonomy levels might engage in calculated risk-taking, experimenting with new ideas or approaches while maintaining a balance with established learning methods.

In similar manner, Haughery (2017) concluded that motivation to achieve academically is linked to learners’ autonomy. The study indicated that academic motivation in terms of performance goal and self-efficacy significantly predicts the academic performance of the students. Similarly, Arbabisarjou, Zare, Shahrakipour, and Ghoreishinia (2016) found that there was a significant relationship between academic achievement motivation and academic performance among medical students. In addition, a longitudinal study by Liu and Hou (2017) has shown that intrinsic motivation considerably promotes academic performance. Other studies have also demonstrated that academic achievement motivation was significantly related to academic performance (Izuchi & Onyekuru, 2017).

*Ability to Plan Learning*. The fourth indicator of learners’ autonomy in this studywhich refers to the capacity of students to independently and proactively organize, strategize, and schedule their learning activities. It involves setting goals, selecting appropriate resources, and creating a structured plan to achieve educational objectives (Ayyildiz & Tarhan, 2015). According to Mbatha (2015), autonomy in planning learning involves setting clear and meaningful goals. Students with this level of autonomy are adept at defining their learning objectives in alignment with their overall educational aims. As pointed out by Brown (2014), learners at high autonomy levels excel in managing their time effectively. They allocate time to various learning tasks based on priorities, ensuring a balanced and comprehensive approach to their studies. .

More so, Harding (2019) concluded that high autonomy entails the ability to select and utilize diverse learning resources judiciously. Students make informed choices about textbooks, online materials, and other resources that enhance their understanding of the subject matter. Autonomy in planning learning at a high level involves dynamic and flexible approaches. Students can adapt their plans in response to changing circumstances or new learning opportunities. As pointed out by Alsaleh (2020), autonomy signifies a strong sense of ownership over the learning process. Students take the initiative to direct their own learning journey, making decisions that align with their personal and academic growth. Likewise, Panadero (2017) viewed that learners at high autonomy levels engage deeply with their study materials. They structure their learning plans to allow for in-depth exploration of topics, fostering a comprehensive understanding of the content.

*Numerical Inquisitiveness*

Numerical Inquisitiveness as defined by Snow (2011) is the extent of curiosity, interest, and eagerness displayed by learners when engaging with numerical concepts, problems, and mathematical content. It reflects the degree to which students actively seek to understand, question, and explore numerical information, fostering a dynamic and inquisitive approach to mathematical learning. Waynberg and Leiken (2019) noted that at moderate levels of numerical inquisitiveness, learners display a balanced curiosity. They show interest in numerical concepts without being overwhelmed, maintaining a healthy level of engagement with the subject matter. Bishara and Hui (2016) pointed out that moderately inquisitive learners apply their numerical knowledge effectively in problem-solving. They approach mathematical challenges with interest and a willingness to explore solutions without becoming overly fixated on specific methods.

The study conducted by Vale (2019) showed that numerical inquisitiveness at moderate levels contributes to sustained engagement. Learners can maintain attention during learning tasks, participating actively without experiencing excessive distraction or disinterest. According to Star (2015), moderately inquisitive learners demonstrate a willingness to explore numerical concepts. They engage in activities that involve experimentation and inquiry, contributing to a deeper understanding of mathematical principles. Numerical inquisitiveness at a moderate level is associated with the development of analytical thinking. Learners analyze numerical problems with a balanced approach, avoiding extremes of overthinking or oversimplification. More so, Liljedah et al. (2016) concluded that moderate inquisitiveness fosters a positive attitude towards numerical learning. Learners approach mathematical content with interest and a sense of positivity, creating a conducive learning environment.

As pointed out by Kozlowski et al. (2019), moderately inquisitive learners effectively utilize learning resources. They strike a balance between exploring various sources of information and avoiding information overload, leading to efficient learning outcomes. Numerical inquisitiveness at moderate levels encourages learners to actively contribute to collaborative learning efforts. They work well with peers, share insights, and contribute to group discussions without overshadowing others. Mazana et al. (2019) proposed that numerical inquisitiveness encourages the development of critical thinking skills. Learners analyze numerical information with a balanced and reasoned approach, promoting a deeper understanding of mathematical concepts. Likewise, Yang (2013) affirmed that numerical inquisitiveness at moderate levels contributes to building a foundation for advanced learning. Learners progress steadily, acquiring the necessary skills and knowledge without feeling overwhelmed.

Numerical inquisitive learners are more likely to actively participate in classroom discussions. Their curiosity motivates them to contribute ideas, ask questions, and engage in conversations related to numerical concepts (Blazar & Kraft, 2017). Inquisitive students are more inclined to ask questions when they encounter challenges or seek clarification. This behavior contributes to a more interactive learning environment, fostering a culture of curiosity and inquiry (Sakiz et al., 2012). Numerically inquisitive learners may explore various approaches to problem-solving. Their curiosity drives them to consider different methods and solutions, enriching classroom discussions with diverse perspectives. Inquisitive students often engage in collaborative problem-solving activities. They actively contribute to group work, share insights, and collaborate with peers to explore numerical concepts, enhancing the overall learning experience (Joseph, 2013).

The study of Enu et al. (2015) concluded that students with a high level of numerical inquisitiveness can positively influence their peers. Their enthusiasm and curiosity can inspire others to actively participate in classroom activities and discussions. According to Lalmuanzuali et al. (2019), numerically inquisitive learners tend to develop strong critical thinking skills. Their curiosity encourages them to analyze numerical problems, consider multiple perspectives, and evaluate solutions, contributing to a more intellectually stimulating classroom. Adding more, Guido (2013) asserted that inquisitive students may not only solve problems but also demonstrate and explain their problem-solving strategies to the class. This contributes to a shared learning experience, where students can benefit from each other's approaches.

Inquisitive learners are likely to actively engage in hands-on activities related to numerical concepts. Their curiosity motivates them to explore and experiment, making classroom activities more dynamic and interactive. Students who actively participate and engage with numerical content create a classroom atmosphere that fosters curiosity, collaboration, and a shared passion for learning (Baseya, & Francis, 2011). According to Ray (2015), inquisitive learners are more likely to develop habits of lifelong learning. Their active participation in the classroom reflects a genuine interest in numerical concepts, setting the stage for continuous curiosity and exploration beyond formal education. Likewise, Hansen and Gonzalez (2014) asserted that numerical inquisitiveness plays a crucial role in shaping learners' classroom participation by fostering active engagement, encouraging questions and exploration, promoting collaborative problem-solving, positively influencing peers, enhancing critical thinking, demonstrating problem-solving strategies, actively participating in hands-on activities, contributing to a positive learning environment, and laying the foundation for lifelong learning habits.

As proposed by Klerlein and Hervey (2017), a school where learners exhibit high numerical inquisitiveness is more likely to align with educational goals related to critical thinking, problem-solving, and a holistic understanding of mathematical concepts. This alignment enhances the effectiveness of the school in achieving its educational objectives. Taplin (2019) highlighted that inquisitive learners contribute to a culture of innovation within the school. Their curiosity and willingness to explore numerical concepts can lead to the development of creative solutions, projects, and initiatives that enhance the overall effectiveness of the school. Likewise, Lince (2016) affirmed that numerical inquisitiveness supports diverse learning styles. Inquisitive learners may seek out different resources, approaches, and methods to understand numerical concepts, catering to the varied needs and preferences of a diverse student population.

Moreover, West, Swanson and Lipscomb (2017) proposed that inquisitive students are better prepared to face real-world challenges that require numerical literacy. Their active exploration of mathematical concepts enhances their problem-solving skills, making them more adept at addressing complex issues in various fields. Also, Kintu et al. (2017) asserted that numerically inquisitive learners are more likely to develop habits of lifelong learning. Their active engagement with numerical concepts sets the stage for continuous curiosity and exploration beyond formal education, contributing to a culture of ongoing intellectual development. Adding more, Hossain (2015), reported that learners with a high level of numerical inquisitiveness positively influence their peers. Their enthusiasm and curiosity can inspire others to actively participate in classroom activities, creating a positive peer learning dynamic that benefits the entire school community.

In addition, Haber (2020) found that inquisitive learners actively engage in classroom activities, discussions, and exercises related to numerical concepts. This increased engagement contributes to a more dynamic and interactive classroom, fostering a conducive learning environment. According to Egalite and Kisida (2017), numerical inquisitiveness contributes to a positive learning culture within the school. When students are actively curious about mathematics, it creates an atmosphere of enthusiasm, collaboration, and a shared passion for learning, enhancing the overall school environment. Arikan (2016) found that inquisitive students develop strong critical thinking skills. Their curiosity prompts them to analyze numerical problems, evaluate different approaches, and think critically about mathematical concepts, contributing to a more intellectually rigorous learning environment.

*Emotion*. The first indicator of numerical inquisitiveness in this study which refer to the degree to which learners express curiosity, engagement, and emotional connection towards numerical concepts or mathematical content during their learning experiences (Snow, 2011). According to Reeve et al. (2015), learners with moderate numerical inquisitiveness are likely to show balanced interest and engagement with numerical concepts. They may neither be overly enthusiastic nor completely disinterested, maintaining a steady engagement level. It implies a positive emotional connection without extremes. Learners may view numerical concepts with a moderate level of positivity, associating them with interest and satisfaction.

Moreover, Gurat (2018) found that learners at moderate levels of numerical inquisitiveness are expected to sustain attention during learning tasks. They may not be easily distracted and can maintain focus on numerical content. Moderate inquisitiveness suggests a balanced approach to problem-solving. Learners may employ effective strategies without being overly fixated on solving numerical problems at the expense of understanding the underlying concepts. Dunlosky et al. (2015) suggested that inquisitive learners are likely to be open to exploring numerical concepts. They may ask questions, seek clarification, and show a willingness to delve deeper into the subject matter. Also, Janosz (2015) noted that numerical inquisitiveness at a moderate level is associated with the development of critical thinking skills. Learners may analyze numerical information without becoming overly analytical or overly reliant on rote memorization.

*Engagement*. The second indicator of numerical inquisitiveness in this study which refer to the degree to which students actively involve themselves, show curiosity, and participate in learning activities related to numerical concepts and mathematics (Snow, 2011). Learners with moderate numerical inquisitiveness in terms of engagement are likely to actively participate in numerical tasks. They contribute without being overly dominant or passive, fostering a collaborative learning environment. Moderate inquisitiveness suggests learners have a balanced curiosity. They ask questions and seek clarification, demonstrating an interest in understanding numerical concepts without becoming overly intrusive (Blasco-Arcas et al., 2013).

As viewed by Klerlein and Hervey (2017), moderate engagement implies learners can maintain steady focus during numerical activities. They are attentive without being overly absorbed or easily distracted, contributing to effective learning. Engaged learners are open to exploring numerical problems. They show a willingness to experiment with different approaches to problem-solving, promoting a deeper understanding of numerical concepts. Poth (2018) pointed out that learners with moderate engagement levels effectively communicate their ideas related to numerical concepts. They express themselves clearly without dominating discussions, facilitating effective knowledge sharing. According to Backer et al. (2018), engaged learners actively contribute to collaborative learning efforts. They work well with peers, share insights, and contribute to group discussions without overshadowing others.

*Knowledge*. The third indicator of numerical inquisitiveness in this study which refer to the degree to which students actively seek, acquire, and engage with numerical information and concepts, demonstrating a curiosity-driven exploration of numerical knowledge (Snow, 2011). According to DiNapoli (2018), learners with moderate numerical inquisitiveness in terms of knowledge engage in balanced information seeking. They explore numerical concepts without being overly persistent or disinterested, contributing to a steady acquisition of knowledge. Moderate inquisitiveness suggests learners explore numerical knowledge with a moderate level of curiosity. They ask questions, seek information, and actively participate in learning activities without becoming overwhelmed or indifferent.

Moderately inquisitive learners effectively use learning resources. They strike a balance between exploring various sources of numerical information and avoiding information overload, leading to more efficient learning. They are likely to apply numerical concepts effectively. They use acquired knowledge to solve problems and make connections without being overly fixated on theoretical aspects (Taylor, 2016). According to Star (2015), these learners show a willingness to learn beyond the basic requirements. They may explore additional topics or delve deeper into numerical concepts without becoming overwhelmed by excessive information. Also, Reschley and Christenson (2014) affirmed that numerical inquisitiveness at a moderate level is associated with the development of critical thinking skills. Learners analyze numerical information without becoming overly analytical or neglecting the practical application of knowledge.

*Value*. The fourth indicator of numerical inquisitiveness in this study which refer to the degree to which students recognize and appreciate the practical applications, relevance, and significance of numerical concepts, demonstrating a curiosity-driven exploration of the value of numerical knowledge (Snow, 2011). According to Rajjoshi (2017), learners with high numerical inquisitiveness in terms of value exhibit a deep understanding of the practical relevance of numerical concepts. They recognize how numerical knowledge is applied in real-world situations. Goldenberg et al. (2015) proposed that high inquisitiveness implies learners appreciate the significance of numerical concepts. They understand the impact and importance of numerical knowledge in various contexts, fostering a profound respect for the subject.

High value-driven inquisitiveness leads to the versatile application of numerical concepts. Learners explore how numerical knowledge can be applied across diverse scenarios, promoting a comprehensive understanding (Ahmadi & Besançon, 2017). According to Ingram (2015), learners with high value-driven inquisitiveness are likely to engage in informed decision-making based on numerical data. They recognize the role of numerical information in making sound decisions. Adding more, the study conducted by Kele and Sharma (2015) showed that inquisitiveness implies learners integrate numerical concepts into their daily lives. They find ways to apply numerical knowledge beyond academic settings, recognizing its relevance in personal and professional spheres.

Meanwhile, learners' autonomy improves their numerical inquisitiveness by empowering them with choices, aligning learning with personal goals, encouraging exploration beyond the curriculum, providing a flexible learning pace, promoting independent problem-solving, enabling personalized goal setting, fostering intrinsic motivation, encouraging metacognitive reflection, and giving the freedom to inquire (Qarareh, 2016). More so, Cetin-Dindar (2016) found that learners with autonomy have the freedom to choose their learning path in mathematics. This empowerment fosters a sense of ownership, making them more likely to actively explore numerical concepts based on their interests and preferences. Also, Milner et al. (2012) noted that autonomous learners can align their numerical exploration with personal goals and interests. This relevance makes the learning process more meaningful, increasing their curiosity and inquisitiveness.

In addition, Adak (2017) proposed that autonomy allows learners to select their own learning resources, including textbooks, online materials, and interactive tools. This customization ensures that the resources resonate with their learning styles and preferences, enhancing numerical inquisitiveness. Also, Saeed and Zyngier (2012) found that autonomous learners are more likely to explore numerical concepts beyond the prescribed curriculum. Their curiosity extends to additional topics and applications, fostering a deeper and broader understanding of mathematics. Likewsie, Ayaz and Şekerci (2015) found that learners with autonomy can adapt their learning pace to their individual needs. This flexibility enables them to delve into numerical concepts at a comfortable speed, promoting a more thorough exploration and understanding.

*Caring Behavior of Teachers*

Caring behavior as defined by Kang (2016) refers to the actions, attitudes, and expressions that demonstrate genuine concern, empathy, and support for the well-being, academic growth, and personal development of their students. It involves fostering positive teacher-student relationships, creating a nurturing classroom environment, and addressing students' needs with compassion.. According to Weinstein et al. (2014), caring teachers contribute to a positive and comfortable learning environment. At moderate levels, students feel supported and valued, fostering a conducive atmosphere for learning without excessive dependence on emotional support. Also, Imna and Hassan (2015) found that caring behavior of teachers at moderate levels ensures that students receive balanced emotional support. Teachers acknowledge and address emotional needs without creating dependency, promoting emotional well-being.

In a study conducted by Zhu et al. (2013), result revealed that teachers' caring behavior at moderate levels positively influences students' motivation. Students feel encouraged to participate and engage in learning activities, but the motivation is balanced and not overly reliant on external validation. Also, Eaude (2011) noted that caring teachers at moderate levels contribute to the development of trust between teachers and students. Students feel secure in expressing themselves and seeking assistance, fostering a trusting teacher-student relationship. Adding more, Chang et al. (2011) proposed that learners are more likely to participate actively in class activities and discussions when teachers exhibit caring behavior at moderate levels. They feel encouraged but not excessively dependent on teacher validation for their contributions.

As pointed out by Alkin (2013), teachers' caring behavior influences students' sense of validation. At moderate levels, students appreciate teacher approval, but their self-esteem and confidence are not overly dependent on constant affirmation. Adding more, Abdel-Razek (2011) proposed that the caring behavior of teachers contributes to the development of healthy teacher-student relationships. At moderate levels, these relationships are characterized by support and encouragement without creating an unhealthy dependency. Likewise, Putter (2010) found that teachers' caring behavior at moderate levels provides a supportive academic environment. Students receive assistance and guidance, promoting academic growth without fostering an excessive reliance on teacher intervention.

Moreover, Alzahrani and Woollard (2013) concluded that caring teachers at moderate levels foster resilience in students. Students learn to navigate challenges independently, developing a sense of self-efficacy without relying excessively on external support. Also, Ndon (2012) noted that teachers' caring behavior encourages autonomy in students' learning at moderate levels. Students feel empowered to take initiative, make decisions, and demonstrate independence without relying excessively on teacher direction. According to Cooper and White (2012), caring teachers contribute to students' personal development at moderate levels. Students experience emotional support and encouragement, fostering growth without creating an environment of overdependence.

On one hand, the caring behavior of teachers can significantly improve learners' autonomy. For instance, Alt (2016) found that caring teachers establish a safe and supportive classroom environment where students feel comfortable expressing their thoughts, opinions, and questions. This encouragement of self-expression contributes to the development of learners' autonomy as they learn to communicate independently. Arefi and Naghebzadeh (2014) concluded that caring teachers involve students in certain classroom decisions, such as choosing topics for projects or determining the format of assessments. This inclusion in decision-making empowers students, fostering a sense of autonomy. Likewise, Areepattamannil (2014) noted that teachers who exhibit caring behavior provide students with guided choices within the curriculum. This allows learners to have a degree of control over their learning paths, promoting autonomy while still operating within the framework of the curriculum.

The study conducted by McDougall (2015) showed that caring teachers assist students in setting academic and personal goals. By guiding goal-setting processes, teachers help learners take ownership of their objectives, promoting a sense of autonomy in the pursuit of those goals. Similarly, Cirik, Colak and Kaya (2013) found that caring teachers encourage students to reflect on their learning processes and achievements. This self-reflection fosters metacognitive skills, helping learners become more self-aware and autonomous in managing their own learning. Also, Evans (2014) proposed that caring teachers offer constructive feedback that focuses on improvement rather than evaluation. This approach helps students develop the ability to assess their own work critically, fostering autonomy in the learning and self-improvement process.

On the other hand, caring behavior of teachers improves learners' numerical inquisitiveness. The study conducted by Lund and Hauge (2012) showed that caring teachers contribute to a positive attitude toward mathematics. By fostering a supportive and encouraging environment, they help students view numerical challenges with optimism, enhancing their curiosity and inquisitiveness. Similarly, Bay et al. (2013) proposed that caring teachers recognize and address math anxiety by providing emotional support during challenging numerical tasks. This emotional support helps students feel more comfortable exploring and inquiring about mathematical concepts. Likewise, Laal and Laal (2012) found that caring teachers create a nurturing learning environment where students feel safe to ask questions and make mistakes. This safe space encourages learners to be more inquisitive about numerical concepts without fear of judgment.

Moreover, literatures indicates that the caring behavior of teachers mediates the relationship between learners' autonomy and numerical inquisitiveness. For instance, Isaacs (2013) found that caring teachers foster a supportive environment where autonomy is valued. Their encouragement and support create a conducive atmosphere for students to exercise autonomy in their numerical exploration. Learners with autonomy are more likely to exhibit numerical inquisitiveness, as they feel empowered to explore mathematical concepts independently. Ruey (2012) affirmed that caring teachers reinforce learners' confidence by providing positive feedback and acknowledging their autonomy. This support enhances learners' belief in their ability to explore numerical concepts with curiosity. Likewise, Gee (2013) highlighted that learners with autonomy are more likely to pursue curiosity-driven learning, exploring numerical concepts based on their interests and preferences. Caring teachers actively encourage and nurture students' curiosity. They provide a supportive space where learners feel comfortable asking questions and exploring numerical concepts independently.

As proposed by Kober (2015), autonomous learners have the freedom to explore and inquire about numerical concepts in their own way. Caring teachers recognize and validate learners' inquisitive behavior. Their positive reinforcement reinforces the value of autonomy-driven exploration, creating a feedback loop that encourages further curiosity. Adding more, Kelly (2014) found that autonomy involves the responsibility of overcoming challenges. Learners with autonomy may face difficulties in their numerical exploration. Caring teachers provide emotional support during challenges. Their understanding and encouragement help learners navigate obstacles, ensuring that autonomy is not hindered by emotional setbacks. Also, Nayak (2012) asserted that learners exercising autonomy contribute to shaping a positive learning culture where independence and self-directed learning are valued. Caring teachers actively nurture a positive learning culture. Their support for autonomy aligns with the overall cultivation of an environment where inquisitiveness is encouraged and celebrated.

*Synthesis*

Therefore, this portion of the paper provides the researcher the result of other researches to which the present study is related or has some bearing and similarity. More so, the literature showed that learners’ autonomy as proposed by Ayyildiz and Tarhan (2015) is measured in terms of willingness to learn, learning accountability, impulsement, and ability to plan learning. Numerical inquisitiveness as contextualized by Snow (2011) is indicated with emotion, engagement, knowledge, and value. This give the author sufficient background in understanding the study.

*Theoretical/Conceptual Framework*

The study is anchored on the proposition of Isaacs (2013) that caring teachers foster a supportive environment where autonomy is valued. Their encouragement and support create a conducive atmosphere for students to exercise autonomy in their numerical exploration. Learners with autonomy are more likely to exhibit numerical inquisitiveness, as they feel empowered to explore mathematical concepts independently. According to Ruey (2012), caring teachers reinforce learners' confidence by providing positive feedback and acknowledging their autonomy. This support enhances learners' belief in their ability to explore numerical concepts with curiosity. Nayak (2012) asserted that learners exercising autonomy contribute to shaping a positive learning culture where independence and self-directed learning are valued. Caring teachers actively nurture a positive learning culture

In support, Cetin-Dindar (2016) postulated that learners with autonomy have the freedom to choose their learning path in mathematics. This empowerment fosters a sense of ownership, making them more likely to actively explore numerical concepts based on their interests and preferences. Lund and Hauge (2012) showed that caring teachers contribute to a positive attitude toward mathematics. By fostering a supportive and encouraging environment, they help students view numerical challenges with optimism, enhancing their curiosity and inquisitiveness. Similarly, Bay et al. (2013) proposed that caring teachers recognize and address math anxiety by providing emotional support during challenging numerical tasks. This emotional support helps students feel more comfortable exploring and inquiring about mathematical concepts.

As shown in *Figure 1*, this study consists of three variables. The independent variable is the learners’ autonomy or the set of abilities help students to determine what one needs for learning. As proposed by Ayyildiz and Tarhan (2015) the measures of learners’ autonomy are willingness to learn or the importance given by the individual on learning; learning accountability or one’s responsibility on their own learning; impulsement or the motivation and eagerness towards learning; and ability to plan learning or one’s initiative to plan.

The dependent variable is numerical inquisitiveness or the feelings, beliefs and values held about an object that may be the enterprise of math, school math, and the impact of mathematics on society or mathematicians themselves. According to Snow (2011) the measures of numerical inquisitiveness are emotion or the emotional attachment on the math, engagement or the being engage in math activities, knowledge or the intensity and difficulty of math, and value or the usefulness of mathematics. Lastly, the mediating variable is caring behavior or the adversarial relationship between teachers and students may also be due to teachers' tendency to define caring in warm, fuzzy terms (Kang, 2016).

*Independent Variable Dependent Variable*

*Numerical Inquisitiveness*

* Emotion
* Engagement
* Knowledge
* Value

**Source:** Snow, G. M. (2011). Development of a math interest inventory to identify gifted students from underrepresented and diverse populations. *Masters Theses & Specialist Projects. Paper* 1052.

*Autonomy*

* Willingness to Learn
* Learning Accountability
* Impulsement
* Ability to Plan Learning

**Source:** Ayyildiz, Y., & Tarhan, L. (2015). Development of the self-directed learning skills scale. *International Journal of Lifelong Education, 34*(6), 663-679, http://10.1080/02601370.2015.1091393

*Caring Behavior of Teachers*

**Source**: Kang, M. (2016). *Towards caring classroom: Analysis of teacher-students dialogue in grade 6 in South Korea*.

*Figure 1*. The Conceptual Framework of the Study

*Statement of the Problem*

The primary aim of this study was to determine the mediating effect of caring behavior of teachers on the relationship between learners’ autonomy and numerical inqusitiveness in Bunawan District, Davao City. Specifically, this study seek to answer the following questions:

1. What is the extent of learners’ autonomy in terms of:

1.1 willingness to learn;

1.2 learning accountability;

1.3 impulsement; and

1.4 ability to plan learning?

1. What is the extent of learners’ numerical inquisitiveness in terms of:

2.1 emotion;

2.2 engagement;

2.3 knowledge; and

2.4 value?

1. What is the extent of caring behavior of teachers in Bunawan District, Davao City?
2. Is there a significant relationship among learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers in Bunawan District, Davao City?
3. Does caring behavior of teachers significantly mediates the relationship between learners’ autonomy and numerical inquisitiveness in Bunawan District, Davao City?

*Hypothesis*

 The following null hypotheses were tested at 0.05 level of significance:

H01: There is no significant relationship among learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers in Bunawan District, Davao City.

H02: Caring behavior of teachers does not significantly mediates the relationship between learners’ autonomy and numerical inquisitiveness in Bunawan District, Davao City.

*Department of Education*. Research on learners’ autonomy and numerical inquisitveness can provide valuable insights into the factors that influence learners' engagement and motivation in mathematics. The Department of Education can use this research to inform the development of education policies and initiatives aimed at promoting math interest among learners. For example, the findings can guide the design of curriculum frameworks, teaching strategies, and assessment methods that foster learners’ numerical inquisitiveness.

*Policy Makers*. Research on learners’ autonomy and numerical inquisitveness can contribute to the development of math curricula that are more engaging and relevant to students. Policy makers can use the findings to advocate for curriculum revisions that incorporate real-world applications, problem-solving activities, and hands-on experiences to enhance math interest. This can help students see the practical value and relevance of mathematics in their lives. Also, policy makers can use research on learners’ autonomy and numerical inquisitveness to allocate resources effectively. By understanding the factors that contribute to math interest, they can allocate funding and support to initiatives that have been shown to positively impact student interest in mathematics.

*Teachers*. Research on numerical inquisitveness can provide teachers with insights into effective instructional strategies that can engage and motivate students in mathematics. By understanding the factors that influence math interest, teachers can adapt their teaching methods to create a more engaging and meaningful learning experience for students. They can incorporate activities, examples, and resources that cater to students' interests and promote a positive attitude towards math. Adding more, studies on numerical inquisitveness can help teachers recognize the diverse interests and learning preferences of their students. This knowledge allows them to personalize their instruction, tailoring activities and assignments to align with students' individual interests and strengths.

*Learners*. Research on numerical inquisitveness can help learners develop a positive attitude and intrinsic motivation towards mathematics. Understanding the factors that influence numerical inquisitveness can enable learners to identify their own interests and strengths in math, leading to greater engagement and perseverance in their learning journey. When learners are interested and motivated in math, they are more likely to invest effort and time into their studies. This can lead to improved performance and achievement in mathematics. Research on learners’ autonomy and numerical inquisitveness can provide insights into effective instructional strategies and interventions that can support students in developing a strong foundation in math concepts and skills.

*Future researchers*. Other researchers would benefit on the result of this study because the findings may provide framework and model for the future researches in the context of numerical inquisitveness of learners as well as their autonomy.

For more comprehensive understanding, the following terms were defined operationally:

*Learners’ Autonomy.*It is conceptually defined as the ability and willingness of students to take control of their own learning processes. In this study refers to the independent variable being described in terms of willingness to learn, learning accountability, impulsement, and ability to plan learning.

*Numerical Inquisitiveness.*It is conceptually defined as the extent of curiosity, interest, and eagerness displayed by learners when engaging with numerical concepts, problems, and mathematical content. In this study refers to the dependent variable being describe in terms of the following indicators: emotion, engagement, knowledge, and value.

*Caring Behavior*. It is conceptually defined as the actions, attitudes, and expressions that demonstrate genuine concern, empathy, and support for the well-being, academic growth, and personal development of their students. In this study refers to the mediating variable being expected to contribute to the relationship between the independent and dependent variables.

**CHAPTER 2**

**Method**

This section contains the research design, research respondents, research instrument, data gathering procedure, and data analysis.

*Research Design*

In this study, the researcher utilized quantitative using mediation analysis to gather data ideas, facts and information related to the study. [Bhandari](https://www.scribbr.com/author/pritha/%22%20%5Co%20%22All%20articles%20by%20Pritha%20Bhandari) (2020) described quantitative research as a research strategy that focuses on quantifying the collection and analysis of data. It is formed from a deductive approach where emphasis is placed on the testing of theory, shaped by empiricist and positivist philosophies, while non-experimental research is a research that lacks the manipulation of an independent variable.

Meanwhile, mediation analysis is a statistical method used to quantify the causal sequence by which an antecedent variable causes a mediating variable that causes a dependent variable (Mackinnon, 2019). Specifically, the study focused on determining the mediating effect of caring behavior on the relationship between learners’ autonomy and numerical inquisitiveness. In mediation analysis defines the direct, indirect, and total effects in terms of the linear regression coefficients. The total effect is defined and estimated as the c coefficient and the direct effect is defined and estimated as the c’ coefficient. The indirect effect is defined and estimated as the product of the a and b coefficients (ab) and as the difference between the c coefficient and the c’ coefficient. In this study, the researcher made use of mediation analysis because it provides information about the process by which an independent variable affects a dependent variable.

### *Research Respondents*

The respondents of the study were the elementary school teachers in Bunawan District, Davao City. In this study, the 215 respondents was selected through stratified random sampling technique. Stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata. According to Shi (2015), in stratified random sampling, or stratification, the strata are formed based on members' shared attributes or characteristics such as income or educational attainment Stratified random sampling is appropriate in this study because because there is heterogeneity in a population that can be classified with ancillary information.

In this study, certain inclusion criteria were implemented in determining the respondents of the study. The primary consideration of this study is to select respondents who can provide information to achieve the purpose of this study. The inclusion criteria are as follows: teachers with a minimum of a bachelor's degree in mathematics education, mathematics, or a related field; teachers with a minimum of three years of experience in teaching mathematics; teachers who have experience implementing autonomous teaching strategies or incorporating autonomy-promoting methods in their mathematics instruction; and those who voluntarily signed the ICF were given the survey questionnaires. Moreover, the study was delimited only to the nature of the problem based on the research questions and thus it did not consider the gender and socio-economic status of the teachers.

*Research Instrument*

The study employed the questionnaires adapted from different studies and was modified to fit the context of the respondents of this study. The instrument was divided into two parts. The first tool is about learners’ autonomy. This questionnaire was adapted from Ayyildiz and Tarhan (2015) which has four indicators namely: willingness to learn, learning accountability, impulsement, and ability to plan learning. The reliability of the new scale obtained Cronbach's alpha value of 0.956 interpreted as excellent, indicating high reliability and consistency among the items. The instrument made use of a 5-point Likert scale that was determined base on the following range of mean:

|  |  |  |
| --- | --- | --- |
| *Range of Mean* | *Descriptive Level* | *Interpretation* |
| 4.20 - 5.00 | Very Extensive | The learners’ autonomy is always observed. |
| 3.40 – 4.19 | Extensive | The learners’ autonomy is oftentimes observed. |
| 2.60 – 3.39 | Moderately Extensive | The learners’ autonomy is sometimes observed. |
| 1.80 – 2.59 | Less Extensive | The learners’ autonomy is rarely observed. |
| 1.00 – 1.79 | Not Extensive | The learners’ autonomy is never observed. |

The second part was about that learners’ numerical inquisitiveness which was adapted from the study of Snow (2011). The questionnaire is composed of items indicated with emotion, engagement, knowledge, and value. The reliability of the new scale obtained Cronbach's alpha value of 0.930 interpreted as excellent, indicating high reliability and consistency among the items. More so, this questionnaire was subjected for content validity by panel of experts to test its validity. As a guide in determining the extent of learners’ numerical inquisitiveness, the researcher made use of the range of means, description and interpretation as presented below:

|  |  |  |
| --- | --- | --- |
| *Range of Mean* | *Descriptive Level* | *Interpretation* |
| 4.20 - 5.00 | Very Extensive | The learners’ numerical inquisitiveness is always manifested. |
| 3.40 – 4.19 | Extensive | The learners’ numerical inquisitiveness is oftentimes manifested. |
| 2.60 – 3.39 | Moderately Extensive | The learners’ numerical inquisitiveness is sometimes manifested. |
| 1.80 – 2.59 | Less Extensive | The learners’ numerical inquisitiveness is seldom manifested. |
| 1.00 – 1.79 | Not Extensive | The learners’ numerical inquisitiveness is never manifested. |

The third part was about that caring behavior of teachers which was adapted from the study of Kang (2016). The reliability of the new scale obtained Cronbach's alpha value of 0.942 interpreted as excellent, indicating high reliability and consistency among the items. More so, this questionnaire was subjected for content validity by panel of experts to test its validity. As a guide in determining the extent of caring behavior of teachers, the researcher made use of the range of means, description and interpretation as presented below:

|  |  |  |
| --- | --- | --- |
| *Range of Mean* | *Descriptive Level* | *Interpretation* |
| 4.20 - 5.00 | Very Extensive | The caring behavior of teachers is always evident. |
| 3.40 – 4.19 | Extensive | The caring behavior of teachers is oftentimes evident. |
| 2.60 – 3.39 | Moderately Extensive | The caring behavior of teachers is sometimes evident. |
| 1.80 – 2.59 | Less Extensive | The caring behavior of teachers is seldom evident. |
| 1.00 – 1.79 | Not Extensive | The caring behavior of teachers is never evident. |

*Data Gathering Procedure*

Steps were undergone by the researcher in conducting the study after the validation of the research questionnaire.

*Permission to Conduct the Study*. The researcher secured the permission to conduct the study*.* The researcher secured the endorsement from the Dean of the Graduate School in Rizal Memorial Colleges, Inc., Davao City, and the ethical clearance certification. The endorsement letter from the Dean of the Graduate School in Rizal Memorial Colleges, Inc., Davao City and the ethical clearance certification were attached to the permission letters to be endorsed to the Schools Division Superintendent, and then to the school principals of the selected elementary public schools in Bunawan District, Davao City.

*Distribution and Retrieval of the Questionnaire.* The researcher proceeded to the distribution of the research instrument to the respondents after the approval to conduct the study. The study was conducted last November 14-15, 2023. Upon the distribution of the questionnaires, the benefits of the survey was briefly discussed and explained to the identified respondents of the study. For the administration of the questionnaire, the researcher distributed the questionnaires following health protocols. The respondents of the study were given enough testing time for the questionnaires to be finished. After which, the data collected were subjected to quantitative analysis.

*Collation and Statistical Treatment of Data*. After the data retrieval of the questionnaire, the scores of each respondents was tallied to organized the data per indicator. After which, each score were subjected to descriptive and inferential analysis using SPSS.

*Ethical Considerations*

The researcher observed promptly the protocols deemed necessary as the standard guidelines in carrying out the research study following the study protocol assessments criteria, particularly in managing the population and data. The survey questionnaires with supporting authors were submitted for further evaluation. After the approval from the Ethics Committee the researcher proceeded to the next phase of the study.

*Informed Consent*. The researcher asked for the permission of respondents through a written informed consent. They were properly informed about the purpose of the study and ample explanations were given to them for better understanding of the reason for their participation so that they can choose whether to participate or not.

It was made clear that respondents involvement in the study is voluntary. If ever they would refuse to participate, they were not forced by the researcher. Besides, the researcher was cautious to assure the respondents’ psychological well-being. A written permission from the respondents were secured from them. The researcher informed the respondents that the study aimed to conduct a study on the factors that hinder/promote the learners’ numerical inquisitveness in relation to autonomy as mediated by caring behavior of teachers, and may contribute to the enhancement.

*Vulnerability of Research Participants*. The respondents of the study are teachers so they are not considered vulnerable since all of them are in legal age, and, they are not considered highly vulnerable in the psychological aspect. The researcher emphasized that the survey was be set at the respondents’ convenience. Also, the researcher protected the confidentiality of the information disclosed.

*Privacy and Confidentiality*. This study observed the data Privacy Act of 2012 wherein the researcher assured that the data cannot be traced back to the participants which were the real source of information, to protect the identities of the respondents. Moreover, the researcher assured that no personal data would be shared without the consent of the participants. Thus, to ensure that no personal data would be exposed, the access was limited to the researcher alone. To protect the privacy of the respondents, it was assured that the researcher is the only person that could access the survey information. After the necessary data was collected, the researcher permanently deleted all the survey result to assure that data cannot be traced back to the respondents who were the real source of information.

*Risk, Benefits and Safety* - In administering the survey questionnaires, the researcher fully disclosed to the respondents the nature of their participation and explained thoroughly and properly the purpose and benefits of the study as well as the confidentiality of their responses as stated in the survey questionnaire. The respondents, without restrictions was able to ask questions related to the study. Further, the researcher ensured that the respondents were not be subjected to harm in any ways whatsoever. Moreover, the questionnaire and interview guide that were used in this study did not contain any degrading or unacceptable statements offensive to the respondents of the study.

Likewise, this study is designed purely to collect academic information related to the study and they were not asked with personal information. To minimize inconvenience, the researcher made sure that the respondents were given ample time to answer the survey questionnaire. The respondents were given freedom not to answer questions which made them feel any psychological and emotional distress and they would be free to withdraw as a respondent of the study if they would feel that they cannot discuss the information that being asked from them. The researcher valued their participation and placed their welfare as the highest priority during the course of the study.

*Justice*. To avoid impartiality in choosing the respondents, the researcher regarded all respondents equal regardless if they would be respondent in the survey. The researcher did not prejudiced in choosing the respondents of the study. Anybody who fitted the qualifications of being permanent-regular in the purposively selected schools. During the conduct of the study, the researcher made certain to respect the respondents by interrupting as little time as possible to the routine of the respondents. To compensate for the time spent during data gathering, the researcher gave tokens of appreciation to the respondents. This token was an assortment of souvenir. The tokens were sent via courier, and these was sealed carefully in a package. Also, each tokens were sanitized before having it sent to your doorstep.

*Transparency*. To provide transparency in this study, any type of communication in relation to the research was done with honesty and transparency. To safeguard the welfare of the respondents, the researcher properly implemented the methods that are discussed to use in this study. All the necessary documents that supported the data analysis was included.

*Qualification of the Researcher.*The researcher ensured that the responses of the respondents were not influence by any other factor like the conflict of interest. The findings of the study could be accessed by the respondents and parents, and school administrators of the participating schools because the information would be made available as long as they followed proper protocol to protect the anonymity of the respondents. The researcher also acknowledged the effort of every person who contributed to the success of the study, the Division of Davao City was given a furnished copy of the results of the research so it can be accessed by the respondents and be used for learning and further study.

*Adequacy of Facilities.* The researcher engaged the respondents in a conducive environment and learning materials which were ample and available in the conduct of the study and was done within the time set by the researcher. The accuracy of gathering data from the respondents was ensured by encoding properly the ratings of the respondents during the day when the researcher was not too tired to do them to avoid errors in encoding. Also, the analysis and results gathered were proficient and aligned that serves as a primary basis for adequacy.

*Community Involvement.*It was a good practice to have community involvement during every phase of research from planning to reporting. Hence, the researcher planned to share the findings generated with the community, and community involvement will be accorded with primacy in making decisions about the research agenda, appropriate method to apply in their context, and use of the results or findings. The findings of this study will then be shared back with the community through gatherings, fora, and conferences.

*Data Analysis*

The following were the statistical tools utilized by the researcher in processing the gathered data:

*Mean.* This was useful in characterizing the learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers. This was use to supply the answer for objectives 1, 2 and 3.

*Pearson Product Moment Correlation.* It was used in this study to asses the significant relationship between independent (autonomy), dependent (numerical inquisitiveness), and mediator (caring behavior of teachers) variables. It is a statistical measure of the strength of a linear relationship between paired data. In a sample it is usually denoted by r. This was use to supply the answer for objective 4.

*Multiple Regression Analysis.* It was applied to evaluate the significance on the mediating effect of mediator (caring behavior of teachers) on the relationship between independent (autonomy) and dependent (numerical inquisitiveness) variables. This was use to supply the answer for objective 5.

**CHAPTER 3**

**Results and Discussions**

This chapter presents the results generated from the data gathered. It is sequenced based on the objectives of the study as presented in the first chapter. Thus, it presents the extents of learners’ autonomy, numerical inquisitiveness, and caring brhavior of teachers; the significant relationship between among learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers in Bunawan District, Davao City; and the mediating effect of caring behavior of teachers on the relationship between learners’ autonomy and numerical inquisitiveness in Bunawan District, Davao City.

*Learners’ Autonomy*

*Willingness to Learn.* Table 1 shows that the learners’ autonomy was assessed by the respondents as moderately extensive with a category mean of 3.33, interpreted as sometimes observed by the teachers in Bunawan District, Davao City. The mean rating of the different items ranges from 2.43 to 4.03. On one hand, the item *Learners believing that what they learn in is more important than getting a passing grade* has a mean rating of 2.43, described as less extensive and interpreted as sometimes observed by the respondents. On the other hand, the item *Learners believing in the importance of playing an active role in learning* reflects a mean of 4.03 described as extensive and interpreted as oftentimes observed by the learners.

|  |
| --- |
| Table 1. *Learners’ Autonomy in Terms of Willingness to Learn* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Learners are reviewing notes during leisure time to be didactic.
 | 3.23 | Moderately Extensive |
| 1. Learners prioritizing time for learning while planning a new day.
 | 3.64 | Extensive |
| 1. Learners believing in the importance of playing an active role in learning.
 | 4.03 | Extensive |
| 1. Learners believing that what they learn in is more important than getting a passing grade.
 | 2.43 | Less Extensive |
| ***Mean*** | **3.33** | ***Moderately Extensive*** |

The result implies that the ability and willingness of students to take charge of their own learning is sometimes observed among the learners in Bunawan District, Davao City. This supports the findings of Bray and McCLaskey (2015) that a moderate level of willingness to learn can positively impact students' motivation. When students are moderately willing to learn, they are likely to be more engaged in their studies and exhibit a balanced level of intrinsic motivation. This result reflects the same findings to Grant and Basye’s (2014) study that willingness to learn may contribute to the development of learners' autonomy. Students with a moderate level of willingness are often open to exploring various learning approaches, allowing them to gradually take more control over their learning processes

*Learning Accountability.* Results on table 2 shows that learners’ autonomy in terms of learning accountability got an extensive category mean rating of 3.55 which means that this domain of learners’ autonomy is oftentimes observed among the learners. The mean rating of the different items ranges from 3.24 to 4.14. The item *Learners being held responsible for their own learning* reflects a mean rating of 3.24 described as moderately extensive and interpreted as item sometimes observed*.* Meanwhile, the item *Learners taking time to learn related previous subjects well in order to learn a new subject without difficulty* shows a rating of 4.14, described as extensive and interpreted as item oftentimes observed among the learners in Bunawan District, Davao City.

|  |
| --- |
| Table 2. *Learners’ Autonomy in Terms of Learning Accountability* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Learners using the internet for learning purposes, instead of having a good time.
 | 3.27 | ModeratelyExtensive |
| 1. Learners being held responsible for their own learning.
 | 3.24 | Moderately Extensive |
| 1. Learners taking time to learn related previous subjects well in order to learn a new subject without difficulty.
 | 4.14 | Extensive |
| ***Mean*** | **3.55** | ***Extensive*** |

The result means that the ability of learners to take responsibility for their own learning processes, set meaningful goals, and assess their progress is oftentimes observed. This supports Manavipour and Saeedian’s (2016) findings that students with a high level of autonomy are more likely to set ambitious and meaningful learning goals. They actively work towards achieving these goals, resulting in a higher likelihood of success and accomplishment. According to Soyogul (2015), they are often associated with strong self-regulation skills. Students take ownership of their schedules, allocate time efficiently for learning tasks, and demonstrate effective time management. Adding more, the result is similar to Ng’s (2012) assertion that autonomous learners at high levels are adept at making informed decisions about their learning

*Impulsement.* Specifically, learners’ autonomy in terms of impulsement acquired a category mean of 3.26 described as moderately extensive which means that this domain learners’ autonomy is sometimes observed among the learners. The table further reveals that the mean rating of the items ranges from 3.02 to 3.46. It is noteworthy that item *Learners are being motivated in learning even in the presence of distracting factors* has a mean rating of 3.02, described as moderately extensive*,* interpreted as item sometimes observed while item *Learners learning a lesson, no matter how it is complicated* has a mean rating of 3.46, described as extensive and interpreted as item oftentimes observed by the learners.

|  |
| --- |
| Table 3. *Learners’ Autonomy in Terms of Impulsement* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Learners learning a lesson, no matter how it is complicated.
 | 3.46 | Extensive |
| 1. Learners are being motivated in learning even in the presence of distracting factors.
 | 3.02 | Moderately Extensive |
| 1. Learners being not bothered even if they could not solve the problems that they encounterred.
 | 3.43 | Extensive |
| 1. Learners are planning what should do instead of feeling despair when they encounter a difficult subject.
 | 3.13 | Moderately Extensive |
| ***Mean*** | **3.26** | ***Moderately Extensive*** |

This implies that the capacity of students to make independent decisions and take actions in their learning process based on their immediate inclinations, instincts, or spontaneous reactions is sometimes observed. The result is congruent to the view of Curtis (2017) that learners with moderate autonomy levels may demonstrate adaptive decision-making, combining their spontaneous responses with a consideration of their learning objectives and constraints. Adding more, the result is in agreement with Horn and Staker’s (2013) view that learners at moderate autonomy levels might engage in calculated risk-taking, experimenting with new ideas or approaches while maintaining a balance with established learning methods.

*Ability to Plan Learning.* Results on table 4 shows that learners’ autonomy in terms of ability to plan learning got an extensive category mean rating of 3.71 which means that this domain learners’ autonomy is oftentimes observed in Bunawan District, Davao City. The mean rating of the different items ranges from 3.14 to 4.24. The item *Learners organizing study hours by making plans* reflects a mean rating of 3.14 described as moderately extensive and interpreted as item sometimes observed*.* Meanwhile, the item *Learners knowing clearly and implicitly the objectives of the new subject to be learned* shows a rating of 4.24, described as very extensive and interpreted as item always observed among the learners.

|  |
| --- |
| Table 4. *Learners’ Autonomy in Terms of Ability to Plan Learning* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Learners solving the problems during learning based on cause-and-effect relationship.
 | 3.27 | ModeratelyExtensive |
| 1. Learners organizing study hours by making plans.
 | 3.14 | Moderately Extensive |
| 1. Learners knowing clearly and implicitly the objectives of the new subject to be learned.
 | 4.24 | Very Extensive |
| 1. Learners finishing homework at the last moment.
 | 4.11 | Extensive |
| 1. Learners reviewing the previous knowledge that forms the basis for the new subject when they start to learn something new.
 | 3.78 | Extensive |
| ***Mean*** | ***3.71*** | ***Extensive*** |

This implies that the capacity of students to independently and proactively organize, strategize, and schedule their learning activities is oftentimes observed among the learners. This supports Mbatha’s (2015) idea that autonomy in planning learning involves setting clear and meaningful goals. Students with this level of autonomy are adept at defining their learning objectives in alignment with their overall educational aims. Adding more, the result supports the assertion of Harding (2019) that high autonomy entails the ability to select and utilize diverse learning resources judiciously. Students make informed choices about textbooks, online materials, and other resources that enhance their understanding of the subject matter.

Lastly, Table 5 shows the summary on learners’ autonomy in Bunawan District, Davao City. It shows that the overall mean of learners’ autonomy is 3.46 which is described as extensive. It means that learners’ autonomy is oftentimes observed. More so, learners’ autonomy in terms of ability to plan learningacquired the highest mean score of 3.71 described as extensive and interpreted as oftentimes observed, while, learners’ autonomy in terms of impulsement obtains the lowest mean score of 3.26 described as moderately extensive and interpreted as sometimes observed by the teachers in Bunawan District, Davao City.

|  |
| --- |
| Table 5. *Summary on Learners’ Autonomy in* *Bunawan District, Davao City* |
| **Indicators** | **Mean** | **Descriptive Equivalent** |
| Willingness to Learn | 3.33 | Extensive |
| Learning Accountability | 3.55 | Extensive |
| Impulsement | 3.26 | Moderately Extensive |
| Ability to Plan Learning | 3.71 | Extensive |
| ***Overall*** | **3.46** | ***Extensive*** |

 The result implies that learners actively engage in their education, demonstrating a sense of responsibility and ownership over their learning journey. This supports the view of González (2017) that high autonomy fosters a mindset of continuous learning. Students exhibit curiosity and a willingness to explore beyond the prescribed curriculum, developing a passion for learning that extends beyond formal education. The active engagement characteristic of autonomy contributes to enhanced memory retention. Learners at high autonomy levels often remember and understand concepts more deeply due to their immersive learning experiences. This also congruent to Hall’s (2011) findings that high autonomy implies active involvement in the learning process. Students take ownership of their education, seeking out opportunities for enrichment, and showing a genuine interest in the subject matter.

*Learners’ Numerical Inquisitiveness*

*Emotion*. Table 6 shows that learners’ numerical inquisitivenesswas described by the respondents in Bunawan District in Davao City as moderately extensive with a category mean of 3.12. This means that the learners’ numerical inquisitivenessis sometimes observed. The mean rating of the different items ranges from 2.22 to 4.13. The item *Believing that learning math is cool* shows a mean rating of 2.22, described as less extensive and interpreted as this item seldom observed by the learners. Further, the item *Seeing mathematics as something fun to learn* has a mean rating of 4.13, described as extensive and interpreted as this item oftentimes manifested.

This implies a positive emotional connection without extremes. Learners may view numerical concepts with a moderate level of positivity, associating them with interest and satisfaction. The result is congruent to Reeve’s et al. (2015) idea that learners with moderate numerical inquisitiveness are likely to show balanced interest and engagement with numerical concepts. They may neither be overly enthusiastic nor completely disinterested, maintaining a steady engagement level. This also supports Gurat’s (2018) findings that learners at moderate levels of numerical inquisitiveness are expected to sustain attention during learning tasks. They may not be easily distracted and can maintain focus on numerical content.

|  |
| --- |
| Table 6. *Learners’ Numerical Inquisitiveness in Terms of Emotion* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Finding math as an interesting subject.
 | 3.12 | Moderately Extensive |
| 1. Liking math.
 | 3.42 | Extensive |
| 1. Seeing mathematics as something fun to learn.
 | 4.13 |  Extensive |
| 1. Finding mathematics an interesting concept rather than a boring subject.
 | 2.72 | Moderately Extensive |
| 1. Believing that learning math is cool.
 | 2.22 | Less Extensive |
| **Mean** | ***3.12***  | ***Moderately Extensive*** |

*Engagement.* This domain in learners’ numerical inquisitiveness in terms of engagement as shown in Table 7 reflects as moderately extensive category mean of 3.20 which means that it is sometimes manifested among the learners. Notably, the mean ratings of the different items range from 2.38 to 4.09. The table further reveals that the item *Going places to learn about math* has a mean rating of 2.38 described as less extensive and interpreted as item seldom manifested by the learners.Meanwhile, the item *Looking at websites about math* has mean rating of 4.09 described as extensive and interpreted as learners’ numerical inquisitiveness is oftentimes manifested in Bunawan District, Davao City.

The result implies that the degree to which students actively involve themselves, show curiosity, and participate in learning activities related to numerical concepts and mathematics is sometimes manifested in Bunawan District, Davao City. This supports the idea of Blasco-Arcas et al. (2013) that learners with moderate numerical inquisitiveness in terms of engagement are likely to actively participate in numerical tasks. They contribute without being overly dominant or passive, fostering a collaborative learning environment. Adding more, the result also supports Klerlein and Hervey’s (2017) findings that moderately engaged learners can maintain steady focus during numerical activities. They are attentive without being overly absorbed or easily distracted, contributing to effective learning. Engaged learners are open to exploring numerical problems.

|  |
| --- |
| Table 7. *Learners’ Numerical Inquisitiveness in Terms of Engagement* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Talking to family or friends about things they learned in math class.
 | 3.26 | Moderately Extensive |
| 1. Watching television shows about math.
 | 3.45 | Extensive |
| 1. Looking at websites about math.
 | 4.09 | Extensive |
| 1. Playing math computer games.
 | 3.10 | Moderately Extensive |
| 1. Reading books about math.
 | 2.65 | Moderately Extensive |
| 1. Going places to learn about math.
 | 2.38 | Less Extensive |
| 1. Liking to do math problems.
 | 3.49 | Extensive |
| **Mean** | ***3.20***  | ***Moderately Extensive*** |

*Knowledge.* This domain as shown in Table 8 has a category mean of 3.25 described as moderately extensive and interpreted that this domain of learners’ numerical inquisitiveness is sometimes manifested in Bunawan District, Davao City. Adding on, the mean ratings of the different items range from 2.10 to 3.89. Specifically, the item *Doing well in math classes* has a mean rating of 2.10 described as less extensive and interpreted as item seldom manifested by the learners. The item *Believing that the concepts in math are not hard to understand* reflects a mean rating of 3.89 described as extensive and interpreted as item oftentimes manifested among the learners.

|  |
| --- |
| Table 8. *Learners’ Numerical Inquisitiveness in Terms of Knowledge* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Knowing a lot about math.
 | 3.35 | Moderately Extensive |
| 1. Being good at math.
 | 3.62 | Extensive |
| 1. Believing that the concepts in math are not hard to understand.
 | 3.89 | Extensive |
| 1. Doing well in math classes.
 | 2.10 | Less Extensive |
| 1. Finding math as an easy subject.
 | 3.29 | Moderately Extensive |
| **Mean** | ***3.25*** | ***Moderately Extensive*** |

 The result indicates that the degree to which students actively seek, acquire, and engage with numerical information and concepts, demonstrating a curiosity-driven exploration of numerical knowledge is sometimes manifested in Bunawan District, Davao City. The result supports the idea of DiNapoli (2018) that learners with moderate numerical inquisitiveness in terms of knowledge engage in balanced information seeking. They explore numerical concepts without being overly persistent or disinterested, contributing to a steady acquisition of knowledge. According to Star (2015), these learners show a willingness to learn beyond the basic requirements. They may explore additional topics or delve deeper into numerical concepts without becoming overwhelmed by excessive information.

*Value.* This domain learners’ numerical inquisitiveness in terms of value as shown in Table 9 reflects as extensive category mean of 3.40 which means that it is oftentimes manifested among the learners. Notably, the mean ratings of the different items range from 3.16 to 3.55. The table further reveals that the item *Believing that learning mathematics is important has* a mean rating of 3.16 described as moderately extensive and interpreted as item sometimes manifested by the learners.Meanwhile, the item *Being honest with others in my thoughts and feelings* has mean rating of 3.55 described as extensive and interpreted as learners’ numerical inquisitiveness is oftentimes manifested.

|  |
| --- |
| Table 9. *Learners’ Numerical Inquisitiveness in Terms of Value* |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Believing that learning mathematics is

important. | 3.16 | Moderately Extensive |
| 1. Believing that learning about math is helpful in their daily routines.
 | 3.55 | Extensive |
| 1. Believing that learning mathematics is useful in my future career.
 | 3.49 | Extensive |
| **Mean** | ***3.40*** | ***Extensive*** |

The result means that the degree to which students recognize and appreciate the practical applications, relevance, and significance of numerical concepts, demonstrating a curiosity-driven exploration of the value of numerical knowledge is oftentimes observed. This is congruent to Rajjoshi’s (2017) findings that learners with high numerical inquisitiveness in terms of value exhibit a deep understanding of the practical relevance of numerical concepts. They recognize how numerical knowledge is applied in real-world situations. Goldenberg et al. (2015) noted that high inquisitiveness implies learners appreciate the significance of numerical concepts. They understand the impact and importance of numerical knowledge in various contexts, fostering a profound respect for the subject.

Lastly as shown in the Table 10 is the summary of learners’ numerical inquisitiveness in Bunawan District, Davao City. As shown in the table, learners’ numerical inquisitiveness obtained an overall mean score of 3.28 with a descriptive rating of moderately extensive and interpreted as sometimes manifested by the students of Bunawan District, Davao City. Adding more, results on Table 10 show that learners’ numerical inquisitiveness in terms of value acquired the highest mean score of 3.40 described as extensive and interpreted as oftentimes manifested, while learners’ numerical inquisitiveness in terms of emotion acquire the lowest mean score of 3.12 described as moderately extensive and interpreted as sometimes manifested by the learners.

|  |
| --- |
| Table 10. *Summary on Learners’ Numerical Inquisitiveness in* *Bunawan District, Davao City* |
| **Indicators** | **Mean** | **Descriptive Equivalent** |
| Emotion | 3.12 | Moderately Extensive |
| Engagement | 3.20 | Moderately Extensive |
| Knowledge | 3.25 | Moderately Extensive |
| Value | 3.40 | Extensive |
| ***Overall*** | ***3.28*** | ***Moderately Extensive*** |

This implies that the learners actively seek to understand, question, and explore numerical information, fostering a dynamic and inquisitive approach to mathematical learning. This support the findin gs of Waynberg and Leiken (2019) that at moderate levels of numerical inquisitiveness, learners display a balanced curiosity. They show interest in numerical concepts without being overwhelmed, maintaining a healthy level of engagement with the subject matter. Moreover, this is similar to Vale’s (2019) idea that numerical inquisitiveness at moderate levels contributes to sustained engagement. Learners can maintain attention during learning tasks, participating actively without experiencing excessive distraction or disinterest.

*Caring Behavior of Teachers*

Caring behavior of teachers as shown in Table 11 reflects as extensive category mean of 3.39 which means that it is oftentimes evident among teachers in Bunawan District, Davao City. Notably, the mean ratings of the different items range from 2.49 to 4.05. The table further reveals that the item *Helping learners in this class who are having trouble with their work* has a mean rating of 2.49 described as less extensive and interpreted as item seldom manifested by the teachers.Meanwhile, the item *Sharing my books, materials, and supplies with learners* has mean rating of 4.05 described as extensive and interpreted as oftentimes evident.

|  |
| --- |
| Table 11. *Caring Behavior of Teachers in Bunawan District, Davao City*  |
| **Statement** | **Mean** | **Descriptive Rating** |
| 1. Making friends with learners in this class.
 | 3.16 | Moderately Extensive |
| 1. Trying to make friends with students in the class.
 | 3.85 | Extensive |
| 1. Helping learners in this class who are having trouble with their work.
 | 2.49 | Less Extensive |
| 1. Taking a personal interest in the welfare of the learners.
 | 3.21 | Moderately Extensive |
| 1. Finding time to talk to learners individually.
 | 3.68 | Extensive |
| 1. Sharing my books, materials, and supplies with learners.
 | 4.05 | Extensive |
| 1. Giving as much attention to the questions of students
 | 3.28 | Moderately Extensive |
| **Mean** | ***3.39***  | ***Moderately******Extensive*** |

 The result implies that the actions, attitudes, and expressions that demonstrate genuine concern, empathy, and support for the well-being, academic growth, and personal development of their students is sometimes evident in Bunawan District, Davao City. This supports Weinstein’s et al. (2014) idea that caring teachers contribute to a positive and comfortable learning environment. At moderate levels, students feel supported and valued, fostering a conducive atmosphere for learning without excessive dependence on emotional support. According to Imna and Hassan (2015), caring behavior of teachers at moderate levels ensures that students receive balanced emotional support. Teachers acknowledge and address emotional needs without creating dependency, promoting emotional well-being.

*Relationship among Learners’ Autonomy, Numerical Inquisitiveness, and Caring Behavior of Teachers*

The results on the analysis on the relationship among learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers are presented. Bivariate correlation analysis using Pearson product moment correlation was utilized to determine the relationship among the variables mentioned.

|  |
| --- |
| Table 12. *Relationship among Learners’ Autonomy, Numerical Inquisitiveness, and Caring Behavior of Teachers* |
| **Variables** | *Numerical Inquisitiveness* | *Caring Behavior of Teachers* |
| *Learners’ Autonomy* | 0.953**\*\*** | 0.972**\*\*** |
| 0.000 | 0.000 |
| *Numerical Inquisitiveness* | 1 | 0.974**\*\*** |
| 0.000 |
| *\*\*Significant @ p<0.05* |

Table 12 shows that learners’ autonomy has a significant positive relationship with the numerical inquisitiveness with a p-value of .000 that is less than .05 level of significance (two-tailed) (r = .953, p < 0.05). It means that as the extent of learners’ autonomy, numerical inquisitiveness also significantly changes. This leads to the rejection of null hypothesis of no significant relationship between learners’ autonomy and numerical inquisitiveness in Bunawan District, Davao City. This supports the findings of Cetin-Dindar (2016) that learners with autonomy have the freedom to choose their learning path in mathematics. This empowerment fosters a sense of ownership, making them more likely to actively explore numerical concepts based on their interests and preferences. Also, the result corroborates with Milner’s et al. (2012) idea that autonomous learners can align their numerical exploration with personal goals and interests. This relevance makes the learning process more meaningful, increasing their curiosity and inquisitiveness.

On one hand, the result shows that the relationship between learners’ numerical inquisitiveness and caring behavior of teachers has a significant positive relationship with a p-value of .00 that is less than alpha set at .05 (r = 0.972 p < 0.05). This means that if the extent of numerical inquisitiveness changes, the extent of caring behavior of teachers also significantly changes. This leads to the rejection of null hypothesis of no significant relationship between numerical inquisitiveness and caring behavior of teachers in Bunawan District, Davao City. This supports the assertion of Alt (2016) that caring teachers establish a safe and supportive classroom environment where students feel comfortable expressing their thoughts, opinions, and questions. This encouragement of self-expression contributes to the development of learners' autonomy as they learn to communicate independently. Arefi and Naghebzadeh (2014) affirmed that caring teachers involve students in certain classroom decisions, such as choosing topics for projects or determining the format of assessments. This inclusion in decision-making empowers students, fostering a sense of autonomy.

On the other hand, the result shows that the relationship between caring behavior of teachers has a significant positive relationship with the numerical inquisitiveness of learners with a p-value of .00 that is less than alpha set at .05 (r = 0.974 p<.05). This means that if the extent of caring behavior of teachers changes, numerical inquisitiveness of learners also significantly changes. This leads to the rejection of null hypothesis of no significant relationship between caring behavior of teachers has a significant positive relationship with the numerical inquisitiveness of learners in Bunawan District, Davao City. This is congruent to Lund and Hauge’s (2012) findings that caring teachers contribute to a positive attitude toward mathematics. By fostering a supportive and encouraging environment, they help students view numerical challenges with optimism, enhancing their curiosity and inquisitiveness. According to Bay et al. (2013), caring teachers recognize and address math anxiety by providing emotional support during challenging numerical tasks. This emotional support helps students feel more comfortable exploring and inquiring about mathematical concepts. Laal and Laal (2012) noted that caring teachers create a nurturing learning environment where students feel safe to ask questions and make mistakes.

*Mediating Effect of Caring Behavior of Teachers on the Relationship Between Learners’ Autonomy and Numerical Inquisitiveness*

 The mediating effect of caring behavior of teachers on the relationship between learners’ autonomy and numerical inquisitiveness were tested on JASP software using Structural equation model through mediation analysis. Results on the Table 13 shows that the total effect of learners’ autonomy as the independent variable on the numerical inquisitiveness, which is this study’s dependent variable is significant, is significant as evident on the estimate value of 0.963 and p<0.05. On one hand, it could be seen on the table that the direct effect of learners’ autonomy on their numerical inquisitiveness, is significant as indicated by estimate value of 0.124, p<0.05. Lastly, learners’ autonomy on their numerical inquisitiveness with caring behavior of teachers as mediator, is significant as indicated by the estimate value of 0.839 and p<0.05. Therefore, the null hypothesis of caring behavior of teachers does not mediate the relationship between learners’ autonomy and numerical inquisitiveness is rejected.

|  |
| --- |
| Table 13. *Mediating Effect of Caring Behavior of Teachers on the Relationship Between Learners’ Autonomy and Numerical Inquisitiveness* |
| **Effect Type** | **Path** | **Estimate** | **Std. Error** | **z-value** | **p-value** |
| Indirect Effect Components | LA → CB → NI | 0.839 | 0.052 | 16.281 | 0.000 |
| Direct Effect | LA → NI | 0.124 | 0.052 | 2.390 | 0.000 |
| Total Effect | LA → NI  | 0.963 | 0.016 | 58.786 | 0.000 |
| Ratio Index = 0.871 |

*Legend: LA=Learners’ Autonomy, NI=Numerical Inqusitiveness, CB=Caring Behavior of Teachers*

Adding, the table indicates the results of the computation of the effect size in the mediation test conducted between the three variables. The effect size measures how much of the effect of learners’ autonomy on their numerical inquisitiveness can be attributed to the indirect path. As shown in the figure, the ratio index obtain a value of 0.871 indicating that about 87.10 percent of the total effect of the independent variable on the dependent variable goes through the mediator variable, and about 12.90 percent of the total effect is either direct or mediated by other variables not included in the model.

Through mediation analysis, the mediation model was shown in Figure 2 was generated. The significant role of caring behavior of teachers as mediator in relationship between learners’ autonomy and numerical inquisitiveness is contributed by the fact that there exist a relationship among these variables. It is emphasized in this study that caring behavior of teachers is an undeniable factor that has a positive relationship between learners’ autonomy and numerical inquisitiveness.

The result corroborates with Isaacs’s (2013) proposition that caring teachers foster a supportive environment where autonomy is valued. Their encouragement and support create a conducive atmosphere for students to exercise autonomy in their numerical exploration. Learners with autonomy are more likely to exhibit numerical inquisitiveness, as they feel empowered to explore mathematical concepts independently. This also agrees with Ruey’s (2012) idea that caring teachers reinforce learners' confidence by providing positive feedback and acknowledging their autonomy. This support enhances learners' belief in their ability to explore numerical concepts with curiosity.



Figure 2. Mediation Model

**CHAPTER 4**

**Conclusions and Recommendations**

This part of the paper presents the conclusion and recommendation of the researcher. The discussion is supported by the literature presented in the first chapters and the conclusion is in accordance with statements of the problem presented in this study.

*Findings*

The primary objective of this study was to evaluate the mediating effect of caring behavior of teachers on the relationship between learners’ autonomy and numerical inquisitiveness in Bunawan District, Davao City utilizing non-experimental quantitative design using descriptive-correlation technique. The researcher selected the 215 elementary school teachers in Bunawan District, Davao City as the respondents through stratified random sampling method. The researcher made use of modified and enhanced adapted survey questionnaires which was pilot tested in a nearby school to ensure high reliability and internal consistency of the items in the instrument.

Learners’ autonomy in Bunawan District in Davao City got an overall mean of 3.47 with extensive descriptive rating. Also, learners’ autonomy in terms of willingness to learn, learning accountability, impulsement, and ability to plan learning obtained the mean scores of 3.33, 3.55, 3.26, and 3.71, respectively.

Learners’ numerical inquisitiveness in Bunawan District in Davao City has an overall mean of 3.28 with a moderately extensive descriptive rating. Also, in numerical inquisitiveness of the learners in terms of emotion, engagement, knowledge, and value obtained the mean scores 3.12, 3.20, 3.25, and 3.40, respectively. Moreover, caring behavior of teachers in Bunawan District in Davao City has an overall mean of 3.39 with a moderately extensive descriptive rating.

Learners’ autonomy has a significant positive relationship with their numerical inquisitiveness with a p-value of .000 that is less than .05 level of significance (two-tailed) (r = .953, p<0.05). On one hand, learners’ autonomy has a significant positive relationship with the caring behavior of teachers with a p-value of .000 that is less than .05 level of significance (two-tailed) (r = .972, p<0.05). On the other hand, caring behavior of teachers has a significant positive relationship with learners’ numerical inquisitiveness with a p-value of .000 that is less than .05 level of significance (two-tailed) (r = .974, p<0.05).

Caring behavior of teachers mediate the relationship between learners’ autonomy and numerical inquisitiveness. The analysis obtained the estimates value of 0.839 with p<0.05, 0.124 with p<0.05, and 0.963 with p<0.05 for indirect, direct, and total effects, respectively. Moreover, the ratio index obtain a value of 0.871 indicating that about 87.10 percent of the total effect of the independent variable on the dependent variable goes through the mediator variable, and about 12.90 percent of the total effect is either direct or mediated by other variables not included in the model.

*Conclusions*

Based on the findings of this study several conclusions were generated:

Learners’ autonomy in Bunawan District, Davao City was extensive. Meanwhile, learners’ autonomy in terms of willingness to learn, learning accountability, impulsement, and ability to plan learning obtained extensive descriptive rating. The result implies that learners actively engage in their education, demonstrating a sense of responsibility and ownership over their learning journey.

 Learners’ numerical inquisitiveness in Bunawan District, Davao City were rated as moderately extensive. Learners’ numerical inquisitiveness in terms of emotion, engagement, knowledge, and value belong to moderately extensive rating. This implies that the learners actively seek to understand, question, and explore numerical information, fostering a dynamic and inquisitive approach to mathematical learning.

Caring behavior of teachers in Bunawan District, Davao City were rated as moderately extensive. This means that the actions, attitudes, and expressions that demonstrate genuine concern, empathy, and support for the well-being, academic growth, and personal development of their students is sometimes evident.

Intercultural sensitivity has positive significant relationship with individual work performance and social connectedness. Also, social connectedness has positive significant relationship with individual work performance of the teachers.

Caring behavior of teachers mediates the relationship between learners’ autonomy and numerical inquisitiveness. This affirmed that caring behavior of teachers contributed significantly on the relationship between learners’ autonomy and numerical inquisitiveness. This shows that caring teachers foster a supportive environment where autonomy is valued. Their encouragement and support create a conducive atmosphere for students to exercise autonomy in their numerical exploration.

*Recommendations*

The Department of Education (DepEd) should develop and implement policies that encourage autonomy in the learning process, allowing flexibility in teaching methods and student-centered approaches. More so, Deped should allocate resources for professional development programs that equip teachers with the skills to support learners' autonomy and cultivate caring behavior in the classroom.

 School heads should foster a school culture that values autonomy, inquisitiveness, and caring behavior. Establish clear expectations for teachers and students to create a supportive learning environment. They should also allocate resources for ongoing teacher training programs focused on promoting autonomy, nurturing inquisitiveness, and developing caring relationships with students.

 Teachers should adopt student-centered teaching strategies that empower learners to take ownership of their learning and encourage numerical inquisitiveness. Adding more, they should develop caring relationships with students by showing empathy, providing emotional support, and creating a safe space for exploration and inquiry.

 Learners should provide students with choices in assignments, projects, and learning paths to foster autonomy and cater to individual interests and strengths. Moreover, they should also actively participate in the learning process, ask questions, and explore numerical concepts beyond the classroom to enhance inquisitiveness.

Future researchers should conduct research on pedagogical approaches that effectively promote learners' autonomy, numerical inquisitiveness, and caring behavior of teachers.

*References*

Abdulwahab N., Oyelekan, O. S., & Olorundare, A. S. (2016). Effects of Cooperative Instructional Strategy on Senior School Students’ Achievement in Electrochemistry. *Eurasian Journal of Physics and Chemistry Education, 8*(2), 37-48. http://iserjournals.com/journals/ejpce/download/10.12973/ejpce.2016.0000 5a - DOI: 10.12973/ejpce.2016.00005a.

Abramovich, S., Grishpan, A., & Milligan, D. (2019). *Teaching mathematics through concept motivation and action learning. https://www.hindawi.com/journals/edri/2019/3745406/*

Ahmadi, N., & Besançon, M. (2017). Creativity as a stepping stone towards developing other competencies in classrooms. *[Education Research International](https://www.hindawi.com/journals/edri/)*, 1, 21-32. https://www.hindawi.com/journals/edri/2017/1357456/

Albeshtawi, A. E. M. (2017). Learning styles preferences of EFL learners at Al-Ghad International College for Health Science-Saudi Arabia- DAMMAM. *International Journal of English Language Literature in Humanities, 5*(4), 215-220.

Al-Zu’bi, M. A., & Kitishat, A. R. (2013). The impact of STAD strategy on FL reading achievement of low, average, and high achieving students in Al balqa Applied University. *Anglisticum Journal (IJLLIS), 2*(5), 96-109. https://www.researchgate.net/publication/329417022

Archana, K., & Chamundeswari, S. (2013). Self-concept and academic achievement of students at the higher secondary level. *Journal of Sociological Research, 4*(2), 105-113. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.674.2268&rep= rep1&type=pdf

Arikan, E. E. (2016). Prospective teachers’ beliefs about problem solving in multiple ways. *Universal Journal of Educational Research, 4*(7), 1727-1733. https://files.eric.ed.gov/fulltext/EJ1106260.pdf

Ayyildiz, Y., & Tarhan, L. (2015). Development of the self-directed learning skills scale. *International Journal of Lifelong Education, 34*(6), 663-679, http://10.1080/02601370.2015.1091393

Babaee, N. (2012). Motivation in learning English as a second language: A literature review. *Canadian Journal for New Scholars in Education, 4*(1), 1-7. Retrieved from [https://webcache.googleusercontent.com/search?q=cache:xAoCveF3RW AJ:https://journalhosting.ucalgary.ca/index.php/cjnse/article/view/30496/24 887+&cd=1&hl=en&ct=clnk&gl=ph](https://webcache.googleusercontent.com/search?q=cache:xAoCveF3RWAJ:https://journalhosting.ucalgary.ca/index.php/cjnse/article/view/30496/24887+&cd=1&hl=en&ct=clnk&gl=ph)

Bishara, S., & Hui, S. K. F. (2016). Creativity in unique problem-solving in mathematics and its influence on motivation for learning. *Congent Education, 3*(1), 1-6. https://www.tandfonline.com/doi/full/10.1080/2331186X.2016.1202604

Blazar, D. (2016). *Teacher and teaching effects on students' academic performance, attitudes, and behaviors*. https://dash.harvard.edu/bitstream/handle/1/27112692/BLAZARDISSERT ATION-2016.pdf?sequence=1

Blazar, D., Litke, E., & Barmore, J. (2016). What does it mean to be ranked a high or low value-added teacher? Observing differences in instructional quality across districts. *American Educational Research Journal, 53*(2), 324-359. https://journals.sagepub.com/doi/abs/10.3102/0002831216630407

Bray, B., & McClaskey, K. (2015). *Learner voice and choice leads to engagement*. Retrieved from http://www.centerdigitaled.com/blog/learner-voice-and-choiceleads-to-eng agement.html

Cakici, Y., Aricak, O. T. & Ilgaz, G. (2012). Can attitudes toward biology course and Learning strategies simultaneously predict achievement in biology. *Eurasian Journal of Educational Research*, 45, 31-48. http://www.sciepub.com/reference/51580

Darling-Hammond, L., Flook, L., Cook-Harvey, C., BArron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development*. Applied developmental Science, 24*(2), 21-28. https://www.tandfonline.com/doi/full/10.1080/10888691.2018.1537791

DiNapoli, J. (2018). *Supporting secondary students’ perseverance for solving challenging mathematics tasks*. College of Education and Human Development. University of Delaware. https://udspace.udel.edu/bitstream/handle/19716/23958/DiNapoli\_udel\_00 60D\_13442.pdf?sequence=1&isAllowed=y

Dörnyei, Z., & Kubanyiova, M. (2014). *Motivating learners, motivating teachers: Building vision in the language classroom*. Retrieved from [https://www.researchgate.net/publication/317871069\_MOTIVATING\_LEA RNERS\_MOTIVATING\_TEACHERS\_BUILDING\_VISION\_IN\_THE\_LANG UAGE\_CLASSROOM\_BY\_ZOLTAN\_DORNYEI\_AND\_MAGDALENA\_KU BANYIOVA-BOOK\_REVIEW](https://www.researchgate.net/publication/317871069_MOTIVATING_LEARNERS_MOTIVATING_TEACHERS_BUILDING_VISION_IN_THE_LANGUAGE_CLASSROOM_BY_ZOLTAN_DORNYEI_AND_MAGDALENA_KUBANYIOVA-BOOK_REVIEW)

Dung, P., & Florea, A. (2012). An approach for detecting learning styles in learning management systems based on learners’ behaviors. *International Conference on Education and Management Innovation IPEDR (30)*. IACSIT Press, Singapore.

Dunlosky, J., Rawson, K., Marsh, E., Nathan, M., & Willingham, D. (2013). Improving students’ learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14*(1) 4–58. https://pcl.sitehost.iu.edu/rgoldsto/courses/dunloskyimprovinglearning.pdf

Egalite, A. J., & Kisida, B. (2017). The effects of teacher match on students' academic perceptions and attitudes. *Educational Evaluation and Policy Analysis*, *40*(1), 59–81 https://journals.sagepub.com/doi/abs/10.3102/0162373717714056

Francois, J. (2016). *The impact of teacher prompting and questioning on third grade students' comprehension*. Honors Program Theses. http://scholarworks.uni.edu/hpt/216

Friedlaender, D., Burns, D., Lewis-Charp, H., Cook-Harvey, C. M., Zheng, X., & Darling-Hammond, L. (2014). *Student-centered schools: Closing the opportunity gap*. Stanford, CA: Stanford Center for Opportunity Policy in Education. https://edpolicy.stanford.edu/sites/default/files/scope-pub-student-centered -cross-case.pdf

Geary, D. (2013). Early foundations for mathematics learning and their relations to learning disabilities. *Current Directions in Psychological Science,* *22*, 23–27. http://10.1177/0963721412469398

Goldenberg, P. E., Mark, J., Kang, J., Fries, M., Carter, C. J., & Cordner, T. (2015). Making sense of algebra: Developing students habits of mind. Portsmouth, NH: Heinemann. https://www.heinemann.com/products/e05301.aspx

Grant, P., & Basye, D. (2014). Personalized learning: A guide for engaging students with technology. Eugene, OR: International Society for Technology in Education.

Gurat M. (2018). Mathematical problem-solving strategies among student teachers. *Journal on Efficiency and Responsibility in Education and Science, 11*(3), 53-64. Online ISSN 1803-1617, printed ISSN 2336-2375. https://files.eric.ed.gov/fulltext/EJ1208772.pdf

Hall, J. D. (2011). Self-directed learning characteristics of first-generation, first-year college students participating in a summer bridge program. Graduate Theses and Dissertations.
 https://digitalcommons.usf.edu/etd/3140

Hamzeh, M. A. (2014). Teaching strategies used by mathematics teachers in Jordan public schools and their relationship with some variables. *American Journal of Educational Research, 2*(6), 331-340. Faculty of Educational Sciences, Isra University, Amman, Jordan. http://pubs.sciepub.com/education/2/6/1/index.html#

Hossain, M. Q. (2015). *Teaching productive skills to the students: A secondary level scenario*. Department of English and Humanities. BRAC University, Dhaka, Bangladesh. https://core.ac.uk/download/pdf/74352632.pdf

Ingram, N. (2015). Students’ relationships with mathematics: Affect and identity. In M. Marshman, V. Geiger, & A. Bennison (Ed.), Mathematics education in the margins (Proceedings of the 38th annual conference of the Mathematics Education Research Group of Australasia) (pp. 301–308). Sunshine Coast, Australia: MERGA.

Izuchi, M. R., & Onyekuru, B. (2017). Relationships among academic self-concept, academic motivation, and academic achievement among college students. *European Journal of Research and Reflection in Educational Science, 5*(2), 93-102. http://www.idpublications.org/wp-content/uploads/2017/02/Full-Paper-REL ATIONSHIPS-AMONG-ACADEMIC-SELF-CONCEPT-ACADEMIC-MOTIV ATION-AND-ACADEMIC.pdf

Kabody, M. A. (2013). Second language motivation: The role of teachers in learners’ motivation. *Journal of Academic and Applied Studies, 3*(4), 45-54. Retrieved from [https://www.semanticscholar.org/paper/Second-Language-Motivation%3 B-The-Role-of-Teachers-in-Kaboody/ba588fbb730ad4c2ad36e5d03a7f5e 2d6357418a](https://www.semanticscholar.org/paper/Second-Language-Motivation%3B-The-Role-of-Teachers-in-Kaboody/ba588fbb730ad4c2ad36e5d03a7f5e2d6357418a)

Kalaivani, M., & Rajeswar, V. (2016). The role of academic motivation and academic self-concept in student’s academic achievement. *International Journal of Research Granthaalayah, 4*(9), 37-49.

Kalmari, I. (2017). *Motivational strategies used by English teachers: Students’ opinios. Retrieved from https://jyx.jyu.fi/bitstream/handle/123456789/54030/1/URN%3ANBN%3Afi %3Ajyu-201705182411.pdf*

Khalid, R., Mokhtar Ahmad, A., Omar-Fauzee Mohd, S., Kasim Abd, L., Don, Y., Abdussyukur Nurul, F., Ponajan Fatin, A., & Geok Soh, K. (2013). The learning styles and academic achievements among arts and science streams student. *International Journal of Academic Research in Progressive Education and Development,* *2*(2) 68-85. https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.955.1401&rep= rep1&type=pdfhttps://files.eric.ed.gov/fulltext/EJ1108220.pdf

Kintu, M., Zhu, C., & Kagambe, E. (2017). Blended learning effectiveness: The relationship between student characteristics, design features and outcomes. *International Journal of Educational Technology in Higher Education, 14*(7), 1-20. https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s4 1239-017-0043-4

Kirkpatrick, Y. (2012). *Teacher perceptions of their science teaching and student learning for diverse learners*. University of Tennessee, Knoxville. https://trace.tennessee.edu/cgi/viewcontent.cgi?article=2564&context=utk \_graddiss

Klerlein, J., & Hervey, S. (2017). *Mathematics as a complex problem-solving activity: Promoting students’ thinking through problem-solving*. Gneration Ready. https://36kf1rfh5v23ru41h2gm84pz-wpengine.netdna-ssl.com/wp-content/ uploads/2019/02/Mathematics-as-a-Complex-Problem-Solving-Activity.pdf

Krawec, J., & Montague, M., (2012). A focus on cognitive strategy instruction. *Current Practice Alerts, Teaching LD.org, 19*(1), 1-4. http://s3.amazonaws.com/cmi-teachingld/alerts/21/uploaded files/original Alertl9.pdf?1331403099.

Kristiansen, S. D., Burner, T., & Johnsen, B. H. (2019). Face-to-face promotive interaction leading to successful cooperative learning: A review study. *Cogent Education*, 6, 1-19. https://www.duo.uio.no/bitstream/handle/10852/74487/Face%2Bto%2Bfac e%2Bpromotive%2Binteraction%2Bleading%2Bto%2Bsuccessful%2Bcoo perative%2Blearning%2BA%2Breview%2Bstudy.pdf?sequence=1&isAllow ed=y

Komarraju, M., & Nadler, D. (2015). Self-efficacy and academic achievement: Why do implicit beliefs, goals, and effort regulation matter? *Learning and Individual Differences*, 25, 67-72. https://doi.org/10.1016/j.lindif.2013.01.005

Kozlowski, J., Chamberlin, S., & Mann, E. (2019). Factors that influence mathematical creativity. *The Mathematics Enthusiast, 16*(1), 505-540. https://scholarworks.umt.edu/cgi/viewcontent.cgi?article=1471&context=tm e

Lafont, L., Rivière, C., Darnis, F., & Legrain, P. (2017). How to structure group work? Conditions of efficacy and methodological considerations in physical education. *European Physical Education Review, 23*(3), 327–338. doi:10.1177/1356336X15626639

Le, H., Janssen, J., & Wubbels, T. (2017). *Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration*. Retrieved from https://www.tandfonline.com/doi/full/10.1080/0305764X.2016.1259389

Lerner, J., Li, Y., Valdesolo, P., & Kassam, K. (2014). Emotion and decision making.https://scholar.harvard.edu/files/jenniferlerner/files/annual\_review\_ manuscript\_june\_16\_final.final\_.pdf

Liljedah, P., Santos-Trigo, M., Malaspina, U., & Bruder, R. (2016). *Problem solving in mathematics education.* ICME-13 Topical Surveys. https://link.springer.com/chapter/10.1007/978-3-319-40730-2\_1

Lince, R. (2016). Creative thinking ability to increase student mathematical of Junior high school by applying models numbered heads together. *Journal of Education and Practice, 7*(6), 206-212. https://files.eric.ed.gov/fulltext/EJ1092494.pdf

Maulana, R., Opdenakker, M., Stroet, K., & Bosker, R. (2013). Changes in teachers' involvement versus rejection and links with academic motivation during the first year of secondary education: A multilevel growth curve analysis. *Journal of Youth and Adolescence, 42*(9), 1348-71. Retrieved from http://dx.doi.org.goucher.idm.oclc.org/10.1007/s10964-013-9921-9

Millis, B. J. (2014). Using cooperative structures to promote deep learning. *Journal on Excellence in College Teaching, 25*(3&4), 139–148.

More, H. W., & Miller, L. S. (2015). *Effective police supervision*. 7th ED. USA : Elsevier Inc.

Morin, L. (2014). *Using schematic-based and cognitive strategy instruction to improve math word problem solving for students with math difficulties*. Doctor of Philosophy (PhD), dissertation, Comm Disorders & Special Educ, Old Dominion University. https://core.ac.uk/download/pdf/223228475.pdf

Nguyen, M. P., Terlouw, C., & Pilot, A. (2012). Cooperative learning in Vietnam and the west-east educational transfer. *Asia Pacific Journal of Education,* *32*, 137–152. https://www.tandfonline.com/doi/abs/10.1080/021 88791.2012.685233

Poth, R. (2018). *Collaboration: Bringing students together to promote learning*. Riverview Junior/Senior High in Oakmont. https://www.gettingsmart.com/2018/10/collaboration-bringing-students-tog ether-to-promote-learning-can-move/

Psaltou-Joycey, A., & Kantaridou, Z. (2011). Major, minor, and negative learning style preferences of university students. *System*, 39, 103-112. https://blogs.ubc.ca/maritzamontano/archives/389

Raba, A. A. A. M., & Harzallah, H. T. M. (2015). Effective teaching from An-Najah National University M.A. Students’ perspectives. *Journal of Languages and Culture*, *6*(6), 52 - 60. http://academicjournals.org/journal/JLC/article-abstract/6A4DEA953991

Raba, A. A. A. M. (2017). The impact of effective teaching strategies on producing fast and good learning outcomes. *International Journal Research Granthaalaya, 5*(1), 43-58. https://doi.org/10.5281/zenodo.259563

Rajjoshi, M. (2017). *Students’ attitude towards mathematics.* University Campus Tribhuvan University Kirtipur, Kathmandu, Nepal. http://107.170.122.150:8080/xmlui/bitstream/handle/123456789/840/1339 8.pdf?sequence=1&isAllowed=y

Rimm- Kaufman, S. & Sandilos, L. (2013). *Improving students' relationships with teachers to provide essential supports for learning*. Retrieved from http://www.apa.org/education/k12/relationships.aspx?item=1#

Rogers, B. (2012). *Teacher leadership and behaviour management*. New delhi : Sage publications company.

Saputra, J. B., & Aziz, M. S. A. (2014). *Teaching strategies. https://sinta.ristekbrin.go.id/authors/detail?id=259906&view=documentsgs*

Savolainen, R. (2016). Information seeking and searching strategies as plans and patterns of action: A conceptual analysis. *Journal of Documentation, 72*(6), 1154–1180. doi:10.1108/JD-03-2016-0033

Sengupta-Irving, T. (2017). Conceptualizing perseverance in problem solving as collective enterprise. *Mathematical Thinking and Learning, 19*(2), 22-32. https://www.tandfonline.com/doi/abs/10.1080/10986065.2017.1295417?sc roll=top&needAccess=true&journalCode=hmtl20

Sil, N. C. (2017). *Use of motivational strategies in English classrooms: Perceptions of Bangladeshi secondary school English teachers and students*. Retrieved from [https://pdfs.semanticscholar.org/43f7/5fb410ca245d251897219be90f3235f 3e369.pdf](https://pdfs.semanticscholar.org/43f7/5fb410ca245d251897219be90f3235f3e369.pdf)

Sheffield, L. J. (2014). Creativity and school mathematics: some modest observations. https://link.springer.com/article/10.1007/s11858-013-0484-8

Skipper, Y., & Douglas, K. (2015). The influence of teacher feedback on children's perceptions of student-teacher relationships. *British Journal of Educational Psychology, 85*(3), 276. Retrieved from https://goucher.idm.oclc.org/login?url=http://search.proquest.com.goucher. idm.oclc.org/d ocview/1705485710?accountid=11164

Star, J. R. (2015). *When not to persevere – Nuances related to perseverance in mathematical problem solving* (White paper). Chicago, IL: Spencer Foundation. Retrieved from http://hub.mspnet.org/index.cfm/28127/.

Subramanian, A. (2016). Time Management and academic achievement of the higher secondary school students. *International Journal of Research - Granthaalayah, 4*(12), 6-15. https://doi.org/10.5281/zenodo.230852.

Sun, R. C. F. (2013). *Student Classroom Misbehavior: An Exploratory Study Based on Teachers' Perceptions. https://www.hindawi.com/journals/tswj/2012/208907/*

Suyitno, I. (2017). *Cognitive strategies use in reading comprehension and its contributions to students' achievement*. Negeri Malang Indonesia. https://files.eric.ed.gov/fulltext/EJ1162686.pdf

Tang, Y., & Tseng, H. (2013). Distance learners’ self-efficacy and information literacy skills. *The Journal of Academic Librarianship*, 39, 517-521.
 https://doi.org/10.1016/j.acalib.2013.08.008

Taplin, M. (2019). *Mathematics through problem solving*. Institute of Sathya Sai Education, Hongkong. https://www.mathgoodies.com/articles/problem\_solving

Taylor, E. V. (2016). *Cultural considerations in support of mathematical perseverance: The role of context activation* (White paper). Chicago, IL: Spencer Foundation. http://hub.mspnet.org/index.cfm/28130

Tofade, T., Elsner, J. & Haines, S. (2013). Best practice strategies for effective use of questions as a teaching tool*. American Journal of Parmaceutical Education, 77*(7), 1-9. *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3776909/*

Van Leeuwen, A., Janssen, J., Erkens, G., & Brekelmans, M. (2013). Teacher interventions in a synchronous, co-located CSCL setting: Analyzing focus, means, and temporality. *Computers in Human Behavior,* *29*, 1377–1386. https://www.researchgate.net/publication/257253118\_Teacher\_interventio ns\_in\_a\_synchronous\_colocated\_CSCL\_setting\_Analyzing\_focus\_means \_and\_temporality

Varga, M. (2017). *The effect of teacher-student relationships on the academic engagement of students*. Retrieved from <https://mdsoar.org/bitstream/handle/11603/3893/VargaMeagan_paper.pdf>

Wegner, C., Minnaert, L., & Strehlke, F. (2014). The importance of learning strategies and how the project ‘Kolumbus-Kids’ promotes them successfully. *European Journal of Science and Mathematics Education, 1*(3), 137-143. 3 Department for Didactics of Biology, Bielefeld University, Bielefeld, Germany.

Zakaria, E., & Iksan, Z. (2012). Promoting cooperative learning in science and mathematics education: A Malaysian perspective. volume 3.

**Appendix A**

Research Instrument

**CARING BEHAVIOR OF TEACHERS AS MEDIATOR ON LEARNERS’ AUTONOMY AND NUMERICAL INQUISITIVENESS**

Name (*optional*) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Instructions:**

This survey questionnaire is intended to determine the extents of learners’ autonomy, numerical inquisitiveness, and caring behavior of teachers. Rest assured that the answers and responses contributed in this study must be handled with right data management in allegiance to the Data Privacy Act of 2012 and shall be dealt with utmost confidential confidence. Please answer the questions on the next sheet by putting check mark (/) on the box that correspond your answer.

**I. Learners’ Autonomy**

**Direction:** Please put a check (√) mark on the column that you think most suited to your level of agreement/disagreement regarding learners’ autonomy the scale below:

 5 = Very Extensive 2 = Less Extensive

 4 = Extensive 1 = Not Extensive

 3 = Moderately Extensive

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Willingness to Learn* | **5** | **4** | **3** | **2** | **1** |
| 1. Learners are reviewing notes during leisure time to be didactic.
 |  |  |  |  |  |
| 1. Learners prioritize time for learning while planning a new day.
 |  |  |  |  |  |
| 1. Learners believe in the importance of playing an active role in learning.
 |  |  |  |  |  |
| 1. Learners believe that what they learn in is more important than getting a passing grade.
 |  |  |  |  |  |
| *Learning Accountability* | **5** | **4** | **3** | **2** | **1** |
| 1. Learners use the internet for learning purposes, instead of having a good time.
 |  |  |  |  |  |
| 1. Learners can be held responsible for their own learning.
 |  |  |  |  |  |
| 1. Learners take time to learn related previous subjects well in order to learn a new subject without difficulty.
 |  |  |  |  |  |
| *Impulsement* | **5** | **4** | **3** | **2** | **1** |
| 1. Learners learn a lesson, no matter how it is complicated.
 |  |  |  |  |  |
| 1. Learners are motivated in learning even in the presence of distracting factors.
 |  |  |  |  |  |
| 1. Learners don’t get bothered even if they could not solve the problems that they encountered.
 |  |  |  |  |  |
| 1. Learners are planning what should do instead of feeling despair when they encounter a difficult subject.
 |  |  |  |  |  |
| *Ability to Plan Learning* | **5** | **4** | **3** | **2** | **1** |
| 1. Learners can solve the problems during learning based on cause and effect relationship.
 |  |  |  |  |  |
| 1. Learners organize study hours by making plans.
 |  |  |  |  |  |
| 1. Learners know clearly and implicitly the objectives of the new subject to be learned.
 |  |  |  |  |  |
| 1. Learners finish homework at the last moment.
 |  |  |  |  |  |
| 1. Learners review the previous knowledge that forms the basis for the new subject when they start to learn something new.
 |  |  |  |  |  |

**II. Learners’ Numerical Inquisitiveness**

**Direction:** Please put a check (√) mark on the column that you think most suited to your level of agreement/disagreement regarding the learners’ inquisitiveness the scale below:

 5 = Very Extensive 2 = Less Extensive

 4 = Extensive 1 = Not Extensive

 3 = Moderately Extensive

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Emotion****The learners,…* | **5** | **4** | **3** | **2** | **1** |
| 1. find math as an interesting subject.
 |  |  |  |  |  |
| 1. like math.
 |  |  |  |  |  |
| 1. see mathematics as something fun to learn.
 |  |  |  |  |  |
| 1. find mathematics an interesting concept rather than a boring subject.
 |  |  |  |  |  |
| 1. believe that learning math is cool.
 |  |  |  |  |  |
| ***Engagement****The learners,…* | **5** | **4** | **3** | **2** | **1** |
| 1. talk to family or friends about things they learned in math class.
 |  |  |  |  |  |
| 1. watch television shows about math.
 |  |  |  |  |  |
| 1. look at websites about math.
 |  |  |  |  |  |
| 1. play math computer games.
 |  |  |  |  |  |
| 1. read books about math.
 |  |  |  |  |  |
| 1. go places to learn about math.
 |  |  |  |  |  |
| 1. like to do math problems.
 |  |  |  |  |  |
| ***Knowledge****The learners,…* | **5** | **4** | **3** | **2** | **1** |
| 1. know a lot about math.
 |  |  |  |  |  |
| 1. is good at math.
 |  |  |  |  |  |
| 1. believe that the concepts in math are not hard to understand.
 |  |  |  |  |  |
| 1. do well in math classes.
 |  |  |  |  |  |
| 1. find math as an easy subject.
 |  |  |  |  |  |
| ***Value****The learners,…* | **5** | **4** | **3** | **2** | **1** |
| 1. believe that learning mathematics is important.
 |  |  |  |  |  |
| 1. believe that learning about math is helpful in their daily routines.
 |  |  |  |  |  |
| 1. believe that learning mathematics is useful in my future career.
 |  |  |  |  |  |

**III. Caring Behavior of Teachers**

**Direction:** Please put a check (√) mark on the column that you think most suited to your level of agreement/disagreement regarding caring behavior of teachers the scale below:

 5 = Very Extensive 2 = Less Extensive

 4 = Extensive 1 = Not Extensive

 3 = Moderately Extensive

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Statements** | **5** | **4** | **3** | **2** | **1** |
| 1. I make friends with learners in this class.
 |  |  |  |  |  |
| 1. I try to make friends with students in the class.
 |  |  |  |  |  |
| 1. I help learners in this class who are having trouble with their work.
 |  |  |  |  |  |
| 1. I take a personal interest in the welfare of the learners.
 |  |  |  |  |  |
| 1. I find time to talk to learners individually.
 |  |  |  |  |  |
| 1. I share my books, materials, and supplies with learners.
 |  |  |  |  |  |
| 1. I give as much attention to the questions of students.
 |  |  |  |  |  |