

## The Most Essential Learning Competencies in Statistics of the Grade 7 Learners



Christy U. Buquing

Burgos National High School, Burgos, Ilocos Sur

**ABSTRACT:** This study aimed to formulate valid supplementary statistic learning materials for Grade 7 learners to improve their attainment of the most essential learning competencies in statistics. It examined the demographic profile of the respondents, level of attainment of the MELCs in statistics, mastered and least mastered competencies, and significant relationship between their profile and their attainment of the MELCs in statistics.

Results revealed that the level of attainment of the MELCs in statistics for Grade 7 learners was Satisfactory. They showed less mastery on competencies involving posing problems, formulating simple statistical instruments, using appropriate graphs to represent organized data, calculating measures of variability, and drawing conclusions. The educational attainment of parents showed significant relationship with the attainment of the MELCs.

The researcher recommends that parents must involve themselves in the learner's education. Furthermore, supplementary learning activities can help poor performing students to help them improve their mathematical skills in statistics.

**KEYWORDS:** Supplementary Statistics Learning Materials, Most Essential Learning Competencies, achievement test, Least Mastered Competencies, level of attainment

### 1. INTRODUCTION

#### 1.1 Background of the Study

The Philippine educational system had its major shift when the K to 12 Curriculum was implemented in 2012. Part of the curriculum change is the spiral progression approach which aims to ensure that learners acquire knowledge and skills that are essential, beneficial, and appropriate to their developmental stage with high retention and mastery through revisiting of previous knowledge (Gaylo & Masinading, 2022)[32].

Conversely, despite the curriculum enrichment along with the continuous development of different strategies in teaching mathematics in line with it, no significant development has been observed among Filipino learners through the years as they have performed poorly in mathematics based on national and international assessments. It is evident in the undesirable results of the Trends in International Mathematics and Science Study (TIMSS) in 2003 where the Philippines ranked 34<sup>th</sup> in mathematics among 38 participating countries. According to Villegas (2021), it even deteriorated in the TIMSS results in 2019 wherein the country obtained the lowest scores among 58 participating countries. The country's score in mathematics of 358 in 2003 down to 297 in 2019, a decrease of 61 points is very alarming. Another academic crisis has been reported by the Department of Education in their PISA 2018 Philippine National Report of the Philippines on their official website. The result of the PISA 2018 (Program for International Student Assessment) of the Organization for Economic Cooperation and Development (OECD) states that the country ranked lowest in mathematics, science, and reading among the 79 countries that participated where fifteen-year-old students garnered 353 points in mathematics which is 136 points lower than the OECD average of 489 points. Furthermore, in the report of de la Fuente (undated), the National Achievement Test (NAT) in the school year 2017-2018 results also reflected poor performance among Filipino learners as their mean percentage scores scaled low proficiency in mathematics.

In 2020, the Department of Education released the most essential learning competencies (MELCs) which help the teachers to focus on the most essential and needed learning competencies that our learners must acquire without compromising the quality of education. The MELCs were not only released as a response to the distance learning brought by the pandemic but as a long-term response to the Sustainable Development Goal 4 (SDG 4) which is to develop resilient education systems. For the current school year, 2022-2023, the full implementation of face-to-face classes was allowed from the previous years' modular distance learning

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and the MELCs is in continuing use. Such factors were insufficient time to finish the desired learning tasks and too many activities incorporated in the modules.

The results of assessments among Filipino students in the field of mathematics, before and during the pandemic, from international to local settings is deteriorating amidst the enhancement of the curriculum. Several factors are to be considered why these worsening results happen. The non-attainment of mastery on the intended most essential learning competencies is one of the underlying factors of such adversity.

The different supplementary learning materials in improving students' academic performance like the use of strategic intervention materials have proven its effectiveness based on studies (Arpilleda, 2021[9], Hernandez et al., 2019, Mawi, 2019). It helped improve the academic performance of students in mathematics where the SIM provided a positive impact on the mastery of least learned competencies. This teaching approach helps the students to grasp learning more effectively because the teacher executes the lesson ensuring progress in the students' learning in a more interactive way of teaching the subject eliminating the stigma of mathematics being a boring and difficult subject.

However, the teaching and learning process is not merely done by the teachers along with their creative strategies just to keep retention and mastery among learners. Students' attitude towards learning the subject as well as their preferred learning style are very crucial in implementing such strategies. Hence, the teachers are greatly challenged on how to teach the subject more effectively to the students while enjoying the experience of learning.

Thus, this study aims to evaluate the attainment of the most essential learning competencies in statistics which will be a basis for the researcher to create supplementary statistics learning materials for Grade 7 learners. This is to offer opportunities to the teachers to teach mathematics in a creative way which would help the students in learning mathematics. It also aims to progressively eliminate the dilemma of some students perceiving mathematics as a subject that is boring and difficult to understand.

### 1.2 Framework of the Study

This study is anchored on the following theories and concepts about the use of strategic intervention material in attaining the most essential learning competencies in mathematics.

The Constructivism Theory is based on the cognitive theories of John Dewey (1916), Jean Piaget (1973), and Lev Vygotsky (1978). The theory deals with the construction of knowledge based on their experiences and ideas which contributes to the learners' behavior and social knowledge. In the article of Brau (2022)[17], Mascolo & Fischer stated that it is a learning theory whereby learning is best acquired through reflection and active construction of knowledge. The learners draw interpretations through processing their previous experiences and connect it to their personal ideas and their social and cultural background. In constructivism, the teacher is not the giver of information but a facilitator of learning. Teachers' task is to prepare the students for what to learn by organizing the environment and the materials needed for learners to construct knowledge (Vintere, 2018)[68]. Studies show that the constructivist approach in teaching and learning mathematics boosts competencies needed for sustainable development. In the meta-analysis of Ayaz & Sekerci (2015)[10], they found that 50 out of 53 studies show positive results on the use of constructivist learning approach on the students' academic achievement. Moreover, in this computer age, technology is highly used in classrooms and most students are exposed to such. In the constructivist learning environment, students are motivated and directed in learning on technology-assisted classroom and approaches that encourages collaboration and active involvement of learners while using their critical thinking skills.

This study is further supported by the Discovery Learning Theory of Jerome Bruner (1966) is an inquiry-based instruction which allows learners to build on previous knowledge and experiences then use it to develop new information and discover facts. Bruner believes that learners have a vital role in learning by finding their own knowledge. They are the key responsible in building new concepts by using prior knowledge through observation, exploration, discovery and problem-solving (Kamaluddin & Widjajanti, 2019)[38]. He also believed that students learn and remember the concepts better if they discover them on their own. It also encourages active participation from learners in supplementary learning activities like strategic interventions, stimulates motivation, improves creativity, and enhances their problem-solving skills (Bastida & Bastida, 2022)[12]. Discovery learning is process-oriented which means that it focuses on the new information acquired during the process of learning rather than the end-result. Moreover, there are more advantages discovery learning has to offer based on studies. In the article of Kamaluddin & Widjajanti (2019)[38], they have enumerated the following advantages: it encourages learners to be motivated to have active involvement and develop creativity, students can learn at their own pace, enhance their critical thinking skills (Yuliani & Saragih, 2015)[70] and their reasoning abilities (Purba et al., 2018)[53]. However, though discovery learning is about the students finding their own new knowledge, studies say that it is still important to have the guidance of teachers to ensure successful learning outcome and to minimize misconception (Mayer, 2004 [44], Prince & Felder, 2006 [52]).

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The Experiential Learning Theory of David Kolb (1984) stresses the significance of experience and its role in the teaching and learning process. Learners acquire knowledge through transformation of their experiences. The learners engage themselves in the process through learning by doing and focused experience to gain more knowledge and acquire necessary skills. Studies have supported this premise wherein the success of improving the academic performance of learners can be attributed to experiential learning whereby it provides learners time and space in learning through engaging in real and modern situations and it provides relevant and useful information which expands learners' intellectual capabilities and retention (Prestholdt & Flecher, 2018 [51], Abu-Assab, 2015 [3], Rapaport, 2013 [55]). Furthermore, in the field of mathematics, studies have confirmed that experiential learning has contributed and positively influenced not only the cognitive aspect of the learners but also their creativity and attitude (Uyen et al., 2022 [66], Mutmainah et al., 2019 [46], Chesimet et al., 2016 [21]).

Furthermore, instructional decisions are crucial to teachers for a more effective and efficient teaching and learning process since they are the key resources for the success of the curriculum. Thus, teachers are conceptualizing different teaching strategies for learners to understand mathematics in a more creative and interactive manner for them to have confidence in the subject.

The use of supplementary learning materials is one of the approaches used to aid learning especially in the attainment of the most essential learning competencies. It is an approach intended for remediation and/or enrichment of learning among students who exhibited less mastery on a certain topic or competency. Generally, supplementary learning materials are used in developing the least mastered skills of the learners to aid learning gaps and to ensure successful learning among students. These carefully designed and conceptualized materials provide the learners the needed support to have meaningful progress in their studies. It provides an avenue to expand and explore various ideas and concepts to deepen and increase their understanding on a certain topic (Rodrigo, 2015)[60]. The basis in making the supplementary learning materials should be aligned in the Most Essential Learning Competencies (MELCs) provided by DepEd to ensure that the learners assimilate information and skills essential in enhancing the least mastered skills (Cordova et al., 2019).

Moreover, the planning and execution of the supplementary learning materials is greatly affected by students' diverse learning styles and is a result of learners' individual differences in perceiving, organizing, and processing information. Learning styles of the students play a significant role in the academic performance of students (Magulod, Jr., 2018)[43]. In the study of Rezaeinejad et al. (2015) [57], they stated that there is evidence wherein a mismatch between teachers' instructional strategies and students' learning styles can negatively affect the learning process. Hence, teachers are greatly challenged in planning instructional strategies for applicable supplementary learning materials needed to maximize learning opportunities.

The use of different effective teaching strategies along with continuous improvement and updating of such strategies patterning with the changing learning styles of students ensures successful learning outcomes. In the meta-analysis of Sugano & Nabua (2020) [62] on the effects of teaching methods on academic performance, the use of varied teaching strategies is affirmed to be effective. Studies show the effectiveness of using the supplementary learning materials in enhancing the mathematics skills of the learners and mastering the least learned competencies (Abdullah, 2020 [1], Jacob, et al., 2020 [37], Abdullah & Cerado, 2020 [2], and Skoglund, et. at, 2018). Hence, such strategy has proven its effectiveness through the years.

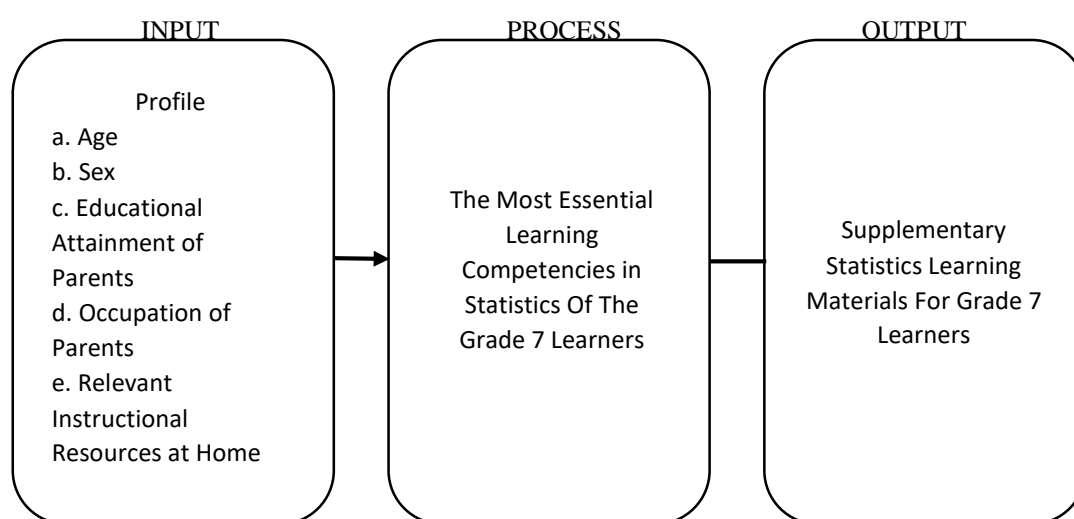


Figure 1. The Research Paradigm

This present study follows the Input-Process-Output. The input variables include the demographic profile of the respondents while the process variable is the attainment of the most essential learning competencies in statistics and the output variable is the

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formulation of supplementary statistics learning materials for Grade 7 learners. The researcher yearns to know if the level of attainment of the most essential learning competencies in statistics is affected by the demographic profile of the students and what valid Supplementary Statistics Learning Material for Grade 7 Learners can be proposed to improve student performance in statistics.

### 1.3 Statement of the Problem

1. What is the demographic profile of the respondents in terms of: a. age, b. sex, c. educational attainment of parents, d. occupation of parents, e. relevant instructional materials at home
2. What is the level of attainment of the most essential learning competencies in statistics?
3. What are the least attained learning competencies in statistics?
4. Is there a significant relationship between the demographic profile of the respondents and the level of attainment of the most essential learning competencies?
5. What valid supplementary statistics learning materials for Grade 7 learners can be proposed to improve student performance in statistics?

### 1.4 Hypothesis

1. There is a significant relationship between the demographic profile of the respondents and the level of attainment of the most essential learning competencies.

### 1.5 Scope and Limitation

This study focused on the formulation of supplementary statistics learning materials for Grade 7 learners to ensure the attainment of the most essential learning competencies in statistics of the respondents in Burgos National High School during the fourth quarter of the school year 2022-2023. The respondents were composed of 138 students from Grade 7.

The result of the achievement test has been the basis in formulating the MELC-based supplementary statistics learning materials for Grade 7 learners.

### 1.6 Importance of the Study

The results of this study were considered beneficial to the following:

**Teachers.** This research will help teachers understand further the importance of different teaching strategies, instructional materials and acknowledging learners' capabilities and needs. Furthermore, this is to provide them supplementary statistics learning materials for Grade 7 learners that they may use.

**Students.** It will provide them with learning opportunities that deepen their understanding of their learning capabilities and how they respond in learning can affect their performance in Mathematics. It will also help them learn mathematics in a fun way.

**Other Stakeholders.** This study will provide crucial information which can guide them in designing policies and strategies aiming to improve students' performance in Mathematics.

**The researcher and future researchers.** This study may serve as reference for the development of future related studies.

### 1.7 Definition of Terms

**Profile of the Respondents.** This refers to the characteristics of the respondents in terms of their:

**Age.** It refers to the time elapsed between the respondents' date of birth and the time the study is being conducted.

**Sex.** It refers to the biological attribute, whether the respondent is a male or a female.

**Educational Attainment of Parents.** It refers to the highest level of education that the parents of the respondents have successfully completed.

**Occupation of Parents.** It refers to the current job of the parents of the respondents.

**Relevant Instructional Resources They Have At Home.** It refers to the learning materials that are beneficial and relevant to the respondents in learning mathematics, specifically statistics.

**Level of Attainment.** It refers to the status of students' achievement in the given set of standards. In this paper, the MELCs for Grade 7 Mathematics for the Fourth Grading Period.

**Most Essential Learning Competencies.** It refers to the set of competencies that are relevant for the learners to attain and develop such skills that would equip them to be globally competitive.

**Least Attained Learning Competencies.** It refers to the competencies where the learners have exhibited difficulty and need intervention.

**Supplementary Statistics Learning Material.** It refers to the researcher-made and MELC-based material that aims to help learners master a competency in statistics that is found difficult.

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### 1.8 Review of Literature

#### 1.8.1 Profile of the Respondents

There are different factors that might or might not affect students' academic performance. One of which is the demographic profile of the students in terms of their age, sex, educational attainment, occupation of parents and relevant instructional materials at home. In the systematic review of Wang, et. al (2023) [69], they have found that the age of the students has positive significance in the academic performance of students which means that the older the students, the higher their scores are. Furthermore, gender is also part of the demographic profiles of the students. According to Nguyen, et al. (2022) [48], there has been an established gap regarding gender in middle school when it comes to mathematics. They said that female students have been reported to exhibit higher anxiety and lower engagement that would eventually affect their academic performance. However, the study has found that the use of games in learning mathematics, which can be a strategic intervention material, can be an effective strategy in bridging gender gaps. Additionally, the socio-economic characteristics of students play a vital role in students' academic performance. This includes educational attainment and occupation of parents. Studies show that it has a significant effect on the students' academic performance in mathematics (Das & Sinha, 2017 [23], Bhat et al., 2016 [14], Udayakumar, 2022 [64]). And the last among the demographic profile of the students is the use of relevant instructional materials at home. These materials are said to be positively associated with the academic performance of the students, particularly with books. However, there is a negative or insignificant relationship among ICT availability and academic performance on students (Wang, et. al, 2023) [69].

Hence, it can be said that the demographic profile of the students may or may not contribute to attainment of most essential learning competencies.

#### 1.8.2 Most Essential Learning Competencies

In 2020, the Philippine educational system was greatly affected by the pandemic, Covid-19, where schools were forced to close to mitigate the spread of the virus. It had a significant impact on the basic education system because there are about 1.5 billion learners or 87% of the student population globally were greatly affected by school closures (UNESCO, 2020). However, the Department of Education adheres to UNESCO's statement that "Education cannot wait. If learning stops, we will lose human capital", and hence, the education system went from face-to-face classes to distance learning. In line with this, DepEd provided the revised K to 12 curricula wherein the most essential learning competencies (MELCs) were released to develop resilient education systems, especially during emergencies like the pandemic. The new MELCs are similar to the pre-pandemic curriculum guide, but it has been compressed (Ravina & Mendoza, 2021) [56]. This was to enable the department to focus on the competencies that are deemed essential and indispensable for the learners to still have quality education despite the change in learning modality.

In terms of competence in mathematics, studies from other countries revealed that scores were slightly lower in 2020 as compared to the pre-pandemic years where there is a standard deviation of -0.03. The low achieving learners had significant learning loss during those times and hence, learning backlogs were earned that needs instructional attention (Schult, et al., 2022) [61]. Different teaching approaches are done in accordance with the most essential learning competencies to ensure that learners are given the essential and indispensable skills needed. According to Ravina & Mendoza (2021) [56], various teaching approaches have significant effect on the most essential learning competencies distribution in teaching science. It has been recommended that the identification of competencies that define the broader outcomes should be done, considering the learning strategy the students are most comfortable with.

However, Urbano (2020) [65] found the existing problem on the implementation of the learning competencies of the K to 12 program. That is, teachers failed to complete the given competencies on its required allotted time due to disruptions of classes though interventions were done to address the issue. Additionally, Gabriel, et al., (2022) [31] found that the most essential learning competencies were compromised because of the unmastered basic concepts which eventually affects students' learnings in the future since the curriculum design is spiral progression. The students need to learn and master basic concepts that are essential in learning other competencies at the higher level.

It is therefore necessary to continuously review and improve these competencies and look for ways for the students to attain mastery of such to ensure the realization of the aim of the department that the learners in the Philippines will be equipped with skills to be globally competitive. Moreover, as per DepEd order no. 34 s. 2022 or the School Calendar of Activities for School Year 2022-2023, the Most Essential Learning Competencies shall continue to be in use for the said school year.

#### 1.8.3 Supplementary Statistics Learning Materials on the Least Learned Competencies

Teachers play a vital role in the success of the teaching and learning process. They are the key to ensuring that the students grasp the knowledge they need and further guide the students in discovering more. They are the ones who are accountable in selecting the best tool for students' learning considering their level of grasping information. According to Isa et al. (2020) [36], the extent

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of the students' academic performances is greatly determined by teaching methods. In this case, teachers have the responsibility to apply appropriate teaching strategies in accordance with the competencies and specific objectives (Cardino et al., 2020) [20] following the level of understanding of the students (Arevalo et al., 2020) [8] to ensure successful transmission of knowledge among students. In the meta-analysis of Aytac & Kula (2020) [11], they found out that among the 104 studies between 1990 and 2020, the student-centered approaches are meaningful variables that positively affect the critical and creative thinking of the students. It requires greater collaboration, flexibility, and innovation for them to integrate an array of revolutionizing perspectives.

The kind of learning outcome is determined by the suitable knowledge given to the students using diverse pedagogies (Raba, 2017) [54]. Additionally, in the meta-analysis of Sugano & Nabua (2020) [62] on the effects of teaching methods on academic performance, the use of varied teaching strategies towards students' achievement is affirmed to be effective. Their review covering the period of 2005 – 2016 conducted in the Philippines revealed that incorporating other avenues of learning using various and innovative teaching strategies promotes academic gain.

The goal of every teacher in teaching mathematics is for the learners to understand and apply what they have learned in class. However, it would not be achieved if the learners find difficulty in understanding and mastering the lessons (Arpilleda, 2021) [9]. Any learner, both excelling and struggling may demand to have intervention in a certain competency/ies. In this regard, the teachers must be keen enough to recognize the grey areas of the students for immediate intervention according to Kautzman in Arpilleda (2021) [9]. Hence, supplementary activities are helpful tool in attaining such goal.

Supplementary learning materials are the teachers' aid in providing learners who require support with appropriate tools to ensure progress by deepening their knowledge, skills and understanding. These are instructional materials that aims to help learners in improving their academic performance across all subject areas while stimulating their active participation especially on the least mastered competencies (Dy, 2011) [27]. In the field of mathematics, students find difficulty on the basic concepts such as probability, problem solving and geometry. According to the study of Ereño & Benavides (2022) [28], students find it difficult to understand when these concepts are formally presented and without connecting its relevance to real life situations. To ensure students' experience more meaningful in studying mathematics, the teachers should consider their individual differences and encourage them to participate in every teaching and learning interactions (Abdullah, 2020) [2].

The supplemental learning materials are support aids made by the teachers to help the learners to achieve successful learning. Its effectiveness in improving the least learned competencies has been proven by recent researches (Abdullah, 2020 [2], Jacob, et al., 2020 [37], Abdullah & Cerado, 2020 [2], and Skoglund, et. at, 2018). Furthermore, the integration of innovative strategies as supplementary learning materials such as Information and Communications Technology integration has also been effective since it caters the 21st century skills of the learners and stir their attention and interest in the teaching and learning process (Aragon, 2022) [7]. Giving additional learning resources to students who are lagging and are struggling to attain the target competencies particularly in statistics will be of so much help since they will be given a chance to improve their mathematics skills and will be able to cope up with other learners.

Moreover, interactive and creative supplementary learning materials can help the learners to study their lesson more effectively and proficiently and eventually improve their mathematical performance. In the study of Vankus (2021) [67] found out that 84% showed positive influences of the game-based learning strategy, which can be supplementary learning materials, in terms of students' motivation, engagement, attitudes, enjoyment, state of flow, etc. The study stated that 54% of the articles considered the affective domain in the measurement of the effectivity of the strategy which signifies that it is a helpful tool suppress mathematics anxiety among students and view the subject as enjoyable and eventually increase their academic performance. Furthermore, it has been found that students learn best using various activities and intervention materials (Arpilleda, 2021) [9]. While using the supplementary statistics learning materials, the teachers can be mere facilitators of learning since they shall give less guidance. The teachers may provide activities and exercises as supplementary materials and let learners discover to make learning successful and more meaningful.

## 2. METHODOLOGY

This chapter presents the research design, population and locale of the study, research instrument, and treatment of data/data analysis that will be used in this study.

### 2.1 Research Design

Descriptive-Correlational research design has been utilized in order to investigate the relationship among the attainment of the most essential learning competencies and level of achievement among the students. Furthermore, the Developmental design was

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also used since the researcher formulated Supplementary Statistics Learning Materials for Grade 7 Learners based on the result of the attainment of the MELCs.

### 2.2 Population and Locale of the Study

The study was conducted at Burgos National High School, Burgos, Ilocos Sur. The school has 167 Grade 7 students, and the study required a sample of 138 students from the five sections of Grade 7 for the school year 2022-2023 who serve as respondents of the study.

**Table 1. Distribution of the Respondents**

Sections	Population	Sample
Narra	41	38
Mahogany	36	30
Yakal	36	30
Tanguile	26	21
Acacia	28	23
<b>TOTAL</b>	<b>167</b>	<b>138</b>

### 2.3 Research Instrument

In this study, the researcher constructed an achievement test in statistics to the respondents for the school year 2022-2023 to identify the level of attainment of the most essential learning competencies. The test was a 50-item multiple choice test covering all the competencies in the statistics of Grade 7. It was guided by the Table of Specifications provided by the SDO – Ilocos Sur and has undergone validity and reliability testing. The reliability testing was administered to the Grade 7 students at Santa Maria National High School, Santa Maria, Ilocos Sur with a result of 0.77 and an interpretation of “good for classroom test” and was further validated by 5 experts in mathematics with a mean score of 4.28 which made the instrument reliable and valid. Moreover, the results of the achievement test were used as a basis in formulating the Supplementary Statistics Learning Materials for Grade 7 Learners. The Supplementary Statistics Learning Materials contained the least mastered competencies with percentage range of 0 – 50.

### 2.4 Treatment of Data/Data Analysis

The collected data was analyzed using descriptive and inferential statistics.

**2.4.1 Frequency count** and **percentage** were used in identifying the demographic profile of the respondents.

**2.4.2 Mean** and **standard deviation** were used to identify the level of attainment of the most essential learning competencies and the least mastered competencies in statistics.

In determining the significant relationship between the profile of the students and their attainment of the most essential learning competencies, the following statistical treatments were used: **Pearson Correlation** for age of the students, **Chi-squared test** was used for sex, occupation of the parents and, relevant instructional resources at home, and **Spearman rank correlation coefficient** for the educational attainment of parents.

### 2.5 Data Categorization

The researcher used the following scales to interpret the gathered data:

#### A. Attainment of Learning Competency in Statistics

Range	Descriptive Rating
0.76 – 1.00	Highly Attained
0.51 – 0.75	Attained
0.26 – 0.50	Moderately Attained
0.00 – 0.25	Not Attained

#### B. Categorization of Least Mastered Competency

Range	Descriptive Rating
0.51 – 1.00	Mastered
0.00 – 0.50	Least Mastered

#### C. Level of Validity of the Supplementary Statistics Learning Material for Grade 7 Learners

Rating	Statistical Limit	Descriptive Rating	Overall Rating
5	4.21 – 5.00	Very Evident	Highly Valid
4	3.41 – 4.20	Evident	Valid
3	2.61 – 3.40	Moderately Evident	Moderately Valid
2	1.81 – 2.60	Less Evident	Fairly Valid
1	1.00 – 1.80	Least Evident	Not Valid

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### 2.6 Ethical Considerations

Ethical practices were given consideration in the conduct of this study. The researcher requested for the full consent of the respondents and guaranteed the confidentiality of their participation in this study.

Moreover, it is ensured that this study was conducted with utmost respect for the respondents. Honesty and transparency were applied and there was no profiting, harm nor jeopardy happened to anyone, party or organization in the conduct of this study.

### 3. RESULTS AND DISCUSSION

This chapter presents the result and discussion of the data that were gathered in this study which includes the presentation, interpretation, and analysis of the significant findings. It also contains the conclusions and recommendations.

#### 3.1 Findings

##### 3.1.1 Demographic Profile of the Respondents

**Table 2. Demographic Profile of the Respondents**

Profile	F	Percentage %
<b>Age</b>		
12	43	31.16
13	91	65.94
14	4	2.90
<b>Total</b>	<b>138</b>	<b>100.00</b>
<b>Sex</b>		
Male	75	54.35
Female	63	45.65
<b>Total</b>	<b>138</b>	<b>100.00</b>
<b>Educational Attainment of Parents</b>		
Elementary Undergraduate	1	0.72
Elementary Graduate	4	2.90
High School Undergraduate	9	6.52
High School Graduate	54	39.13
College Undergraduate	17	12.32
College Graduate	47	34.06
Vocational Course Graduate	5	3.62
With Master's Units	0	0.00
Maste's Graduate	1	0.72
With Doctorate Units	0	0.00
Doctorate Graduate	0	0.00
<b>Total</b>	<b>138</b>	<b>100.00</b>
<b>Occupation of Parents</b>		
Government	11	7.97
Business	3	2.17
Agriculture	71	51.45
Overseas Workers	31	22.46
Others	22	15.94
<b>Total</b>	<b>138</b>	<b>100.00</b>
<b>Relevant Instructional Materials at Home</b>		
Books	90	27.11
Textbooks	15	4.52
Educational Magazine	13	3.92
Laptop	39	11.75
Educational Games	30	9.04
Workbooks	22	6.63
Mobile Phones	123	37.05
Others	0	0.00

Table 2 presents the demographic profile of the respondents which includes age, sex, educational attainment of parents, occupation of parents, and relevant instructional resources at home.

**Age.** The table shows that most of the respondents are 13 years old with a frequency of 91 or 65.94% of the total population. On the other hand, 4 of the respondents or 2.90% of them are 14 years old. The figure states that most of the respondents are of the common age of a Grade 7 student and it is the proper time and age to cultivate their study. This is strengthened by the study of Leander & Fabelle (2020) [40] where the Grade 7 learner-respondents are 12 – 13 years old. 14 – year old students are now quite matured being able to distinguish good and bad that would help them and the teachers (Dingal, 2019) [24].

**Sex.** The males with a total number of 75 or equivalent to 54.35% of the total population is higher than the female respondents who has 63 or 45.65%. This only means that males dominated the females in terms of their number which is parallel to the study of Millan (2018) [45] and Ajai & Imoko (2015) wherein males outnumbered the females. Conversely, this finding negates Duque, et al. (2021) [26] where females dominate the learners. Furthermore, Magbanua & Aplao's (2017) [42] findings show that females have higher positivity in learning mathematics than male and Dizon, et al. (2023) [25] stated that females' domination may be attributed to the fact that males tend to stop attending school to help their parents.

**Educational Attainment of Parents.** Table 2 shows that most of the parents are high school graduates with a total of 54 which comprises the 39.13% of the total population. There were 47 or 34.06% of the parents who are college graduates and 17 or 12.32% college undergraduates. These results indicate that most of the parents of the Grade 7 students finished at least their high school which would mean that they are capable of guiding their children in their studies. This is parallel to the findings of Millan (2018)



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[45], Leander & Fabella (2020) [40], and Dizon, et al. (2023) [25] that most of the parents are at least high school graduates. Furthermore, according to the data posted by the Philippine Statistics Authority in 2011, most of the Filipinos have at least graduated high school. However, it negates Duque, et. al's (2021) [26] findings that most of the parents have either finished elementary school or have no schooling completed at all.

**Occupation of Parents.** The data exhibits that the dominating occupation of the parents of the respondents are in the agricultural sector which comprises 71 or 51.45%. It was seconded by overseas workers with 31 or 22.46% and others which include manual laborers (construction & factory workers), security service providers, drivers and customer service providers were 22 or 15.94%. The finding in this study is parallel to Duque, et al. (2021) [26] where most of the head of the family is employed in a farm or in the agricultural sector. This is further supported by Bliznashka, et al. (2023) [15] wherein most of the parents, both mother and father are employed in the field of agriculture. This implies that most of the parents of the respondents are making the most out of the rich agricultural lands of the country. However, in the study of Tomul, et al. (2021) [63], they found that parents' occupation explained small amount of variance in students' mathematics achievement.

**Number of Relevant Instructional Materials at Home.** Table 2 presents that almost all the respondents have their mobile phones as an instructional material which has a total of 123 or 37.05%. It was followed by books which comprises of 90 or 27.11% of the total population. This means that students nowadays are exposed to digital learning resources such as mobile phones and the information needed are just one click away. In the study of Begum (2011) [13], her findings tell us that the use of mobile phones has a great potential as an instructional tool given that students are disciplined and eliminate the thought of it as a disturbing factor but rather an aid in their learning. Furthermore, Dizon, et al. (2023) [25] found that majority of the students have mobile phones which provides them additional instructional material and take advantage of its educational potential.

### 3.1.2 Level of Attainment of the Most Essential Learning Competencies in Statistics for Grade 7 Learners

Table 3. Level of Attainment of the Most Essential Learning Competencies in Statistics for Grade 7 Learners

Competencies	Item No.	Percentage Who Answered Correctly Per Item	Mean per Competency	SD	DR
<b>Statistics</b>					
1. poses problems that can be solved using Statistics.	46	40	0.40	0.49	MA
2. formulates simple statistical instruments	36 47 48	26 51 48	0.42	0.49	MA
3. gathers statistical data	1 16 26	57 61 44	0.54	0.50	A
4. organizes data in a frequency distribution table	2 17 18 49	61 79 58 41	0.60	0.49	A
5. uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive	19 27 41 50	54 44 26 28	0.38	0.49	MA
6. illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	3 20 28	65 67 57	0.63	0.48	A
7. calculates the measures of central tendency of ungrouped and grouped data.	4 5 6 21 29 30 31 42	72 52 75 49 42 51 31 32	0.51	0.50	A
8. illustrates the measures of variability (range, average deviation, variance, and standard deviation) of a statistical data	7 8 9 10 22 32 37 43	54 51 71 63 62 60 47 61	0.59	0.49	A
9. calculates the measures of variability of grouped and ungrouped data	11 12 23 33 34 35	45 49 49 38 47 38	0.44	0.50	MA
10. uses appropriate statistical measures in analyzing and interpreting statistical data.	13 14 15 24 38 44	58 68 64 45 41 55	0.55	0.50	A
11. draws conclusions from graphic and tabular data and measures of central tendency and variability	25 39 40 45	51 66 21 20	0.39	0.49	MA

Legend: 0.00 – 0.25 (NA)      0.26 – 0.50 (MA)      0.51 – 0.75 (A)      0.76 – 1.00 (HA)

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Table 3 shows the level of attainment on the most essential learning competencies in statistics of the respondents in the achievement test given to them. The highest among the competencies is competency number 6 with a mean of 0.63 which is described as “Attained”. Along with, are competency number 3 with a mean of 0.54, competency number 4 with a mean of 0.60, competency number 7 with a mean of 0.51, competency number 8 with a mean of 0.59 and competency number 10 with a mean of 0.55. The competency with the lowest mean is competency number 5 which is 0.38 described as “Moderately Attained”. The other competencies with the same descriptive ratings are competency number 1 with a mean of 0.40, competency number 2 with a mean of 0.42, competency number 11 with a mean of 0.39 and competency number 9 with a mean of 0.44. Furthermore, one of the Moderately Attained competencies involves drawing conclusions, wherein the students failed to master various mathematical skills on how to simplify problems which leads to poor reasoning and making conclusions, which is similar to the study of Garcia (2022) [30]. Additionally, Botor (2019) [16] found that one of the least mastered competencies in statistics was calculating the measures of variability which further affirms the result of this study.

### 3.1.3 Overall Performance of the Grade 7 Learners

**Table 4. Overall Performance of the Grade 7 Learners in Statistics**

Competencies	Mean per Competency	DR
<b>Statistics</b>		
1. poses problems that can be solved using Statistics	0.40	MA
2. formulates simple statistical instruments	0.42	MA
3. gathers statistical data	0.54	A
4. organizes data in a frequency distribution table	0.60	A
5. uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive	0.38	MA
6. illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	0.63	A
7. calculates the measures of central tendency of ungrouped and grouped data.	0.51	A
8. illustrates the measures of variability (range, average deviation, variance, and standard deviation) of a statistical data	0.59	A
9. calculates the measures of variability of grouped and ungrouped data	0.44	MA
10. uses appropriate statistical measures in analyzing and interpreting statistical data.	0.55	A
11. draws conclusions from graphic and tabular data and measures of central tendency and variability.	0.39	MA
	<b>OVERALL</b>	<b>Moderately Attained</b>
<i>Legend:</i>	0.00 – 0.25 (NA)	0.26 – 0.50 (MA)
	0.51 – 0.75 (A)	0.76 – 1.00 (HA)

Table 4 presents the overall performance of the respondents in the attainment of the Most Essential Learning Competencies in Statistics. Among the eleven competencies, none of which are described as Not Attained, five competencies belonged to the descriptive rating Moderately Attained, six competencies were Attained and no competency was described as Highly Attained. The overall result of the test has a mean of 0.50. This shows that the learners exhibited a fairly satisfactory performance because the competencies are ‘moderately attained’. This implies that interventions are needed to enhance their performance and fill their remaining gaps in attaining the most essential learning competencies in statistics.

This finding is similar to Retutas & Rubio (2021) [58] which states that the level of students’ performance in statistics is fairly satisfactory which means that students possess little knowledge, skills and understanding in statistics. Additionally, Calma, et al. (2022) [18] found that students have difficulties in learning lessons in statistics and probability especially on the fundamental/basic topics. However, the student-respondents obtained scores lower than the mean which implies unsatisfactory ratings in statistics and probability.

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### 3.1.4 Mastered and Least Mastered Competencies of the Respondents in Statistics

Table 5. Mastered and Least Mastered Competencies of the Respondents in Statistics

Competencies	Mean per Competency	SD	DR
<b>Statistics</b>			
1. poses problems that can be solved using Statistics.	0.40	0.49	LM
2. formulates simple statistical instruments	0.42	0.49	LM
3. gathers statistical data	0.54	0.50	M
4. organizes data in a frequency distribution table	0.60	0.49	M
5. uses appropriate graphs to represent organized data: pie chart, bar graph, line graph, histogram, and ogive	0.38	0.49	LM
6. illustrates the measures of central tendency (mean, median, and mode) of a statistical data.	0.63	0.48	M
7. calculates the measures of central tendency of ungrouped and grouped data.	0.51	0.50	M
8. illustrates the measures of variability (range, average deviation, variance, and standard deviation) of a statistical data	0.59	0.49	M
9. calculates the measures of variability of grouped and ungrouped data	0.44	0.50	LM
10. uses appropriate statistical measures in analyzing and interpreting statistical data.	0.55	0.50	M
11. draws conclusions from graphic and tabular data and measures of central tendency and variability.	0.39	0.49	LM

Legend: 0.00 – 0.50 (LM)      0.51 – 1.00 (M)

Table 5 reveals that in the eleven learning competencies, six of which are mastered, and the remaining five competencies are least mastered.

Among the mastered competencies, the students grasped how to gather statistical data and organize it, illustrate, and calculate measures of central tendency, illustrate measures of variability, and can use appropriate statistical measures in the analysis and interpretation of data. These are the learning competencies that reached the mean of 0.51 to 1.00. The findings verify that these six competencies are somehow easier than the other five competencies in statistics.

Furthermore, it can be seen in the table that posing problems that can be solved by statistics, formulating simple statistical instruments, using appropriate graphs to represent organized data, calculating measures of variability and drawing conclusions from statistical measures are where the respondents lag and needs support. These are the learning competencies in statistics which has a mean of 0.50 and lower. The findings are similar to the result of the study of Botor (2019) [16] wherein one of the least mastered competencies in statistics was calculating the measures of variability. Furthermore, it has been evident in the study of Garcia (2022) [30] that students failed to master various mathematical skills on how to simplify problems which leads to poor reasoning and making conclusions.

In overall, there are 5 out of 11 competencies that are least mastered by the learners which is equivalent to 45.45% of the total competencies. This means that the learners are struggling in statistics which coincides with the study of Llanes, et. al, (2018) [41], along with real numbers system, polynomials, and equations and inequalities. In addition, Calma, et al., (2022) [18] and Kandeel (2019) [39] also affirms to this claim that students find it difficult to study statistics and probability. This implies that students have gained limited knowledge in statistics and therefore, interventions such as supplementary statistics learning materials should target these learning competencies in statistics to aid in the enhancement of learning and meet the desired outcome.

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### 3.1.5 Significant Relationship between the Profile of the Respondents and the Attainment of the Most Essential Learning Competencies in Statistics

Table 6. Correlation between the Demographic Profile of the Respondents and the Attainment of the Most Essential Learning Competencies in Statistics

Profile	Computed r	p-value	Interpretation
Age	0.036	0.676	NS
Sex	0.147	0.086	NS
Educational Attainment Of Parents	0.198	0.020	S
Occupation of Parents	-0.045	0.601	NS
Number Relevant Instructional Materials at Home	0.109	0.204	NS

\*correlation is significant at 0.05 level (two-tailed)

It is evident in Table 6 that the scores of the respondents does not necessarily correlate with their demographic profile. There was a very minimal significant relationship between the variables. The only one that is significantly correlated are the scores of the respondents and the educational attainment of their parents with a computed r of 0.198 and a p-value of 0.020 which is less than 0.05 level of significance ( $p \leq 0.05$ ). The positive computed r indicates that the higher the educational attainment of the parents of the learners significantly contribute to the attainment of the most essential learning competencies in statistics. This implies that the educational attainment of parents has an impact to the academic achievement of learners in statistics. The age, sex, occupation of parents, and relevant instructional materials at home are not significantly related to the attainment of the most essential learning competencies in statistics of the grade 7 learners because all of their p-values are greater than 0.05 level of significance ( $p \geq 0.05$ ).

The result of the study confirms the study of Idris, et. al (2020) [35] and Leander & Fabella (2020) [40] wherein the high education of the parents positively contributes on their children's academic achievement. In the rapid literature review conducted in 2020 by Clearing House Technical Assistance Team, they found out that most of the literatures that they reviewed show that parent's educational levels strongly influence educational and economic opportunities of their children. Furthermore, Habungan (2021) [34], stated that parental involvement is significantly related to the attitude of the students towards mathematics yielding to a better performance on the subject. Gutierrez-de-Rozas, et. al (2022) [33] further stated that contextual variables like related to family may influence the academic achievement of the learners. It however, contrasted Nelson's (2009) [47] study which states that parent education mediates but generally does not directly influence student academic achievement.

### 3.4 Validity of the Supplementary Statistics Learning Materials

Table 7. Validity of the Supplementary Statistics Learning Materials for Grade 7 Learners

Indicators	Mean	Interpretation
1. The materials are consistent with the learning competencies for the subject and grade level it was intended for.	5	Very Evident
2. The materials can stimulate and promote critical thinking of the learners.	5	Very Evident
3. The materials are free from error in spelling and grammar	5	Very Evident
4. The materials are relevant to real – life situations that learners can relate to.	5	Very Evident
5. The materials are logically developed and organized to contribute to the enrichment, reinforcement and mastery of the identified learning objectives.	4.6	Very Evident
<b>OVERALL</b>	<b>4.92</b>	<b>Highly Valid</b>

Table 7 displays the result of the validation of the supplementary statistics learning materials for grade 7 learners.

The table indicates the result of the validation done by experts in the field of mathematics in terms of the contents of the materials. It shows that the overall mean of 4.92 which means that the indicators are very evident in the supplementary materials. Therefore, the researcher-made materials are highly valid.

It is apparent that the materials made are consistent with the learning competencies, can stimulate critical thinking, free from spelling and grammatical error, and is relevant to real-life situation, all with a mean of 5.

This confirms that the supplementary statistics learning materials for grade 7 learners can be used by teachers to aid in the enhancement of the skills of the students in the particular competencies. Supplementary materials can be in a form of strategic

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intervention materials which can be used to address the needs of the learners in helping them improve their mathematical skills (Garcia, 2022) [30].

### 3.5 CONCLUSIONS

Based on the findings, the following conclusions are made:

1. Most of the respondents are 13 years old which are dominated by the male students and almost all of them has a mobile phone as their relevant instructional material at home. Most of their parents are high school graduates and have jobs related to agriculture.
2. The level of attainment of the most essential learning competencies in statistics for Grade 7 learner-respondents was Moderately Attained. Five competencies appear to be moderately attained and six competencies were attained.
3. The respondents showed less mastery and needs support on competencies which involves posing problems that can be solved by statistics, formulating simple statistical instruments, using appropriate graphs to represent organized data, calculating measures of variability and drawing conclusions.
4. The educational attainment of parents showed significant relationship with the attainment of the most essential learning competencies in statistics for Grade 7 students. The other variables under the profile of the students seems no effect on the attainment of the MELCs most especially the age of the respondents.
5. The researcher-made Supplementary Statistics Learning Materials in Statistics for Grade 7 Learners is Highly Valid. These materials can be used by the mathematics teachers to give support to the students who are lagging for them to attain mastery in the learning competencies.

### 3.6 RECOMMENDATIONS

Based on the conclusions of the study, the following recommendations are hereby made:

1. Students must learn how to focus on things relevant and worthwhile and see gadgets as an aid to achieve their goals and not as a distraction or any sort. Parents must and/or continue to give their children the needed support regardless of their educational attainment.
2. Teachers must continue to find ways on how to help the learners stay motivated and willing to learn mathematics and eventually enhance their mathematical ability. This can be done through interactive classroom discussions or learning materials, integrating information and communication technology in learning and relating the lessons to real-life situations to make learning more successful and meaningful.
3. Teachers must be vigilant in identifying the learners' needs to give the appropriate help for the learners. They should always intend to assist learners who are lagging and provide approaches to help them catch up and improve their mathematical skills most especially in statistics.
4. Parents must have academic involvement in their children's student life. They must recognize their children's emotional and academic needs. Their utmost support to the educational tasks of the learners has an impact to their academic achievement.
5. The Supplementary Statistics Learning Materials for Grade 7 Learners can be used as a tool in enhancing performance of learners in statistics especially to learners who exhibits poor mastery on the competencies.
6. Further related studies may be conducted to intensify the results of this present study. Modifications in terms of variables can be done to enhance the study.

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