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Factors Affecting Numeracy Skills

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Abstract

This study aimed to determine what factors affect the numeracy skills of the Grade 1-3 students. This study used a descriptive correlational quantitative research design, which examines the relationships between factors affecting numeracy skills and the level of numeracy skills of students. The research instrument used was a survey questionnaire containing two parts: the summative test for the level of numeracy skills and the survey questionnaire for the factors. The respondents of this study were 38 Grade 1-3 students of Canloterio Elementary School during
School Year 2023-2024.

Chapter I
INTRODUCTION
BACKGROUND OF THE STUDY

Education has provided individuals with sufficient reasons to choose which learning themes will be preserved and maintained throughout their lives. The foundation subjects allow students to begin anew and see life from a different perspective. However, according to Education Scotland (2019), Mathematics, out of all the learning areas in basic education, presents students with problems that arise from within or from without, which consequently affects numeracy skills.

According to the United Nations Relief and Works Agency (2013), numeracy is a skill that involves confidence and the ability to deal with numbers and measurements. It necessitates a working knowledge of the number system, a set of computational skills, and a desire and capacity to solve number issues in various situations. Numeracy also requires a practical understanding of how data is obtained by counting and measuring and then presented or depicted in graphs, diagrams, charts, and tables. Additionally, Ofsted (2018) has highlighted the importance of early mathematical instruction on young children's ability development on the impact of prior achievement on future academic success on the need to focus on numeracy. However, some students still have a low level of numeracy skills. With that, this study aimed to determine the factors that affect the numeracy skills of students. In addition, the researcher would also like to determine the significant relationship between the level of numeracy skills of respondents and the factors affecting numeracy skills. This study is beneficial not only to students but also to teachers and parents. This research also helps deliver vital information regarding students' numeracy skills.

STATEMENT OF THE PROBLEM

This research is to investigate factors that affect numeracy skills of students of K-3 at Canloterio Elementary School. At the end we will be able to find answer the following questions:

1. What is the Socio-Demographic profile of the K-3 students of Canloterio Elementary School in terms of:

a. Age

b. Gender
c. educational background of parents
d. parental involvement
2. Which factor affects the most to students' numeracy level?
3. What are the relationships between the factors affecting numeracy skills to students' numeracy?

HYPOTHESIS

Hypothesis 1: Increased parental involvement in a child's early math education positively correlates with higher numeracy skills in later years.

Hypothesis 2: Children from higher socioeconomic backgrounds will demonstrate higher numeracy skills compared to those from lower socioeconomic backgrounds due to access to resources and educational opportunities.

Hypothesis 3: Early exposure to mathematical concepts and activities in preschool and kindergarten correlate positively with higher numeracy skills in primary school.

Hypothesis 4: Proficiency in the language of instruction positively influences numeracy skills, with children who are fluent in the language demonstrating better mathematical comprehension and problem-solving abilities.

SIGNIFICANCE OF THE STUDY

Understanding the factors influencing numeracy skills can help identify disparities in mathematical proficiency among different groups of students. By addressing these disparities, educators and policymakers can work towards creating more equitable educational opportunities and reducing achievement gaps. Research on factors affecting numeracy skills provides valuable insights into effective teaching practices and instructional strategies. Educators can use this knowledge to tailor their teaching methods to better support the diverse needs of students and enhance mathematical learning outcomes.

Identifying factors that impact numeracy skills early in development allows for targeted interventions to support children who may be at risk of falling behind. Early intervention programs can help prevent long-term academic struggles and improve overall educational attainment. Recognizing the importance of parental involvement in numeracy skill development highlights the role of families in supporting children's mathematical learning. Educators can collaborate with parents to provide resources and guidance for fostering numeracy skills at home, strengthening the home-school partnership.

Research on factors affecting numeracy skills can inform education policies aimed at improving mathematics education at the local, regional, and national levels. Policy interventions may include initiatives to enhance teacher training, increase access to early childhood education, and provide support for students from disadvantaged backgrounds. Numeracy skills are essential for success in the modern workforce, where mathematical literacy is increasingly important across various industries. By improving numeracy skills among students, education systems can better prepare future generations for the demands of the 21st-century economy. Proficiency in numeracy skills contributes to individuals' overall quality of life by enabling them to make informed decisions, solve everyday problems, and participate fully in society. Improving numeracy skills can empower individuals to achieve their academic, professional, and personal goals.

THEORETICAL/CONCEPTUAL FRAMEWORK

Piaget's Theory of Cognitive Development suggests that children progress through stages of cognitive development, including the sensorimotor, preoperational, concrete operational, and formal operational stages. Piaget emphasized the importance of hands-on experiences and interaction with the environment in developing numerical concepts.

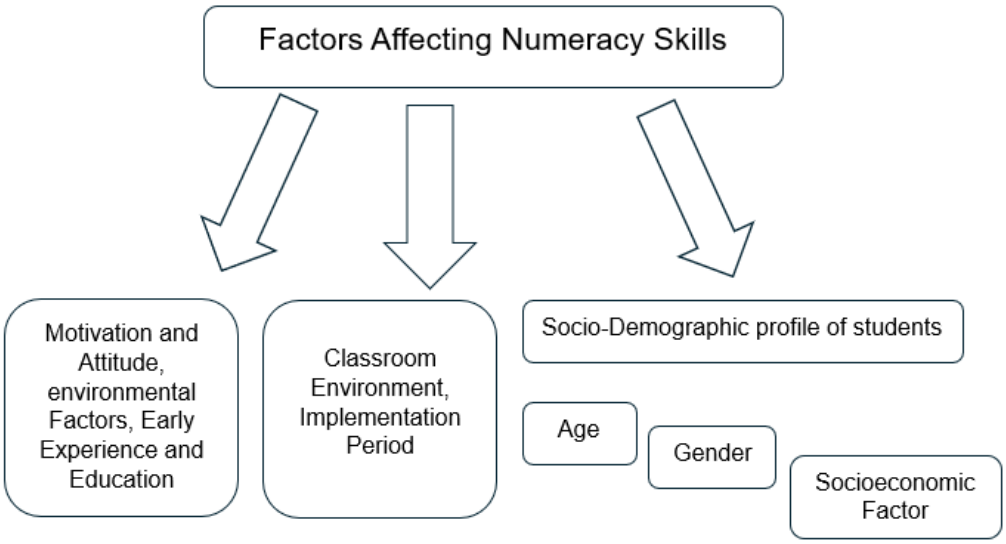
Vygotsky's Sociocultural Theory emphasizes the role of social interaction and cultural context in cognitive development. According to Vygotsky, learning occurs through social interaction with more knowledgeable others, such as parents, teachers, and peers. Numeracy skills are acquired through collaborative problem-solving activities and guided participation in cultural practices involving mathematics.

Information Processing Theory views the mind as a computer-like system that processes information through various cognitive processes, including attention, perception, memory, and problem-solving. Numeracy skills are developed through the gradual refinement of these cognitive processes, such as recognizing numerical patterns, retrieving mathematical facts from memory, and applying problem-solving strategies.

Dual Coding Theory: Proposed suggests that information is processed through two distinct channels: verbal (language-based) and non-verbal (visual/spatial). Dual coding theory posits that representing information in both verbal and visual formats enhance learning and memory retention. In the context of numeracy skills, dual coding theory suggests that combining verbal explanations with visual representations (e.g., diagrams, graphs) can facilitate understanding and retention of mathematical concepts.

Conceptual Change Theory: This theory explores how individuals acquire and revise their understanding of scientific concepts, including mathematical concepts. Conceptual change theory suggests that learning involves more than the acquisition of new information; it often requires learners to restructure their existing mental frameworks or misconceptions. In the context of numeracy skills, conceptual change theory emphasizes the importance of identifying and addressing students' misconceptions and promoting deep conceptual understanding of mathematical concepts.

These theories provide frameworks for understanding the cognitive processes, social interactions, and cultural influences involved in the development of numeracy skills.



SCOPE AND LIMITATION OF THE STUDY

This study is limited to the K-3 students of Canloterio Elementary School, for the S.Y 2023 – 2024 in Maydolong Eastern Samar, Philippines. This study is to examine the relationship between factors affecting numeracy skills and level of numeracy skills of students.

DEFINITION OF TERMS

- Numeracy Skill - the ability to work with numbers, including the use of mathematical formula, such as multiplication, division, ratios, and percentages.
- Factors - one that actively contributes to the production of a result.
- Environmental Factors - involve everything that changes the natural environment.
- Student Related Factors - refer to various aspects of a student's life and experiences that can impact their academic achievement, such as reading issues, teacher competency, personal needs, attendance, and discipline.
- Teacher Factors - The sum of all the several things that influence the teacher in the performance of his teaching to the learners.

Chapter 2

REVIEW OF RELATED LITERATURE

The Definition of Numeracy Skills

Numeracy, according to Victorian Curriculum and Assessment Authority (2017), is the knowledge, skills, practices, and attitudes that learners need to do math in a variety of situations. It involves perceiving and comprehending the world's mathematical functions. Many people's numerical experience in daily life includes number, estimation, and calculation (Raymundo, 2013). Numerical agreement, familiarity, and critical thinking get extremely advanced and developed as learners grow (Kurmaniak,2021). These abilities enable students to use arithmetic to make informed decisions and solve problems effectively. Orpwood, Schmidt & Jun (2012) stated that numeracy skills are, in a sense, more important now than they ever have been. Also, Essential Skills Ontario (2012) echoes many of these abilities, dividing numeracy into five dimensions that reflect everyday use: 1) money math, or the ability to make financial transactions such as paying bills; 2) scheduling, budgeting and accounting, or planning for the best use of money and time; 3) measuring and calculating quantities, areas, volumes and distances; 4) data analysis; and 5) numerical estimation. Furthermore, according to the United Nations Relief and Works Agency (2013), numeracy is a skill that incorporates confidence and competence with numbers and measurements. It requires an understanding of the number system, a repertoire of computational skills and an inclination and ability to solve number problems in a variety of contexts (Central Foundation, 2022).

Development of Early Numeracy and its Significance to Future Numeracy Skills of Students

Early math and numeracy are the general understanding of numbers and basic mathematical concepts as stated by (Harris & Petersen 2019); (Toll & Van Luit 2014). These are skills such as counting, comparing, and contrasting, describing shapes and positions and problem solving. According to the findings of Harris & Petersen (2019), students who are exposed to and master early math abilities at a young age are more likely to succeed in school. Students who enter Kindergarten low in math skills tend to continue to perform below their peers in later grades. Math learning and intervention needs to happen before kindergarten. These students, especially at-risk students, need the opportunity to build a strong foundation at a young age. Clerkin and Gilligan (2018) also performed a study Arithmetic achievement in fourth grade is linked

to numeracy activities at home with young children and attitudes toward math. They discovered that early childhood numeracy play was strongly and positively associated with fourth-grade math attitude. Students who were exposed to arithmetic activities at an early age developed a more positive attitude toward math in general. The cheerful attitude lasted at least until fourth grade. Furthermore, they found that students with a negative attitude toward math in fourth grade also were achieving at a lower level. This shows that early numeracy play is directly linked to positive attitudes toward math which leads to higher achievement in upper elementary math classes. Parents are the first teachers in a child's life and their time devoted to introducing numeracy activities at a young age is shown to pave the way for their child's math future.

Factors Affecting Numeracy Skills

One factor affecting numeracy learning can be environmental factors, it may be the social environment, which is the child's relationship with others in school and community. Emotional environment, which is how well the child's relational needs at home (McGuirre, 2022). Angela (2018) said that in a school or home setting, a positive learning environment is crucial for a child. Also, major findings in the study of Wali (2015) found that home environment plays a vital role in developing children numeracy skills development because children undergo certain formal and informal experiences at home. Parental involvement is a huge factor in the learner's achievement. In a study of Cai et al. (2016), parents play the roles of motivators, resource suppliers, monitors, mathematics content advisers, and mathematics learning counselors, according to them. Footprints (2022) said that the classroom should be a dynamic and engaging place for the students to be. Hannah (2013) said that if there is too much structure set in place it can stifle creativity, and if there is not enough structure it can lead to distractions and little focus. On the contrary, a classroom with fresh, warm air can create an atmosphere conducive to learning (Burke and Samide, 2013). However, without an organized classroom, even a generously sized room can diminish students' sense of ease and autonomy and limit their learning (Responsive Classroom, 2016). Additionally, cluttered or unorganized rooms can be distracting and impede learning, and furniture should be arranged in such a way that there is little traffic throughout the day and so that it appears organized (Angela, 2013). Also, Math teachers' behaviors have had much impact on encouraging the students towards mathematics (Khayati & Payan, 2014). Manoah, Indoshi and Othuon (2011) confirmed that students' attitudes about mathematics have a direct impact on their academic achievement. Further, White (2011) said that individual attitudes regarding the issue can also influence numeracy acquisition. In contrast, Uok and Langat (2015) found that students who had positive attitudes towards mathematics did not affect their mathematics score. Similarly, Krukru (2015) found that in Nigeria, instructional materials have a significant impact on academic performance. He claims that using instructional materials makes it easier to present a lesson and improves teaching and learning. The usage of instructional materials aids students in better understanding a subject's concept. As a result, students who are taught using instructional resources do better than students who are taught without them, as added by (Adalikwu & Lorkpilgh, 2013).

Difficulties of Students in Numeracy

According to the Ministry of Education (2011) report, findings of the Primary School Assessment Test (UPSR), Malaysian elementary school pupils have difficulty answering questions that need numeracy understanding, particularly those that involve fundamental and problem-solving calculations. This supported by the findings from the Trends in International Mathematics and Science Study (TIMSS) in 2010 which demonstrated that Malaysian pupils are less familiar with questions demanding understanding, such as those that need the application of real-world knowledge, such as money titles, lengths, and weights. He also noted that headlines including the words numeracy, geometry, number, algebra, and data are less

dominated by pupils. Also, Guinocor and company (2020) stated that in the Philippine setting, educational modules in mathematics contain a specific topic and instructional plan standards to empower understudies to create consistent and numerical abilities expected to get it the fundamental mathematical concepts. However, low performance in this discipline is still evident (Almerino, P., et.al., 2020) and low achievement of students in learning mathematics is still perceived as a continuous problem (Mushtaq, 2013). Meanwhile, the Philippines ranked 2nd from the bottom among the participating countries in the recent Programme for International Student Assessment (PISA) 2018 according to DepEd - National Report of the Philippines (2019). This alarming result revealed that Filipino students recorded a mean score of 353 points in Mathematics Literacy which is significantly lower than the OECD mean of 489 points. It is also reported that only 1 out of 5 Filipino students or approximately 19.7% attained at least the minimum proficiency level (Level 2) in Mathematics Literacy. Additionally, in 2016, "57 per cent of the grade six candidates gained mastery of Mathematics in the Grade Six Achievement Test and only 44 per cent of those candidates passed the CSEC Mathematics, falling from 62 per cent in the previous year" (Buddo, 2017). In addition, the result of this study was supported by Care, E. and friends (2015) that the participation of the Philippines in TIMSS reported that the performance of Filipino students in national and international surveys on mathematics and science competencies lag its neighboring countries like Singapore, South Korea, Hongkong, Chinese Taipei and Japan.

Ways to Improve Numeracy Skills

Learners need to become familiar with the critical thinking ability with which they can solve problems in their current circumstances (Widodo, 2018). According to Krisdiana and company, (2019), teachers should utilize the use of worksheets-based learning so the learners may improve critical thinking. In the study by it is shown that students' critical thinking skills are increased by worksheet-based learning, and they are excellent. Another study shows that Team Accelerated Instruction can further develop numerical critical thinking abilities. It is important to plan visual learning media to make learning more successful (Widodo, 2019; Bernard, 2019). Next, is that teachers' assistance has a significant impact on the cognitive, behavioral, and emotional elements of students' numeracy skills in a math class. Teachers should encourage students to love math activities (Liu, 2018). It is also noted that teachers' efficacy is related to the learners' performance and accomplishment (Gulistan, 2017). One of the teaching traits a teacher should possess is the ability to nurture new approaches for evaluating the kind of information, abilities, and manners that children and society require. According to Kelly (2020) that the key to success in the field is a teacher's ability to organize the lesson, the classroom, and the students. Also, a teacher's ability to organize and prioritize classroom materials and schedules makes for successful teacher-student learning and efficacy (Mendez, 2019). Additionally, according to the study of Sharma (2016), teacher support plays a significant role in generating a learning environment and induces the academic achievement and attainment of learners. Oluwasanmi (2012) proved through his research that in cooperative learning, students are more motivated to learn. They also tend to possess higher self-esteem, and they are less worried in learning Mathematics (Chan and Idris, 2017). Research has shown that when compared to traditional learning with lectures and individual performance, cooperative learning provides higher student achievement (Anwar et al., 2020). According to LoBello (2009), students who listen in class gain a better understanding of the content the teacher presents and can identify the fundamental knowledge which helps them build up prior knowledge especially in Math. Further, Iwankovitsch (2010) said that students with strong listening skills don't just retain more information, but they are also less likely to feel unprepared and frustrated in class. Additionally, improved listening skills can lead to improving a student's belief that

they can succeed in class (Graham, 2011). Also, a student with a positive attitude towards math is more confident when learning math, enjoys math, motivated to do more, actively engages during math lessons, gets more practice, and achieves more (Kennedy, 2019). Furthermore, another easy way for parents to help their children is to set up a distraction-free zone where they can do their homework. Parents can assist children in creating a space and time for them to return to their duties, as well as giving necessary tools for homework assignments (Patall, Cooper, & Robinson, 2008). However, Solari and Mare (2011) said that the lack of a comfortable, quiet space can lead children to have difficulties studying and reading, affecting their school performance. Oftentimes, the emphasis on math in schools is on abilities, instead of tackling its uses and importance, that is why some learners cannot appreciate the subject well (Larkin, 2016). Number-related activities can be done at home that will uphold the mathematical skills of the children through different board games or card games (Zippert and Rittle-Johnson, 2019). Dimakos, Tyrlis, and Spyros (2012) stated the parent influences a child's ability to learn numbers. Additionally, parents can be urged to utilize home numeracy encounters to the advancement of their kids' numeracy skill (Cheung, 2018).

Chapter 3
METHODOLOGY
RESEARCH DESIGN
This study will use descriptive-correlation research design that will aim to provide static pictures of situations as well as establish the relationship between different variables. This will be utilized by interviewing the respondents to determine the relationship with the level of numeracy skills and factors affecting numeracy skills.

RESEARCH INSTRUMENT
The researcher will use two (2) sets of questionnaires. The first set of questionnaires is an assessment type, the E-RUNT numeracy test developed by the DepEd Regional Office.

The second set of questionnaires was a researcher-made questionnaire. The respondents were asked to rate each item along a five-point scale ranging from 5 (Always) to 1 (Never).

RESPONDENTS OF THE STUDY
The respondents of this study are the k-3 students of Canloterio Elementary School. There are 11-kindergarten, 4 – Grade 1, 11 – Grade 2, and 12 – Grade 3 a total of 38 students with 17 boys and 21 girls.

DATA COLLECTION
A letter of approval to request the Numeracy Test for the S.Y 2023 – 2024 will be sent to the school principal. Another letter to conduct the study and to administer the questionnaire to K-3 students will be sent to the school principal. The anonymity of the students' identities and the confidentiality of the documents requested will be strictly observed by the researcher. The numeracy test will be administered during the free period. Data will be gathered, tabulated, and summarized.

DATA ANLYSIS
The study will use descriptive correlations which will examine the relationship between factors affecting numeracy skills and level of numeracy skills. Mean, standard deviation, and Pearson-r will be used as statistical tools in this study.

ETHICAL CONSIDERATIONS
Given the importance of ethics in conducting research and the challenges involved, the researcher strives to safeguard the dignity and safety of the respondents.

In adherence to ethical norms, all respondents provided informed consent, confidentiality, and potential risks associated with the study.

REFERENCES

1. Abaidoo, A. (2018). Factors Contributing to Academic Performance of Students School.
2. University of Education.
3. Adalikwu (2013) as cited in the study of Abaidoo, A. (2018). Factors in Contributing Performance of Students in Junior High School. University of Education. Junior
4. Almerino, P., Mamites, I., Lumayag, C., Villaganas, M.A., Capuyan, M., Guinocor, M., (2020). Mathematics Performance of Students in a Philippine State University. International Electronic Journal of Mathematics Education. p. 2. Retrieved from https://www.iejme.com/download/mathematics-performance-of-students-in-a philippine-state-university-7859.pdf
5. Andrew, S. (2019). Assessment of Factors Affceting Numeracy and Mathematics Skills of Children in Uganda. Retrieved from https://www.academia.edu/44103953/Assessment-of-Factors-Affecting-Numeracy
6. Angela, M. (2013). How to Create a Positive Learning Environment for Children. Retrieved from https://www.hellomotherhood.com/how-to-create-a-positive-learning-environment-for-children-5604381.html High to Academic
7. Anwar, K., Shaikh, A. A., Dash, N. R., & Khurshid, S. (2012). Comparing the efficacy of team-based learning strategies in a problem based learning curriculum. Apmis, 120(9), 718–723. https://doi.org/10.1111/j.1600 0463.2012.02897.x
8. Armstrong, D. G., Henson, K. T. and Savage, T. V. (2009). Teaching today: An introduction to education (8th ed.). Upper Saddle River, New Jersey, OH: Pearson.
9. Ayuwanti, I., Marsigit, and Siswoyo, D. (2020). Teacher-student interaction in mathematics learning. International Journal of Evaluation and Research in Education (IJERE).
10. Azizan, M. T., Mellon, N., Ramli, R. M. & Yusup, S. (2018). Improving teamwork skills and enhancing deep learning via development of board game using cooperative learning method in Reaction Engineering course. Education for Chemical Engineers, 22, 1-13. doi.org/10.1016/j.ece.2017.10.002 evaluation
11. Blazar, D., & Kraft, M. A. (2017). Teacher and teaching effects on students' attitudes andbehaviors. Educational and policy https://journals.sagepub.com/doi/pdf/10.3102/0162373716670260 analysis,
12. Buddo, C. (2017, February 20). Mathematics education: A case for problem- Observer. Retrieved 39(1), solving. Jamaica from http://m.jamaicaobserver.com/columns/Mathematics-education–A-problem-solving_90150 146-170. casefor
13. Burke, K. and Burke-Samide, B. (2013). Required changes in the Classroom Environment: It's a matter of Design. The Clearing House, Vol. 77, No. 6 (Jul. - Aug., 2004), pp. 236-239 [13]. Care, E., Azim, F., Beswick, B., Harding, S. M., Luo, R., Bustos, T., & Cagasan, L. (2015). Large-scale assessments for use in the Philippines. Retrieved from http://bit.ly/2G0PvYq
14. Chan, L., Idris, N. (2017). Cooperative Learning in Mathematics Education. International Journal of Academic Research in Business and Social Sciences. 546-547. Retrieved from http://dx.doi.org/10.6007/IJARBSS/v7-i3/2757
15. Chen, Y. (2018). Perceptions of EFL College Students toward Collaborative Learning. Canadian Center of Science and Education, 11(2), 1-4. http://doi.org/10.5539/elt.v11n2p1

16. Cheung, S. K., Yang, X., Dulay, K. M., & McBride, C. (2018). Family and individual variables associated with young Filipino children's numeracy interest and competence. British Journal of Developmental Psychology, 36(2), 334- [17]. Central 353. Foundation for Girls (2022). Numeracy. Retrieved https://www.central.towerhamlets.sch.uk/page/Numeracy-Numeracy-is-proficiency-that,-in-variety-contexts.
17. Clerkin, A., & Gilligan, K. (2018). Pre-school numeracy play as a predictor of towards mathematics at age 10. Journal of Early doi:10.1177/1476718X18762238 Childhood Research,
18. Department of Education. (2019). PISA 2018 National Report of the Philippines. https://www.deped.gov.ph/wp- children's 16(3), content/uploads/2019/12/PISA-2018-Philippine-National-Report.pdf.
19. Dettmers, S., Trautwein, U. Lüdtke, O., Kunter, M., & Baumert, J. (2010). Homework works if homework quality is high: Using multilevel modeling to Journal of Educational Psychology, 102(2), 467-482.
20. Dimakos, G., Tyrlis., & Spyros, F. (2012). Factors that Influence students to do Math. Retrieved from http://elib.mi.sanu.ac.rs./files/journals/tm/28/tm1514.pdf primary school.
21. Dockrell, E., Shield, B., (2008). The effects of environmental and classroom noise on the academic attainments of children. https://pubmed.ncbi.nlm.nih.gov/18177145/ Journal, 11(2), 326-348. measure teacher quality. Retrieved from is- National from attitudes 319-334. Retrieved from predict the development of achievement in mathematics. Library of Medicine. Retrieved
22. Education Scotland (2019). Curriculum for Excellence, The Scottish Government, Edinburgh, http://www.gov.scot/resource/doc/226155/0061245.pdf (accessed on 18 December 2017). [24]. Eren, O. & Henderson, D. J. (2008). The impact of homework on student achievement. from Econometrics
23. Essential Skills Ontario (2012). Literacy and Essential Skills in Ontario. Toronto: Author. Retrieved from http://www.essentialskillsontario.ca/sites/www.essentialskillsontario.ca/files/Literacy%20and%20Essential%20Skill s%20in%20Ontario_Final2_0.pdf [26]. Fischetti, J., (2016, September 1). Focusing on tests and invalid assessments is the wrong way to https://theconversation.com/focusing-on-testsand-invalid-assessments the-wrong-way-to-measure-teacher-quality-63931 from
24. Footprints (2022). How to Create A Positive Learning Environment. Vancouver, BC, Canada, V6P 5Z2. Retrieved https://www.footprintsrecruiting.com/teacher-community/blog/how-create-positive-learning environment.
25. Franc, J. (2020). Response, Factor, and Level-Three Experimental Definitions You Might be Getting Wrong. Retrieved from https//www.stat59.com/blog/2020/6/response-factor-level-definitions/
26. Gage, N. A., Scott, T., Hirn, R., and MacSuga-Gage, A. S. (2018). The implementation of classroom relationship between teachers' management practices and student behavior in elementary school. Behav. Disord. 43, 302–315. doi: 10.1177/0198742917714809