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RESEARCH ARTICLE

Mathematical and Reading Comprehension Skills: Their Influence on Social Relations Among College Students

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Abstract

Objectives: This descriptive-correlational study determined the level of mathematical skills, reading comprehension skills, and social relations of third-year college students on the external campuses of the West Visayas State University, Iloilo, Philippines. **Methods:** Three hundred twenty-five (325) third-year college students served as the study participants who were selected through a stratified sampling method. They were classified as to sex, family structure, and course. The instruments used for this study were obtained through a researcher-made mathematical skills test to determine the students' level of mathematical skills and a reading comprehension skills test to determine their reading comprehension skills. A modified instrument on social relations was also used. Descriptive statistics employed frequent means, percentages, and standard deviations. The Mann-Whitney U Test, Kruskal-Wallis Test, and Spearman's rho were used as inferential statistics set at a 0.05 level of significance. **Findings:** Generally, they had "high" mathematical skills, reading comprehension skills, and social relations. The students differ significantly in their mathematical skills when classified as sex, family structure, and course. There was a significant difference in the students' reading comprehension when organized to sex and course, and no significant difference was noted when classified to family structure. There was no significant difference in the students' social relations when classified as sex, family structure, course, and reading comprehension skills. A significant difference was noted when classified as mathematical skills. Significant relationships existed among students' mathematical skills, reading comprehension, and social relations. **Novelty:** Thus, teachers should employ various teaching techniques to respond to the diversity of learners considering their mathematical and reading comprehension skills that somehow affect their social skills.

Keywords: Mathematical Skills; Reading Comprehension; Skill and Socia Influences; Social Relations; College Students

1 Introduction

The importance of mathematical and reading comprehension skills in daily and professional lives has been common knowledge in the academic community and society. The demand for these skills is collectively growing with technological advancements. However, these skill sets may influence the social relations of individuals, which enables them to understand and adjust to the diverse and myriad changes to the needs of times. Relative to areas of development, social and vocabulary skills are also important aspects that involve reading achievement and dynamic association among individuals [1].

Mathematics skills are determined by solving reality-based scenarios - the effective teaching of mathematics instruction anchored in education standards. These activities need serious text and numeric understanding to solve real-life context problems. The relevance of a sense of real-life context and mathematics problem factors directly impacts comprehension processes [2]. Complex words and mathematical skills are associated strongly with language and numerical knowledge in this context. Good command of the language, especially among native speakers, plays a significant role in comprehending mathematical problems [3]. This explains that language is not just a medium of communication; it also represents and retrieves mathematical knowledge to facilitate memory and reasoning during mathematical learning and performance [4]. This paces individuals' reading motivation as a strong predictor of reading comprehension. Consequently, it suggests a relationship between being motivated and understanding one's context, in this case – reading. It is critical to focus on context-based determinants of motivation and quality reading [5].

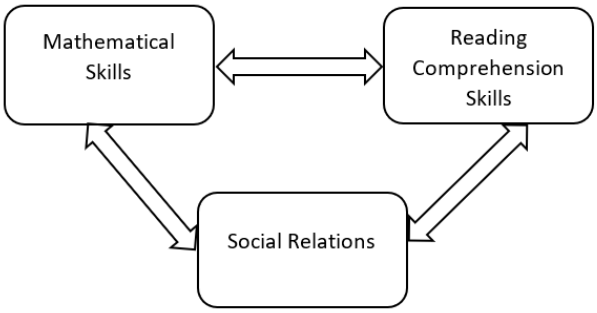

Fig 1. The relationship among mathematical skills, reading comprehension skills, and social relations

Human activities have their complexities, including reading comprehension. It envokes complex interaction, making teaching, measuring, and studying difficult. Many types of research have been dedicated to reading comprehension, which indicates stagnant growth for adolescents (both national and international) [6]. The academic institutions are the reservoir of culture contributing to social reforms to maintain society's economic and political order. In this context, the students' social relations should be molded so that achieving the individual's role in society must be addressed [7].

Although it is not clear to what extent the influence of social relationships on mathematical and reading comprehension skills, specifically among college students in the local context, there is considerable evidence that concepts will enable us to understand and adjust to the various and manifold changes as well as to act accordingly to the needs of the times.

Thus, this study is built upon the concept that mathematical skills are positively associated with reading comprehension. One cannot apply the principles of problem-solving and even higher analytical thinking if an individual has poor understanding. Thus, the researcher wanted to sort out the implications of this practice. From the preceding theoretical constructs and ideas, the researcher was motivated to conduct this study to determine the students' mathematical and reading comprehension skills and how they influence their social relations.

2 Methodology

This descriptive correlational study aimed to determine the level of mathematical and reading comprehension skills and social relations of third-year college students on the four external campuses of WVSU using the survey method. Three hundred twenty-five (325) randomly selected third-year college students were involved in the study.

The adapted instrument was utilized to determine social relations. However, the tool was modified to enhance further and fit the participants' needs in this study. The researcher-made devices were used to resolve mathematical and reading comprehension skills.

The instruments passed through specific validation by the jury of experts in reading, mathematics, statistics and research, social sciences, test construction and measurement, and reliability testing to further enhance their stability and consistency using Chronbach's alpha. The instrument for students' social relations consist of statements with the following responses: always (4), often (3), seldom (2), and never (1). The participants' mathematical and reading comprehension skills were determined using the 20 items test, purposively constructed for this study.

The weighted mean was utilized in data analysis to determine the mathematical and reading comprehension skills using the scale: Very high (15.01 – 20.00), High (10.01 – 15.00), Low (5.01 – 10.00), and Very Low (0.00 – 5.00). For social relations, the following scale was utilized: Very high (3.26 – 4.00), High (2.51 – 3.25), Low (1.76 – 2.50), and Very low (1.00 – 1.75).

3 Result and Discussion

3.1 Level of Mathematical Skills of College Students

Table 1 revealed that the students had high (M=11.64, SD =4.22) mathematical skills as an entire group. When classified according to sex, males and females also had high mathematical skills (M=10.69, SD =4.50; M=12.18 SD =3.96, respectively). As to family structure, Intact and dispersed families had high mathematical skills (M=11.93, SD =4.16; M=10.78, SD =4.28, respectively). Finally, those who belonged to board courses had high (M=12.95, SD =4.04) mathematical skills, while non-board courses had low (M=8.97, SD =3.20) mathematical skills. The study expanded that the students manifested average mathematical skills, whether taken as an entire group or classified according to family structure.

Table 1. Level of Mathematical Skills of College Students

Category	Mean	Description	SD
Entire Group	11.64	High Mathematical Skills	4.22
Sex			
Male	10.69	High Mathematical Skills	4.50
Female	12.18	High Mathematical Skills	3.96
Family Structure			
Intact	11.93	High Mathematical Skills	4.16
Dispersed	10.78	High Mathematical Skills	4.28
Course			
Board	12.95	High Mathematical Skills	4.04
Non-Board	8.972	Low Mathematical Skills	3.20

3.2 Level of Reading Comprehension Skills of College Students

The investigation results in Table 2 revealed that the entire group of students had high (M=9.96, SD=3.42) reading comprehension skills. When the students were classified as to sex, the male had low (M=9.38, SD=3.66) reading comprehension skills while the female had high (M=10.28, SD=3.24) reading comprehension skills. As to family structure, those who belong to the intact family had high (M=10.02, SD=3.30) reading comprehension skills, and those who belonged to the dispersed family had low (M=9.77, SD=3.77) reading comprehension skills. Finally, when the respondents were classified as to course, those taking courses with the board had high reading comprehension skills (M=10.87, SD=3.19). However, those taking non-board courses had low (M=8.10, SD=3.10). The study supports the claim that when reading a text without any difficulties in understanding or having a high comprehension, the process has more in common with perception than problem-solving. The process of understanding is unconscious.

One significant factor of academic language proficiency is the comprehension of connectives. This feature is developing in younger years. The study shows a positive effect on grades 2 and 3 performance in reading comprehension and mathematics [8].

Reading and mathematics are not associated with one another. But many researchers disapproved of the notions because mathematics problems involved substantial reading. Mathematics teachers appreciated the crucial role of reading comprehension in the mathematics performance of the learners, and they already included reading in their lessons [9].

Table 2. Level of Reading Comprehension Skills of College Students

Category	Mean	Description	SD
Entire Group	10.08	High Mathematical Skills	3.42
Sex			
Male	9.38	Low Reading Comprehension Skills	3.66
Female	10.34	High Mathematical Skills	3.24
Family Structure			
Intact	10.07	High Mathematical Skills	3.30
Dispersed	9.78	Low Reading Comprehension Skills	3.77
Course			
Board	10.87	High Mathematical Skills	3.19
Non-Board	8.10	Low Mathematical Skills	3.24

The research paper about self-efficacy about the association of instruction and mathematical reasoning was about effective strategies. Selecting instructional approaches is important in developing mathematical reasoning and maths self-efficacy beliefs [10].

a. Level of Social Relations of College Students

The data in Table 3 revealed that the students had high social relations, whether taken as an entire group or when classified according to sex, family structure, course, learning styles, mathematical skills, and reading comprehension skills. This was revealed by the obtained mean, which fell within 2.51 – 3.25. The obtained standard deviations, which ranged from 0.3575 to 0.4706, revealed the narrow dispersion of the means, indicating almost the homogeneity of the data of their social relations. The study confirms that less socially skilled individuals may gravitate toward mediated communication because it reduces social boundaries. They might have more to gain from new media than their more socially connected peers. Thus, having high social relations help a lot in their academic setting.

Table 3. Level of Social Relations of College Students

Category	Mean	Description	SD
Entire Group	3.05	High	0.39
Sex			
Male	3.01	High	0.40
Female	3.08	High	0.39
Family Structure			
Intact	3.05	High	0.38
Dispersed	3.05	High	0.42
Course			
Board	3.02	High	0.40
Non-Board	3.11	High	0.37
Mathematical Skills			
Very High	2.92	High	0.43
High	3.05	High	0.37
Low	3.12	High	0.38
Very Low	3.12	High	0.36
Reading Comprehension Skills			
Very High	3.10	High	0.47
High	3.00	High	0.39
Low	3.05	High	0.38
Very Low	3.19	High	0.36

3.3 Differences in the Students' Mathematical Skills When Classified According to Sex, Family Structure, and Course

The investigation found that when the students were classified as to sex, a significant difference was noted, as shown by the z-value of 3.198 with a p-value of 0.001, which was less than the set of 0.05 level of significance. When classified as to family structure, the z-value was 2.148. The p-value of 0.032 is less than the set 0.05 level of significance. Thus, a significant difference existed. A significant difference also existed, as shown by the z-value of 8.100, of which the p-value of 0.000 was less than the set 0.05 level of significance. The result of the study contrast where students did not differ significantly in their mathematical skills when classified according to family structure and parents' level of education.

Table 4. Mann-Whitney Test results in the Differences in the Students' Mathematical Skills When Classified According to Sex, Family Structure, and Course

Category	z-value	p-value	Decision
Sex			
Male Female	3.198**	0.001	Significant
Family Structure			
Intact Dispersed	2.148*	0.032	Significant
Course			
Board Non-Board	8.100***	0.000	Significant

*p<.05, **p<.01, ***p<.001

The study between problem-solving skills in mathematical words and reading comprehension has a solid relationship. The results advise that the two areas should be integrated [11].

3.4 Differences in the Students' Reading Comprehension Skills When Classified According to Sex, Family Structure, and Course

The findings revealed a significant difference when the students were classified as to sex. The z-value was 2.459, of which the p-value of 0.014 was less than the set 0.05 level of significance. When they were classified as family structures, no significant difference existed with the z-value of 0.563. The p-value of 0.574 was more significant than the set 0.05 level of significance. Finally, the students differ significantly in their reading comprehension skills when classified as a course. The z-value of 6.906, of which the p-value of 0.000 was less than the set 0.05 level of significance. The study confirms where the students differ significantly in their reading comprehension when taken to sex, and no difference is noted in parents' type of school and educational attainment.

Table 5. Mann-Whitney Test Results in the Differences in the Students' Reading Comprehension Skills When Classified According to Sex, Family Structure, and Course

Category	z-value	p-value	Decision
Sex			
Male Female	2.459*	0.014	Significant
Family Structure			
Intact Dispersed	0.563	0.574	Not significant
Course			
Board Non-Board	6.906***	0.000	Significant

*p<.05, **p<.01, ***p<.001

3.5 Differences in the Students' Social Relations When Classified According to Sex, Family Structure, and Course

The findings revealed that no significant difference existed when the students were classified as sex. The z-value was 1.576, of which the p-value of 0.115 was more significant than the set 0.05 level of significance. When they were classified as family structures, no significant difference existed with the z-value of 0.167. The p-value of 0.868 was more significant than the set 0.05 level of significance. Finally, the students did not differ significantly in their reading comprehension skills when classified as a course. The z-value of 1.739, of which the p-value of 0.082 was more significant than the set 0.05 level of significance. The study supports the claim that social relationships are impoverished in the conversational/cultural account for reasons that vary according to the child's clinical condition. Consequently, understanding of others' minds is impaired at either the broader or narrower level depending on the nature of experience (linguistic, social) that has been limited.

In doing mathematical problems decoding real-world situations are essential. In Germany and Taiwan, giving students reading comprehension improves situational interest [12].

Table 6. Mann-Whitney Test Results in the Differences in the Students' Social Relations. When Classified According to Sex, Family Structureand Course

Category	z-value	p-value	Decision
Sex			
Male Female	1.576	0.115	Not significant
Family Structure			
Intact Dispersed	0.167	0.868	Not significant
Course			
Board Non-Board	1.739	0.082	Not significant

3.6 Differences in the Students' Social Relations When Classified According to Mathematical and Reading Comprehension Skills

Table 7 revealed that the students did not differ significantly in their social relations when classified as to their learning styles. The computed chi-square ratio was 2.669 with a p-value of 0.446 for df = 3, greater than the 0.05 level of significance. A significant difference existed in their social relations when they were classified as their mathematical skills. The chi-square ratio was 10.204, of which the p-value of 0.017 for df = 3 was less than the set 0.05 level of significance (see Table 9). A posteriori test for pairwise comparison of means using the Mann-Whitney test revealed that the students with very high mathematical skills had significantly better social relations than those with low mathematical skills. This was revealed with a p-value of 0.002, less than the set .05 level of significance reflected in table 10.

Finally, Table 9 shows that the students did not differ significantly in their social relations regarding their reading comprehension skills. The chi-square ratio of 5.796, of which a p-value of .122 for df = 3, was more significant than the set 0.05 level of significance.

This implies that when individuals with low social communication skills spend time reading about ties and looking through those ties' photos and profiles, they feel increased bridging social capital. In contrast, individuals with higher communication skills are not affected by passive consumption.

Examining the factors touching problem-solving evaluates the reading comprehension, metacognition, Mathematics anxiety, attitude, and self-efficacy significantly [13].

3.7 Relationships among Students' Mathematical Skills, Reading Comprehension Skills, and Social Relations

The Spearman's rho results in Table 9 revealed a significant relationship between the student's mathematical skills and reading comprehension skills (r_s=.557, p-value =0.000). Their reading comprehension skills can account for 31.02%(r2=0.3102) of the mathematical skills. The findings also revealed a significant relationship between mathematical skills and social relations(r_s=0.385, p-value = 0.001). 14.82%(r^2=0.1482) of the mathematical skills can influence the social relations of college

Table 7. Kruskal-Wallis Test Results in the Differences in the Students' Social Relations. When Classified According to Learning Style, Mathematical and Reading Comprehension Skills

Category	df	x2	p-value	Decision
Mathematical Skills				
Very High				
High	3	10.204*	.017	Significant
Low				
Very Low				
Reading Comprehension Skills				
Very High				
High	3	5.796	.122	Not significant
Low				
Very Low				

*p<.05

Table 8. Posteriori for Pairwise Comparison of Means using Mann-Whitney Test

Comparison	z-value	p-value
Very low vs Low	-0.021	0.983
Very low vs High	-0.594	0.552
Very low vs Very high	-1.905	0.057
Low vs High	-1.337	0.181
Low vs Very high	-3.043	0.002
High vs Very high	-2.020	0.08

students.

Finally, a significant relationship existed between the students' reading comprehension skills and their social relations (r_s=0.124, p-value = 0.026). 1.53%(r^2=0.0153) of the students' reading comprehension skills can influence their social relations.

Numerous correlational studies have shown the same context with the result of the study. Those achievements in math and reading are associated in many ways, and these relationships have been explored in both learning-disabled and typically-developing populations. Also, studies carried out amongst learning-disabled populations have shown that children who have difficulties in reading are also likely to have difficulties in mathematics. In times of typically-developing children, it is shown that reading skills play a major role in the solution of arithmetic word problems. Similarly, it demonstrated the importance of students' reading skills in mathematical word problem-solving.

The reflective analysis of reading comprehension and its respective levels of concreteness in teaching concluded it enhances critical thinking and agrees with the improvement of cognitive reasoning[14].

Table 9. Spearman's rho test results in the Relationships of Students' Mathematical Skills to their Reading Comprehension Skills and Social Relations

Category	Decision value	rs-value	pvalue
Mathematical Skills vs Reading Comprehension Skills	Significant	0.557***	0.000
Mathematical Skills vs Social Relations	Significant	0.385**	0.001
Reading comprehension Skills vs Social Relation	Significant	0.124*	0.026

*p<.05, **p<.01, ***p<.001

4 Conclusion

The student's high level of mathematical skills proves that they possess the ability to solve, comprehend, perform calculations and apply problem-solving strategies (provide quantitative value). The student's high level of reading comprehension skills

(provide quantitative measure) might pertain to the necessary assessment and engagement given to students, especially if it involves reading comprehension in mathematics. Their high level of social relations shows that the students can socialize and mingle, especially with their peers, friends, classmates, and even teachers. The significant differences noted in the students' mathematical skills when classified into sex, family structure, and course specified that males and females, either intact and dispersed family structure or even board and non-board methods vary significantly in their acquired mathematical skills. The significant differences existed in the students' reading comprehension skills when classified as to sex and course manifest that male and female and board and non-board courses vary in their acquired reading comprehension skills. However, the no significant difference in the students' reading comprehension skills (quantitative value) when classified as to family structure shows that they have the same comprehension level whether they belong to intact or dispersed families. The no significant differences noted in the students' social relations when classified as to sex, family structure, course, and reading comprehension skills signify that they tend to acquire the right qualities on how to socialize with other people similarly. However, it is not surprising that the difference existed in the social relations when classified as to their mathematical skills; this may be due to the inferior qualities and attitudes of having low skills in mathematics. People tend not to socialize well if they think they are weak in numbers. In contrast, those equipped with high mathematical skills tend to be more sociable because they somehow think that their classmates could help them. The significant relationship noted between mathematical and reading comprehension skills, between mathematical skills and social relations, and between reading comprehension skills and social relations seemed to prove that these variables pose to increase or influence one another as they are necessary strategies and skills that a person should possess. The social relation is life itself, it is a practice, and its absence affects mathematical and reading comprehension skills.

School administrators, deans, and directors, who play an important role in the academic setting, should look into the improvement of teaching in school and see to it that students' needs are given proper attention, especially on how the subject scheduling can be done to become responsive to the students' time preferences for their mathematics and reading subjects. Teachers should employ a variety of techniques in teaching to respond to the diversity of the learning styles in the classroom. They should raise the students' awareness of the alternative approaches and help learners to become more flexible in countering the varied demands of learning situations. Teachers should reinforce students with praises, prices, encouragement, and motivation to learn by giving them more challenging and diverse activities, warming-up lessons, and mathematical games. Teachers are encouraged to use effective strategies in teaching and equip themselves with the latest technology and techniques that respond to the needs of the learners and uplift their status as world-class reading educators. Parents are advised to create a home environment suited to their children's learning capabilities and good social relations. The closeness between children and parents is a potential element in a strong social life of a person. Parents should be aware of developing students' potential by supporting their academic activities. Despite having high mathematical and reading comprehension skills, the students should still enhance their mathematics skills and competencies. Students should be exposed to different mathematics programs to develop higher mathematical aptitude. The students should apply Polya's principles, especially in comprehending mathematical problems. They should formulate concepts in mind that possessing very high skills in reading comprehension could increase their ability to love numbers even more and improve their awareness in conversation. The students should maintain high social relations or even improve socializing with other people. Students should attend seminars focusing on making new friends or how to boost their self-confidence and self-esteem. Future researchers can do other research along this thought using other variables and another venue for comparison and more references.

References

1) Sparapani N, Connor CM, Mclean L, Wood T, Toste J, Day S. Direct and reciprocal effects among social skills, vocabulary, and reading comprehension in first grade. *Contemporary Educational Psychology*. 2018;53:159–167. Available from: https://doi.org/10.1016/j.cedpsych.2018.03.003.
2) Leiss D, Plath J, Schwippert K. Language and Mathematics - Key Factors influencing the Comprehension Process in reality-based Tasks. *Mathematical Thinking and Learning*. 2019;21(2):131–153. Available from: https://doi.org/10.1080/10986065.2019.1570835.
3) Peng P, Lin X, Ünal ZE, Lee K, Namkung J, Chow J, et al. Examining the mutual relations between language and mathematics: A meta-analysis. *Psychological Bulletin*. 2020;146(7):595–634. Available from: https://doi.org/10.1037/bul0000231.
4) Peng P, Lin X. The relation between mathematics vocabulary and mathematics performance among fourth graders. *Learning and Individual Differences*. 2019;69:11–21. Available from: https://doi.org/10.1016/j.lindif.2018.11.006.
5) Troyer M, Kim JS, Hale E, Wantchekon KA, Armstrong C. Relations among intrinsic and extrinsic reading motivation, reading amount, and comprehension: a conceptual replication. *Reading and Writing*. 2019;32(5):1197–1218. Available from: https://doi.org/10.1007/s11145-018-9907-9.
6) Elleman AM, Oslund EL. Reading Comprehension Research: Implications for Practice and Policy. *Policy Insights from the Behavioral and Brain Sciences*. 2019;6(1):3–11. Available from: https://doi.org/10.1177/2372732218816339.
7) Brock C, Tulasiewicz W. The concept of identity: Editors' introduction. 2018. Available from: https://www.taylorfrancis.com/chapters/edit/10.4324/9780429503771-1/concept-identity-colin-brock-witold-tulasiewicz.
8) Volodina A, Heppt B, Weinert S. Relations between the comprehension of connectives and school performance in primary school. *Learning and Instruction*. 2021;74:101430. Available from: https://doi.org/10.1016/j.learninstruc.2020.101430.

9) Gomez AL, Pecina ED, Villanueva SA, Huber T. The undeniable relationship between reading comprehension and mathematics performance. *Issues in Educational Research*. 2020;30(4):1329–1354. Available from: https://search.informit.org/doi/abs/10.3316/informit.606186472569473.
10) Mukuka A, Mutarutinya V, Balimuttajjo S. Effect of Self-Efficacy on the Relationship between Instruction and Students' Mathematical Reasoning. *Journal on Mathematics Education*. 2021;12(1):73–92. Available from: https://doi.org/10.22342/jme.12.1.12508.73-92.
11) Hadianto D, Damaianti VS, Mulyati Y, Sastromiharjo A. Does reading comprehension competence determine level of solving mathematical word problems competence? *Journal of Physics: Conference Series*. 2021;1806(1):012049. Available from: https://doi.org/10.1088/1742-6596/1806/1/012049.
12) Krawitz J, Chang YP, Yang KL, Schukajlow S. The role of reading comprehension in mathematical modelling: improving the construction of a real-world model and interest in Germany and Taiwan. *Educational Studies in Mathematics*. 2022;109(2):337–359. Available from: https://doi.org/10.1007/s10649-021-10058-9.
13) Öztürk M, Akkan Y, Kaplan A. Reading comprehension, Mathematics self-efficacy perception, and Mathematics attitude as correlates of students' non-routine Mathematics problem-solving skills in Turkey. *International Journal of Mathematical Education in Science and Technology*. 2020;51(7):1042–1058. Available from: https://doi.org/10.1080/0020739X.2019.1648893.
14) Mondragón-Díaz JDLC, Vergaray JM, Mondragón-Laura GIA, Cuadros L, Jénica M, Flores E. Reading comprehension in high school students. A theoretical review. *Turkish Journal of Computer and Mathematics Education*. 2021;12(6):4122–4132. Available from: https://turcomat.org/index.php/turkbilmat/article/view/8383.