

Reciprocal Determinants of Students' Mathematics Performance in Two Boarding Schools in Cebu, Philippines



Emerson D. Peteros*
Cebu Technological University, Cebu City, Philippines

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*Corresponding Author:

Emerson D. Peteros

emerson.peteros@ctu.edu.ph

ABSTRACT. Students' ethnicity and self-concept have been less explored in the Philippine educational setting. Exploring the effects of these factors on the mathematics performance of students who enrolled in classes with diverse ethnicity can provide a better understanding of how to handle this type of educational setup. This study aimed to investigate the relationship between ethnicity, self-concept toward Mathematics, and performance in Math of the Grade 7 students of two boarding schools. A descriptive correlational research design was employed using a survey questionnaire to assess the students' self-concept and the results of the unified institutional test to assess their mathematics performance. The 300 respondents were selected using stratified sampling with their ethnic group as the stratum. The data were treated using descriptive and inferential statistics. The results revealed that the students have moderate self-concept of Mathematics in all ethnic groups. Moreover, findings show no significant relationship between the students' ethnicity and self-concept. However, it revealed a significant relationship between ethnicity and performance in Mathematics and self-concept and performance in Mathematics. Hence, a positive sense of identity and self-efficacy can contribute to the better performance of the students in Mathematics.

Moreover, teachers are encouraged to consider the ethnicity of students in delivering instruction in classrooms where students have different ethnic orientations.

1.0. Introduction

People differ in many ways, including their place of origin, which affects the personality and ability of every individual. The individual's place of origin can serve as the source of one's social identity, which is referred to as the person's ethnicity. Ethnicity is the most critical criterion for collective social distinction in daily life, and ethnic distinctions are rooted in perceptions of differences between lifestyles (Hernández et al., 2017; Casinillo et al., 2020). Every ethnic group is associated with their common values, attitudes, and preferences in their primordial viewpoint (Desmet et al., 2017). The individual's ethnicity is the typical source of conflict worldwide because every ethnic group has its views and philosophies in life that usually contradict others (Organization for Economic Co-operation and Development [OECD], 2019).

In the Philippines, differences in language are the primary criterion for ethnic identity, known as "ethnolinguistic group." More than 70 ethnic groups are spread all over the country. However, only eight of these ethnic groups make up 82 percent of the population (Castro, 2011). With this distribution of ethnic groups, some may be considered dominant while others are the minority ethnic group. Hence, people who belong to this minority feel inferior to others. The ethnic minority groups have an inferior status in social positions (Eduardo & Gabriel, 2021). Their interests are not effectively represented in society (Yang et al., 2019). Such a feeling of inferiority contributes to how a person perceives himself over others (Keromnes et al., 2019).

In a particular province in the Philippines, there are two boarding high schools for the less privileged students that accept students from different regions. These private sectarian schools accept students whom they considered scholars after passing the entrance examination and interview. The schools provide the students with free clothing, education, food, and lodging. Students stay together inside the campus for the whole duration of the academic year. However, students of these schools face challenges relative to the diversity of their ethnic groups because they come from different



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regions. When these students were enrolled in these schools, they were strangers to each other. They would usually speak their dialect, which hinders them from mingling with other students. They usually experience a culture shock because they are introduced to a different environment wherein the people around them have different dialects, upbringing, and cultures (Drobot, 2021). Students preferred to blame culture shock on external variables such as language, communication, and surroundings rather than internal affective or cognitive issues (Akarowhe, 2018).

Moreover, these students are away from their families, which would supposedly give them comfort in their times of trials and hardships, leading them to feel homesick. Students here usually encounter hardships adjusting to the new environment, particularly homesickness while studying, which could affect them (English, 2017). Self-esteem, ego identity, and internal locus of control were all lower in homesick students. They highlighted denial, a yearning for family and friends, and a longing for one's home and hometown (Chevrier & Lannegrand, 2022). All these things have to be dealt with by the student alone to survive in this new environment. In such cases, the way they look at themselves may be affected because of the absence of parental and family support.

Another struggle that these students encounter is the language used inside the classroom. Teachers tend to speak the Cebuano dialect when explaining lessons, especially when emphasizing complicated concepts and ideas, particularly mathematics. It has been a constant practice of teachers of these schools to apply code-switching when delivering the lessons. Code-switching positively increases learner participation and lesson comprehension (Castillejo et al., 2018). However, students who do not speak the dialect of the teacher will tend to disengage in the discussion because they cannot understand the teacher anymore. Code-switching is a common practice in Philippine education, which could affect students who are not familiar with the language used by the teacher inside the classroom (Gamotin, 2021). Consequently, students who have difficulty understanding the language may feel that they are not part of the class (Zheng & Cheng, 2018).

Nonetheless, schools must consider the importance of the influence of the teacher attitudes on school climate where students are of diverse ethnicity and their responsibility in fostering an organizational structure that respects their students regardless of their ethnic background and emphasizes the significance of this diversity in the educational process (Grütter et al., 2021; Liethwood, 2021; Maxwell et al., 2017). Teachers' and other school professionals' attitudes towards ethnic diversity can impact how they introduce students of an ethnic minority into a new school environment (Bacon, 2011). Hence, teachers can avoid a scenario that affects the students on how they look at themselves in the classroom or their self-concept of the subject. Self-concept is a set of views or reference points that a person has about himself, including features, attributes, qualities, inadequacies, capacities, limits, values, and relationships that the person recognizes as descriptive of himself and perceives as facts about his identity (Cuadros & Berger, 2022; Rivers et al., 2021). Furthermore, the academic performance of students who experience these difficulties is more affected than those who do not; if students feel that they are welcome and part of the school, they are inclined to have more academic engagement inside the classroom (Johnson, 2012; Lei et al., 2018; Rajabalee et al., 2020).

At present, no study has been conducted on how the students' ethnicity inside the classroom with ethnic diversity affects their performance in mathematics and their self-concept toward learning the subject. Exploring the effects of ethnicity and self-concept of students in this classroom setting will provide salient information to address issues and concerns brought about by this classroom situation. Understanding the impact of this classroom setting will provide teachers with input on the appropriate strategies that would address students' ethnic diversity.

Thus, this study must test the relationship between the students' self-concept toward Mathematics, ethnicity, and math performance. It is hoped that the findings of this study could help teachers handling these students enhance their mathematics performance in this kind of classroom setting.

2.0. Framework of the Study

This research is anchored on the Theory of Connectionism by Edward Lee Thorndike (Gomez, 2022), which discussed that learning is the process of forming or reinforcing a link or relationship between a certain circumstance or stimulus and a specific reaction (Culatta, 2022). The respondents of this study come from different regions in the country. They have different ethnic backgrounds that include differences in their socio-cultural backgrounds and speak in different dialects. From their places, they are brought to this school where they have to speak in common languages – *Filipino* and

English. Nevertheless, teachers are *Cebuano* speakers, which sometimes they cannot avoid but speak *Cebuano* when they teach Math. These new students will not understand if Math is taught in English; there would be times that concepts would be explained in *Cebuano*. So there is now a connection between these students' differences and how they will understand concepts in Math explained in *Cebuano*.

Moreover, this theory explains that the strength of the connection increases if the paired stimuli are familiar or common or have a quality of belonging (Hanel et al., 2018; St-Amand et al., 2017). A satisfying result nurtures the connection between whatever stimuli were present and the response made just prior to the appearance of the satisfying result. No matter how these students wanted to learn, they would feel irrelevant if they could not understand what their teacher was explaining (Meissel et al., 2017). Students who do not speak *Cebuano* would feel they are less favored than those who can speak and can understand *Cebuano*, making them unsatisfied with their learning (Enriquez, 2019; Gordon, 2017). This can somehow affect their self-concept toward the subject. Thus, students who feel they do not belong to the group tend to disengage in classroom activities since they feel neglected (Cicekci & Sadik, 2019; Chipchase et al., 2017). As a result of this, their academic performance will be affected.

3.0. Methodology

This study utilized a descriptive-correlational design to investigate the relationship between ethnicity, self-concept, and the students' academic performance in math. A correlational research design is a non-experimental research design that aims to investigate the relationship between two variables without the intention of manipulating or controlling any of them (Bhandari, 2022). There were 300 Grade 7 students who were chosen using stratified random sampling in which the ethnic group was used as the stratum. The researcher secured informed consent from the respondents' parents before they were asked to participate in the study and informed them of their right to withdraw anytime when they no longer feel comfortable participating in the study. The data gathered were treated with the utmost confidentiality and were only used for the study.

A survey questionnaire on "*Self-concept towards Mathematics*" was adapted from Ayodele (2011) with 20 statements describing the students' self-concept. The respondents were asked to rate the statements describing their self-concept using a 5-point Likert Scale, namely, 5-Strongly Agree, 4-Agree 3-Undecided, 2-Disagree, and 1-Strongly Disagree. The respondents were oriented on the purpose of the study by their respective mathematics teachers and how they had to answer the questionnaire. There was enough time allotted for answering the questionnaires, and a 100% retrieval rate was achieved by their teachers. On the other hand, the results from the unified institutional test were used to assess their math performance. The data on the test results were retrieved with the assistance of their adviser.

The data gathered were treated and analyzed according to the objectives of the study. The mean was used to determine the performance of the respondents in the four math skills. The weighted mean was utilized to determine the level of self-concept of the respondents. Standard deviation was utilized to describe the spread of the responses and scores of the students. Pearson r was utilized to describe the relationship between the self-concept and performance of the respondents in mathematics. At the same time, the t -test for correlation was used to test its significance. Pearson r is used to measure the relationship between two quantitative variables and the degree of their relationship (Allen, 2017). The Chi-square test was used to test the relationship between ethnicity and self-concept and ethnicity and performance of the respondents in mathematics. The Chi-square test is a nonparametric tool used to test the relationship of nominal variables (McHugh, 2013).

Lastly, to achieve the main objectives of the study, the following null hypotheses were tested:

Ho1: There is no significant relationship between the students' ethnicity and self-concept.

Ho2: There is no significant relationship between the students' ethnicity and their performance in mathematics.

Ho3: There is no significant relationship between the student's self-concept and their performance in mathematics.

4.0. Results and Discussion

Performance of the students in four Math skills

Table 1 presents the mean performance of the students in four math skills such as factual, conceptual, procedural, and metacognitive skills, based on their ethnicity. This study defines these four skills by what specific skills are measured in the test.

Factual skills refer to the ability of the students to recall formulas, basic terms, and their definitions of the concepts being discussed. Unlocking terms and introducing formulas when learning about a topic are the primary ways to introduce lessons in Math. Learning facts about a topic is crucial to overall knowledge development because these will serve as the foundation for learning new skills. Students' mean performance ($M=24.16$, $SD=6.011$) suggests that students can perform well in Math when it deals with the definition of terms and essential information that needs memorization with more words and lesser numbers involved. Students perform better on recalling formulas and identifying examples of terms given than identifying the terms (for example, sets, universal sets, subsets, the cardinality of sets, rational, irrational, factors, multiples, and others) referred to by the given definition. However, students find it difficult to find keywords in the definition of terms that would help them remember the term defined. The formulas are used in computation and problem solving; it would be easy for them to remember those formulas. The students easily remember examples of the terms defined because they can connect and visualize the words easily through examples. Teachers need to ensure that students develop their factual skills because these define their mastery of the basic concepts in algebra, which can be achieved through interactive and student-centered teaching approaches (Rodrigo & Alave, 2021).

Students' mean performance in conceptual skills ($M=23.54$, $SD=5.705$) reveals that they have good performance in these skills. Conceptual skills refer to the ability of the students to relate or connect the terms to the other terms being discussed. Understanding the concepts behind the facts learned is also an essential aspect of learning Math. Students show a conceptual understanding of mathematics when demonstrating their ability to identify, name, and generate examples. Create and interpret the diagram. Compare, contrast and integrate related concepts and principles. Conceptual understanding is achieved when students understand why they are doing a specific task, allowing them to apply and possibly adopt some mathematical ideas to new situations. Factual skills help the students with concept building. The students performed well on illustrating, relating, connecting, and differentiating the terms, for example, kinds of sets, properties of real numbers, and operations of sets. However, they find it difficult to compare and arrange real numbers, particularly fractions and radicals. This difficulty might be due to their lack of skills in understanding what these numbers represent. Students need to master the concepts in math because this contributes to their higher achievement in the subject (Garinganao & Bearneza, 2021).

On the other hand, the students' mean performance in procedural skills is 23.30, with a 6.079 standard deviation ($M=23.30$, $SD=6.079$). These skills refer to the ability of the students to follow the procedures in computation and solving problems. Knowledge of rules, algorithms, and procedures in Math is helpful in problem-solving (Garzon & Casinillo, 2021). Procedural knowledge means knowing what to do, which helps students find the answers to problems that need computation. Students sometimes have difficulty following procedures in computations and solving problems. Boys tend to divert or explore their way of computing or solving problems. However, teachers introduce the necessary steps to solve problems, but the boys usually create their way. They prefer to solve problems the shorter way, thus disregarding the steps introduced by the teacher. These methods used by the students are usually at risk of committing an error during the process, which results in the lower performance of the boys. On the other hand, girls easily conform to procedures set by the teacher when introducing computation in solving mathematical equations and problems.

Lastly, the students' metacognitive skills have a mean of 20.44, with a standard deviation of 6.292 ($M=20.44$, $SD=6.292$). These skills refer to the ability of the students to use the concepts learned to solve problems in real-life situations. Metacognition is the ability to use prior knowledge to plan strategies for tackling learning tasks, perform necessary problem-solving steps, reflect results, evaluate, and change approaches. This helps students choose the right cognitive tools for their tasks and plays an important role in successful learning. It is often referred to as "thinking about thinking."

Table 1. Mean performance of the students in four Math skills

Ethnic Group	Factual	Conceptual	Procedural	Metacognitive
Bisaya	23.50	22.01	23.86	17.26
Cebuano	24.08	27.63	26.43	27.07
Hiligaynon	25.79	25.82	23.50	19.88
Waray	22.14	22.44	20.14	20.94
Minority Group	25.93	19.82	22.57	17.07
Mean	24.16	23.54	23.30	20.44
Standard Deviation	6.011	5.705	6.079	6.292

Self-concept of the students

It can be gleaned from Table 2 that all ethnic groups have moderate level of self-concept in which the average weighted means of the ethnic groups are Bisaya (M=3.24, SD=0.345), Cebuano (M = 3.31, SD=0.312), Hiligaynon (M = 3.35, SD = 0.265), Waray (M = 3.12, SD = 0.393) and Minority group (M = 3.26, SD = 0.367). From the data, Hiligaynon has the highest self-concept toward mathematics while Waray has the lowest self-concept toward Mathematics. The student’s grade level significantly affects the academic self-concept. The academic self-concept will decline as the students move up to a higher level (Liu & Wang, 2004). This decline in the academic self-concept of the students could be due to the complexity of the subject as they go to the next level. When students experience difficulties in the subject, they will become less motivated to learn from it, negatively impacting them. Thus, they will be less likely to appreciate the subject. Lessons in math for Grade 7 level deal with the basic concepts in Math, which are preparatory skills for advanced algebra that is more complicated. That is why most students still have a positive perception of the subject. Moreover, math teachers need to assess their students’ performance as they progress in learning the subject and explore different strategies in problem-solving to be introduced to the students (Batidor & Casinillo, 2021).

Students who have a positive perception of their ability in Mathematics find enjoyment when solving mathematical problems (Mazana et al., 2019), show interest in learning mathematics (Peters et al., 2022), are aware of the value of the benefits of having good grades in Mathematics that is credited to them and having the confidence that they can perform well in the subject, and are commonly the achievers in the subject (de Vera et al., 2022). In addition, students who develop high and positive self-concepts in mathematics are motivated to strive for excellence in nature rather than indifference and passiveness (Ayodele, 2011).

Table 2. Self-concept of the students

S/N	Indicators	Bisaya	Cebuano	Hiligaynon	Waray	Minority Group
1	Mathematics is an easy subject to learn.	3.22	3.28	3.25	3.08	3.17
2	Mathematics is an easy subject to pass.	2.82	2.87	3.02	2.67	2.92
3	Mathematics helps to find a new way of finding things.	3.47	3.65	3.72	3.53	3.37
4	Every question in Mathematics is answerable.	3.20	3.27	3.12	2.92	3.00
5	Mathematics lesson gives me satisfaction.	3.02	3.40	3.50	3.18	3.25
6	Mathematics improves my understanding of other subjects.	3.22	3.43	3.35	3.35	3.25
7	Mathematics improves my learning and retention capacities.	3.50	3.53	3.67	3.47	3.45
8	I am good at mathematics as a subject.	2.92	2.87	3.20	2.55	2.93
9	I am capable of making a good grade in Mathematics.	2.93	2.93	2.95	2.63	2.78
10	I feel delighted when answering Mathematics question.	2.87	3.03	2.95	2.93	2.98
11	Mathematics facilitates my studying independently.	2.98	3.30	3.07	2.98	2.92
12	Mathematics is suitable for all students.	3.30	3.38	3.58	3.23	3.55
13	Mathematics encourages me to apply detailed steps to solve my problems.	3.53	3.62	3.62	3.58	3.82
14	Mathematics makes me think fast.	3.67	3.43	3.37	3.10	3.45
15	My present knowledge of mathematical concepts is high	2.82	2.83	3.02	2.57	2.87
16	Mathematics is worth passing well.	3.03	3.15	3.22	2.70	3.00
17	I do extra work to learn Mathematics.	3.35	3.23	3.55	3.38	3.32
18	Mathematics is essential in my future	4.12	4.08	3.60	3.97	4.18
19	I am comfortable in Mathematics.	3.22	3.45	3.63	3.03	3.28
20	Learning Mathematics gives me meaning to learn activities.	3.72	3.53	3.55	3.58	3.78
	Average Weighted Mean	3.24	3.31	3.35	3.12	3.26
	Standard Deviation	0.345	0.312	0.265	0.393	0.367

Legend: 4.21 – 5.00-Very High Self - Concept; 3.41 – 4.20-High Self – Concept; 2.61 – 3.40 Moderate Self – Concept; 1.81 – 2.60-Low Self – Concept; 1.00 – 1.80-Very Low Self-Concept

Relationship between ethnicity and self-concept

Table 3 presents the relationship between the students' ethnicity and self-concept at $\alpha=0.05$, showing that the self-concept of the respondents is not related to their ethnicity ($\chi^2_{(16)}=6.01, p=0.98$). The result suggests that students' ethnicity does not affect their perception towards Mathematics. These students from different regions in the country receive similar training in Math because teachers are guided by the Department of Education (DepEd) competencies. They may be from different provinces, yet the kind of education they receive is similar.

Table 3. Relationship between ethnicity and self-concept

Variables	df	Computed Value (χ^2)	Critical Value (χ^2)	p-value	Decision	Remark
Ethnicity and Self-concept	16	6.01	26.30	0.98	Do not Reject Ho	Not Significant

The students are all educated in public schools wherein there is strict supervision and centralized instruction on what the teachers should teach the students, which may only differ in the strategies on how the lessons are taught. Since students experience similar training in learning Math, the differences in their self-concept of the subject would not be significant, thus eliminating the effect of their ethnicity. Moreover, Rambana (2018) found that the relationship between students' ethnicity and self-concept is not conclusive.

Notwithstanding, ethnic identity has many components, including one's views on how their ethnic group is related to their definitions of who they are, how they define their ethnicity, and their perception of how their ethnic group determines their position in the society (Woo et al., 2019; Yang et al., 2019). The understanding of adolescents on the meaning of their ethnic identities influences how they adapt to the present environment, and their responses to the environment are vital for them. Because ethnicity is often significant in education, students' identities may be particularly important in developing how they interpret and respond to the new classroom environment (Lara, 2018).

Relationship between ethnicity and performance in Math

It can be gleaned from Table 4 the test on the relationship between the ethnicity and performance of the students in Mathematics which shows that student's performance in Mathematics is significantly related to ethnicity ($\chi^2_{(8)}=26.84, p<0.01$). The study's finding is supported by Assari et al. (2020), which found that ethnicity is one of the strong predictors of students' math performance. In addition, these findings are also supported by the study of Nix and Perez-Felkner (2019), which indicates that the students' ethnic identities influence their mathematics difficulty orientation.

Table 4. Relationship between ethnicity and performance in Math

Variables	df	Computed Value (χ^2)	Critical Value (χ^2)	p-value	Decision	Remark
Ethnicity and Performance in Math	8	26.84*	15.51	0.00	Reject Ho	Significant

Note: *significant at $p<0.01$

This finding implies that students' ethnicity is one factor that affects their performance in school. Before these students were enrolled in the boarding school, they used to learn the subject through their dialect because Math can be easily taught using the students' dialect when explaining complicated concepts and ideas. Since they are enrolled in a school where teachers use code-switching in translating terms and concepts that are difficult to understand when using the medium of instruction, non-dialect speakers will have more difficulty understanding the lesson. Thus, their performance is affected.

Awareness of individual differences will make educators more sensitive to their role in learning. At the very least, this awareness may provide educators with a better understanding of difficulties for certain learners in relation to specific tasks (Blazar & Kraft, 2017; Graham et al., 2020). Somehow, educators will be willing to project the role of differences into the learning process and adapt the nature of instruction or the type of learning outcomes based on individual differences (Smale-Jacobse et al., 2019).

Relationship between the students’ self-concept and performance in Mathematics

As shown in Table 5, the relationship between the students’ self-concept and performance in Mathematics are significantly related ($r_{(298)}=0.22, p < 0.01$). This result is supported by the study conducted by Peteros et al. (2019), which found a significant relationship between students’ self-concept and academic performance in mathematics. Similarly, the study by Lee and Kung (2018) showed a positive correlation between the students’ self-concept and their math achievement.

It implies that when students have difficulty at school because of their societal limitations, such as difficulty understanding the language used by the teacher during discussions and interaction during classroom activities, their performance will be affected. One important consideration in learning is the relationship students build with their teachers and peers at school. These will provide a foundation that supports the student to boost one’s school engagement. One of the valued goals of education is enhancing students’ self-concepts and serving as a moderator of the students’ scholastic achievement (Marsh & Martin, 2011; Naparan & Alinsug, 2021). Moreover, self-concept is a good predictor of student performance, and positive or negative changes in self-concept result in proportional changes in academic performance (Kodib, 2019).

Table 5. Relationship between self-concept and performance in Math

Variables	df	r-value	Computed Value (t)	Critical Value (t)	P-value
Self - concept and Performance in Math	298	0.22	3.94*	1.65	0.00

5.0. Conclusion

Based on the findings of this study, it can be concluded that the self-concept of the students toward Mathematics is not affected by their ethnicity. However, self-concept and ethnicity affect the students’ academic performance. The higher the self-concept of the students, the better they will perform in the subject. There is a need to improve their sense of belonging inside the classroom to feel comfortable with their environment to enhance the students’ academic performance. The students’ perception of mathematics must also be considered because developing a positive self-concept of the students towards the subject helps motivate them to learn more about the subject. A positive sense of ethnic identity and a high self-concept contribute to one’s perception of themselves, academic ability, and future goal achievement. Furthermore, it can be deduced that by understanding the ethnicity and assessing the self-concept of the students in Mathematics, teachers could be guided on the best practices to employ to maximize students’ performance in the subject.

Thus, in this study, it is highly recommended that students undergo a series of activities that will improve their engagement to minimize the effect of their ethnic identity inside the classroom. The teachers should be given enough training to handle students with different ethnic backgrounds to be more effective in facilitating students’ learning. It is further recommended that a deeper study of the impacts of the variables of this study may be given further studies by interested researchers to widen the topic of this study.

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REFERENCES

Akarowhe, K. (2018). Effects and remedies to cultural shock on the adolescent students. *Sociology International Journal*, 2(4), 306–309. <https://doi.org/10.15406/sij.2018.02.00063>

- Allen, M. (2017). *The SAGE encyclopedia of communication research methods*. Sage Publications
- Assari, S., Boyce, S., Bazargan, M., & Caldwell, C. H. (2020). Mathematical performance of American youth: Diminished returns of educational attainment of Asian-American parents. *Education Sciences, 10*(2), 32. <https://doi.org/10.3390/educsci10020032>
- Ayodele, O. J. (2011). Self-concept and performance of secondary school students in mathematics. *Journal of Educational and Developmental Psychology, 1*(1), 176-183. <http://dx.doi.org/10.5539/jedp.v1n1p176>
- Bacon, L. S. C. (2011). Academic self-concept and academic achievement of African American students transitioning from urban to rural schools.
- Batidor, P. G. & Casinillo, L. F. (2021). Evaluating Spiral Progression Approach (SPA) in teaching Science and Mathematics for junior high curriculum. *Philippine Social Science Journal, 4*(3), 39-47. <https://doi.org/10.52006/main.v4i3.362>
- Bhandari, P. (2022 May 13). Correlational research: When and how to use. <https://bit.ly/3wOC2NP>
- Blazar, D., & Kraft, M. A. (2017). Teacher and teaching effects on students' attitudes and behaviors. *Educational Evaluation and Policy Analysis, 39*(1), 146-170. <https://doi.org/10.3102/0162373716670260>
- Casinillo, L., Camulte, M. C., Raagas, D., & Riña, T. S. (2020). Cultural factors in learning mathematics: the case on achievement level among Badjao students. *International Journal of Indonesian Education and Teaching, 4*(1), 71-81. <https://doi.org/10.24071/ijiet.v4i1.2345>
- Castillejo, F. T., Calizo, M. R., & Maguddayao, R. N. (2018). Code-switching and students' performance in English. *International Journal of English and Education, 7*(4), 406-421. https://www.researchgate.net/publication/331543329_Code_Switching_and_Students'_Performance_in_English
- Castro, N. (2011). The socio-cultural situation in the Philippines. https://www.academia.edu/1304707/The_SocioCultural_Situation_in_the_Philippines
- Chevrier, B., & Lanegrand, L. (2022). Leaving the family home to start university: How is home-leaving related to family environment and attachment? *Current Psychology, 1-17*. <https://doi.org/10.1007/s12144-022-03184-x>
- Chipchase, L., Davidson, M., Blackstock, F., Bye, R., Clothier, P., Klupp, N., Nickson, W., Turner, D., & Williams, M. (2017). Conceptualising and measuring student disengagement in higher education: A synthesis of the literature. *International Journal of Higher Education, 6*(2), 31-42. <https://doi.org/10.5430/ijhe.v6n2p31>
- Cicekci, M. A. & Sadik, F. (2019). Teachers' and students' opinions about students' attention problems during the lesson. *Journal of Education and Learning, 8*(6), 15-30. <https://doi.org/10.5539/jel.v8n6p15>
- Cuadros, O., & Berger, C. (2022). Self-disclosure, self-concept, and friendship's perceived functions among aggressive and popular adolescents. *Youth and Society*. <https://doi.org/10.1177/0044118X221093394>
- Culatta, R. (2022). Connectionism (Edward Thorndike). *Instructional Design*. <https://www.instructionaldesign.org/theories/connectionism/>
- de Vera, J. V., Peteros, E. D., Peconillo Jr, L. B., Alcantara, G. A., Villarin, E. R., & Fulgencio, M. D. (2022). Assessing differences on students' attributes in mathematics based on their learning sessions. *Open Journal of Social Sciences, 10*(3), 170-185. <https://doi.org/10.4236/jss.2022.103012>
- Desmet, K., Ortuño-Ortín, I., & Wacziarg, R. (2017). Culture, ethnicity, and diversity. *American Economic Review, 107*(9), 2479-2513. <https://doi.org/10.1257/aer.20150243>
- Drobot, I. A. (2021). Multilingualism and awareness of cultural differences in communication. In *Multilingualism*. IntechOpen. <https://doi.org/10.5772/intechopen.99178>
- Eduardo, J.P., & Gabriel, A.G. (2021). Indigenous peoples and the right to education: The dumagat experience in the provinces of Nueva Ecija and Aurora, in the Philippines. *SAGE Open, 11*. <https://doi.org/10.1177/21582440211009491>
- English, T., Davis, J., Wei, M., & Gross, J. J. (2017). Homesickness and adjustment across the first year of college: A longitudinal study. *Emotion, 17*(1), 1. <https://doi.org/10.1037/emo0000235>
- Enriquez, J. V. S. (2019). A study on translation strategies used in Visayan folktales. *Online Journal of Communication and Media Technologies, 9*(2). <https://doi.org/10.29333/ojcm/5763>
- Gamotin, F. T. (2021). Speaking performance and the types of code-switching of senior high school students. *International Journal of English Language Studies, 3*(10): 38-71. <https://doi.org/10.32996/ijels.2021.3.10.5>
- Garinganao, N. S. & Bearneza, F. J. D. (2021). Algebraic skills and academic achievement in mathematics of Grade 7 students in a Philippine Chinese school. *Philippine Social Science Journal, 4*(3), 57-64. <https://doi.org/10.52006/main.v4i3.396>
- Garzon, J. R., & Casinillo, L. F. (2021). Visualizing mathematics: The use of block models for strategic problem solving. *Journal of Education Research and Evaluation, 5*(1), 112-117. <https://doi.org/10.23887/jere.v5i1.30888>
- Gomez, S. L. (2022). Level of condition and extent of adequacy of resources in secondary schools in Taguig City and their effects on the national achievement test performance. *European Online Journal of Natural and Social Sciences, 11*(1), 73-92. https://europeanscience.com/eojnss_proc/article/view/6414/2905
- Gordon, S. M. (2017). *Development of word recognition materials for native Cebuano speakers*. <https://scholarsarchive.byu.edu/etd/6311>
- Graham, L. J., White, S. L., Cologon, K., & Pianta, R. C. (2020). Do teachers' years of experience make a difference in the quality of teaching? *Teaching and Teacher Education, 96*, 103190. <https://doi.org/10.1016/j.tate.2020.103190>

- Grütter, J., Meyer, B., Philipp, M., Stegmann, S. & van Dick, R. (2021). Beyond ethnic diversity: The role of teacher care for interethnic relations. *Frontiers in Education*. <https://doi.org/10.3389/feduc.2020.586709>
- Hanel, P. H. P., Maio, G. R., Soares, A. K. S., Vione, K. C., de Holanda Coelho, G. L., Gouveia, V. V., Patil, A. C., Kamble, S. V. & Manstead, A. S. R. (2018). Cross-cultural differences and similarities in human value instantiation. *Frontiers in Psychology*, 9, 849. <https://doi.org/10.3389/fpsyg.2018.00849>
- Hernández, M. M., Robins, R. W., Widaman, K. F., & Conger, R. D. (2017). Ethnic pride, self-esteem, and school belonging: A reciprocal analysis over time. *Developmental Psychology*. <https://doi.org/10.1037/dev0000434>
- Johnson, R. M. (2012). Exploring Ethnic Differences in the Predictors and Outcomes of Academic Engagement during Middle School. http://pdxscholar.library.pdx.edu/open_access_etds/577/
- Keromnes, G., Chokron, S., Celume, M.P., Berthoz, A., Botbol, M., Canitano, R., Du Boisgueheneuc, F., Jaafari, N., Lavenne-Collot, N., Martin, B., Motillon, T., Thirioux, B., Scandurra, V., Wehrmann, M., Ghanizadeh, A. & Tordjman, S. (2019). Exploring self-consciousness from self and other-image recognition in the mirror: Concepts and evaluation. *Frontiers in Psychology*, 719. <https://doi.org/10.3389/fpsyg.2019.00719>
- Kodb, H. S. (2019). Students' self-concept and personalities with their academic achievement in technical health institutes at Suez City. *Port Said Scientific Journal of Nursing*, 6(1), 1-20. <https://doi.org/10.21608/pssjn.2019.33449>
- Lara, L. (2018). Ethnic identities of immigrant and native adolescents: Development and relationship to life satisfaction. *Psicologia: Reflexão e Crítica*, 31. <https://doi.org/10.1186/s41155-018-0100-5>
- Lee, C. Y. & Kung, H. Y. (2018). Math self-concept and mathematics achievement: Examining gender variation and reciprocal relations among junior high school students in Taiwan. *EURASIA Journal of Mathematics, Science and Technology Education*, 14(4), 1239-1252. <https://doi.org/10.29333/ejmste/82535>
- Lei, H., Cui, Y., & Zhou, W. (2018). Relationships between student engagement and academic achievement: A meta-analysis. *Social Behavior and Personality*, 46(3), 517-528. <https://doi.org/10.2224/sbp.7054>
- Leithwood, K. (2021). A review of evidence about equitable school leadership. *Educational Sciences*, 11, 377. <https://doi.org/10.3390/educsci11080377>
- Liu, W. C. & Wang, C.K.J. (2004). Academic self-concept: A cross-sectional study of grade and gender differences in a Singapore secondary school. *Asia Pacific Educ. Rev.*, 6: 20. doi:10.1007/BF03024964
- Marsh, H. W. & Martin, A. J. (2011). Academic self-concept and academic achievement: Relations and causal ordering. *British Journal of Educational Psychology*, 81, 59-77. <https://doi.org/10.1348/000709910X503501>
- Maxwell, S., Reynolds, K. J., Lee, E., Subasic, E., & Bromhead, D. (2017). The impact of school climate and school identification on academic achievement: Multilevel modeling with student and teacher data. *Frontiers in Psychology*, 8, 2069.
- Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2019). Investigating students' attitude towards learning Mathematics. *International Electronic Journal of Mathematics Education*, 14(1), 207-231. <https://doi.org/10.29333/iejme/3997>
- McHugh, M. L. (2013). The chi-square test of independence. *Biochemia Medica*, 23(2), 143-149. <https://doi.org/10.11613/bm.2013.018>
- Meissel, K., Meyer, F., Yao, E. S. & Rubie-Davies, C. M. (2017). Subjectivity of teacher judgments: Exploring student characteristics that influence teacher judgments of student ability. *Teaching and Teacher Education*, 65, 48-60. <https://doi.org/10.1016/j.tate.2017.02.021>
- Naparan, G. B. & Alinsug, V. G. (2021). Classroom strategies of multigrade teachers. *Social Sciences and Humanities Open*, 3(1). <https://doi.org/10.1016/j.ssho.2021.100109>
- Nix, S. & Perez-Felkner, L. (2019). Difficulty orientations, gender, and race/ethnicity: An intersectional analysis of pathways to STEM degrees. *Social Sciences*, 8, 43. <https://doi.org/10.3390/socsci8020043>
- Organization for Economic Co-operation and Development (OECD) (2019). PISA 2018 Global Competence Framework. In *PISA 2018 Assessment and Analytical Framework*, OECD Publishing, Paris. <https://doi.org/10.1787/043fc3b0-en>
- Peteros, E., Gamboa, A., Etcuban, J. O., Dinauanao, A., Sito, R., & Arcadio, R. (2019). Factors Affecting Mathematics Performance of Junior High School Students. *International Electronic Journal of Mathematics Education*, 15 (1). <https://doi.org/10.29333/iejme/5938>
- Peteros, E., de Vera, J. V., Laguna, C. G., Lapatha IV, V. C. B., Mamites, I. O., & Astillero, J. C. (2022). Effects of smartphone utilization on junior high school students' mathematics performance. *World Journal on Educational Technology: Current Issues*, 14(2), 401-413. <https://doi.org/10.18844/wjjet.v14i2.6914>
- Rajabalee, B. Y., Santally, M. I., & Rennie, F. (2020). A study of the relationship between students' engagement and their academic performances in an eLearning environment. *E-Learning and Digital Media*, 17(1), 1-20. <https://doi.org/10.1177/2042753019882567>
- Rambana, T. (2018). The impact of race and identity on college student's mental health and academic self-concept: Understanding the interrelationship between ethnic identity and perceived racial discrimination. *Journal of Interdisciplinary Graduate Research*, 4(4). <https://knowledge.e.southern.edu/jigr/vol4/iss1/4>
- Rivers, D. J., Vallance, M., & Nakamura, M. (2021). Metacognitive knowledge and the self as socially distanced online learner: A virtual reality assisted analysis of academic self-concept. *Journal of Educational Technology Systems*, 50(1), 87-111. <https://doi.org/10.1177/0047239521999779>
- Rodrigo, D. B. & Alave, A. D. (2021). Academic achievement in algebra of the public high school students in the new normal. *Philippine Social Science Journal*, 4(3), 65-74. <https://doi.org/10.52006/main.v4i3.381>

- Smale-Jacobse, A. E., Meijer, A., Helms-Lorenz, M., & Maulana, R. (2019). Differentiated instruction in secondary education: A systematic review of research evidence. *Frontiers in Psychology*, 2366. <https://doi.org/10.3389/fpsyg.2019.02366>
- St-Amand, J., Girard, S. & Smith, J. (2017). Sense of belonging at school: Defining attributes, determinants, and sustaining strategies. *IAFOR Journal of Education*, 5(2), 105-119. <https://hdl.handle.net/20.500.12365/17389>
- Woo, B., Fan, W., Tran, T. V., & Takeuchi, D. T. (2019). The role of racial/ethnic identity in the association between racial discrimination and psychiatric disorders: A buffer or exacerbator? *SSM - Population Health*, 7, 100378. <https://doi.org/10.1016/j.ssmph.2019.100378>
- Yang, Y., Liang, F., Quan, F., Jiang, G., Yu, K., & Zheng, Y. (2019). The importance of ethnicity: Developing a measure of minority ethnic value and value-expressive behavior among Chinese ethnic minorities. *Frontiers in Psychology*, 2603. <https://doi.org/10.3389/fpsyg.2019.02603>
- Zheng, Y. & Cheng, L. (2018). How does anxiety influence language performance? From the perspectives of foreign language classroom anxiety and cognitive test anxiety. *Language Testing in Asia*, 8, 13. <https://doi.org/10.1186/s40468-018-0065-4>

Additional Author's Information:

EMERSON D. PETEROS
emerson.peteros@ctu.edu.ph
<https://orcid.org/0000-0001-9265-704X>