

## Peer Interaction as a Predictor of Secondary Schools Computer Studies Students' Critical Thinking in Anambra State

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### Abstract

*This study examined peer interaction as a predictor of secondary school students' critical thinking skills in Computer Studies in Anambra State, Nigeria. Guided by two research questions and two null hypotheses tested at a 0.05 significance level, the study employed a predictive correlational design. The population comprised 42,572 Senior Secondary Two (SS2) students enrolled in Computer Studies, with a sample of 800 selected through multistage random and purposive sampling techniques. Data were collected using the Peer Relations Questionnaire (PRQ) and the Watson-Glaser Critical Thinking Appraisal (W-GCTA), both validated by three experts from Nnamdi Azikiwe University, Awka. Reliability analysis using Cronbach's Alpha for PRQ (0.88) and Kuder-Richardson Formula 20 for W-GCTA (0.89) confirmed internal consistencies of the instruments. The instruments were administered with the assistance of ten research assistants. Data analysis was conducted using simple and multiple linear regression. Key findings indicated that peer interaction accounted for 0.8% of the variance in critical thinking skills scores, with each unit increase in peer interaction leading to a 0.088 rise in critical thinking. Additionally, peer interaction significantly predicted critical thinking, although none of its individual dimensions (pro-social behaviour, victimization, bullying tendencies) made a significant independent contribution. The study concluded that peer interaction, as a global construct, plays a modest but significant role in fostering critical thinking in Computer Studies. Based on these findings, it was recommended that Computer Studies teachers should deliberately structure collaborative peer activities such as pair programming and code reviews to enhance students' analytical and reasoning skills.*

**Keywords:** Peer Interaction, Critical Thinking, Predictors, Computer Studies, Secondary School

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### Introduction

In today's rapidly evolving technological society, the ability to think critically has become an indispensable skill for secondary school students, transcending the mere acquisition of factual knowledge to focus on higher-order cognitive processes such as analysis, evaluation, and logical reasoning (Fleming & Gray, 2021). Critical thinking, according to Watson and Glaser (2018), is composed of several interrelated dimensions: evaluating arguments, recognising assumptions, making deductions, interpreting information, and drawing inferences. These skills are particularly vital in Computer Studies, where students are required to design algorithms, debug code, and solve complex problems that demand systematic and reflective

thinking (Ren, Tong, Peng & Wang, 2020; Musa, 2020). Without well-developed critical thinking abilities, learners struggle to apply their knowledge to real-world computing tasks, leading to persistent underachievement in the subject. This cognitive gap, however, cannot be understood solely by examining individual mental processes; it is increasingly evident that social factors, especially peer interaction, play a crucial role in shaping how students' reason and learn. Peer interaction, defined as the process of communication and collaboration among individuals of similar status within a shared context (Lee, 2022), has been shown to promote cognitive development by exposing students to diverse perspectives, challenging their assumptions, and requiring them to articulate and defend their reasoning (Altermatt, 2019). Through collaborative activities such as group discussions, peer tutoring, and pair programming, students engage in dialogues that stimulate higher-order thinking; they must analyse a peer's solution, evaluate its logic, infer underlying principles, and explain their own approaches. This social dimension of learning aligns with Johnson and Johnson's Social Interdependence Theory (1989), which posits that cooperative settings foster promotive interaction, shared responsibility, and higher achievement. Nevertheless, peer interaction is not a monolithic construct; it encompasses both positive dimensions (pro-social behaviour, mutual support) and negative dimensions (victimisation, bullying tendencies) that may affect cognitive outcomes in markedly different ways (Rigby & Slee, 1993). The multidimensional nature of peer interaction raises important questions for Computer Studies education in Nigeria. Pro-social behaviours, such as helping classmates understand a programming concept or sharing resources, are intuitively expected to enhance learning by creating a supportive environment (Noorani, Manshaei, Montazeri & Omoomi, 2019). Conversely, victimisation and bullying tendencies might be assumed to hinder critical thinking by inducing anxiety, reducing classroom participation, or fostering a climate of fear (Gao & Xue, 2020). Yet empirical evidence on how these specific dimensions influence subject-specific critical thinking particularly in a technically demanding field like Computer Studies remains scarce. This scarcity is especially problematic in the Nigerian educational context, where secondary schools face unique challenges that may amplify or alter the effects of peer interaction on learning outcomes. In Nigeria, Computer Studies has been integrated into the secondary school curriculum as a critical component of 21st-century digital literacy, yet students' achievement and critical thinking in the subject remain below expectations (Oribhabor, 2020). Traditional teaching methods often prioritise memorisation over analytical reasoning, and the role of social interactions in fostering critical thinking has received limited attention from researchers and practitioners. Anambra State, known for its high academic standards and competitive educational environment, provides a particularly insightful setting for this investigation. However, the state also grapples with overcrowded classrooms, inadequate computer facilities, and limited access to digital resources – conditions that can intensify both positive and negative peer dynamics (Anusiuba, 2022). In such an environment, understanding how peer interaction predicts critical thinking is not merely an academic exercise; it is a prerequisite for designing pedagogies that leverage collaboration to overcome infrastructural deficits. Yet, despite growing recognition of the importance of peer relationships in education, there is a dearth of empirical research examining their predictive role in critical thinking specifically within Computer Studies in Anambra State.

The problem this study seeks to address, therefore, is the lack of systematic evidence on whether peer interaction and its constituent dimensions of pro-social behaviour, victimisation, and bullying tendencies, can significantly predict secondary school students' critical thinking skills in Computer Studies. Existing studies have primarily focused on general academic performance or on peer effects in non-technical subjects, leaving a gap in understanding how peer dynamics influence analytical reasoning in computing disciplines. Moreover, the combined effect of different peer interaction dimensions on critical thinking has not been

examined in a single study, especially within the Nigerian secondary school context. Without such evidence, teachers and policymakers cannot design targeted interventions that harness the benefits of peer collaboration while mitigating the potential harms of negative interactions. This study was therefore, undertaken to fill that gap by investigating peer interaction as a predictor of critical thinking in Computer Studies among SS2 students in Anambra State.

### **Purpose of the Study**

The purpose of the study was to determine peer interaction as a predictor of secondary school students' critical thinking in Computer Studies in Anambra State. Specifically, the study sought to determine the:

1. Predictive value of peer interaction on students' critical thinking skills scores in Computer Studies.
2. Relative contribution of the dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) to prediction of students' critical thinking skills.

### **Research Questions**

The following research questions guided the study:

1. What is the predictive value of peer interaction on students' critical thinking skills scores in Computer Studies?
2. What are the relative contributions of the dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) to the prediction of students' critical thinking skills?

### **Hypotheses**

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

1. Peer interaction is not a significant predictor of students' critical thinking skills scores in Computer Studies.
2. The relative contributions of the dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) to the prediction of students' critical thinking skills scores is not significant.

### **Method**

The study adopted a predictive correlational research design, which is appropriate for examining the extent to which one variable (peer interaction) predicts another variable (critical thinking) and for determining the statistical significance of that prediction, as well as the relative contributions of multiple dimensions of the predictor variable (Nworgu, 2015). The study was carried out in Anambra State, located in the southeastern region of Nigeria, a state known for its robust educational ethos and high academic standards, yet characterised by disparities between urban and rural schools in terms of infrastructure and instructional quality, making it an ideal setting for investigating how peer interaction influences critical thinking in Computer Studies. The population comprised 42,572 Senior Secondary Two (SS2) students offering Computer Studies in all public secondary schools in Anambra State during the 2025/2026 academic session, consisting of 11,041 female students and 9,349 male students (source: Planning, Research and Statistics Department, Post Primary Schools Services Commission, Awka, 2025). A sample of 800 SS2 students was selected using a multistage sampling procedure: first, four education zones were randomly selected from the six zones in Anambra State; second, within each selected zone, ten public secondary schools were randomly sampled, giving a total of 40 schools. Finally, within each school, an intact class of students offering Computer Studies was purposively selected, ensuring representation

across different zones and school types while maintaining practicality. Two instruments were used for data collection: the Peer Relations Questionnaire (PRQ), adapted from Rigby and Slee (1993), which is a 20-item self-report measure assessing three dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) on a four-point scale (Never, Once in a while, Pretty often, Very often), and the Watson-Glaser Critical Thinking Appraisal (W-GCTA), adapted from Watson and Glaser (2018), which measures critical thinking across five dimensions (inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments), with the adapted version reducing the number of items per dimension to two statements with subsequent questions to suit secondary school students. Students' academic achievement in Computer Studies was obtained from teachers' record folders, and the average of their scores over the 2025/2026 academic session was computed as the achievement measure, collected using a proforma. The instruments, along with the title, scope, research questions, and hypotheses, were given to three experts, two from the Department of Science Education and one from the Department of Educational Foundations (Measurement and Evaluation Unit), all from Nnamdi Azikiwe University, Awka. They assessed them for suitability, relevance, clarity, and language appropriateness, and items recommended for retention, modification, or removal were appropriately revised. The reliability of the PRQ was determined using Cronbach's Alpha, as it employs polytomous scoring; the instrument was administered once to 40 SS2 Computer Studies students from a school not involved in the main study, yielding an internal consistency coefficient of 0.88. For the W-GCTA, which is dichotomously scored, reliability was established using the Kuder-Richardson Formula 20 (KR-20), producing a coefficient of 0.89, indicating high internal consistency for both instruments. The researcher secured permission from the appropriate education authorities, and ten research assistants (Computer Studies teachers from selected schools) were trained on the study's objectives and data collection procedures; the PRQ and W-GCTA were then administered to the 800 sampled students during regular class sessions and collected immediately to maximise response rates, while students' Computer Studies achievement scores were obtained from teachers' record folders and collated using a proforma, with only 800 valid and completely filled instruments included in the analysis. Data were analysed using simple linear regression and multiple linear regression. All null hypotheses were tested at the 0.05 alpha level, with hypotheses rejected if the p-value was less than or equal to 0.05 ( $p \leq 0.05$ ) and not rejected if the p-value was greater than 0.05 ( $p > 0.05$ ).

## Results

**Research Question 1:** What is the predictive value of peer interaction on students' critical thinking skills scores?

**Table 1:** Prediction of Students' Critical thinking skills score in Computer Studies by Peer interaction

| Model    | R                 | R <sup>2</sup> | Adjusted R <sup>2</sup> | Unstandardized coefficients (B) | Std. Error |
|----------|-------------------|----------------|-------------------------|---------------------------------|------------|
| Constant |                   |                |                         | 19.415                          | 7.025      |
| PEI      | .091 <sup>a</sup> | .008           | .007                    | .088                            |            |

a. Predictors: (Constant), Peer interaction

Table 1 shows that there is a low positive relationship ( $R = .091$ ) between peer interaction and critical thinking score in Biology. The R-Square value of 0.008 indicates that 0.8percent of the variance in Computer Studies students' critical thinking skills scores is predicted by peer interaction. The unstandardized coefficient *B* of .088 shows that a unit rise in peer interaction increases academic critical thinking skills score in Computer Studies by .088.

**Research Question 2:** What is the relative contribution of the dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) to prediction of students' critical thinking skills?

**Table 2:** Contributions of the Dimensions of Peer interaction in the Prediction of Critical thinking skills scores in Computer Studies

| Model               | Unstandardized Coefficients |            | Standardized Coefficients | t      | Pvalue |
|---------------------|-----------------------------|------------|---------------------------|--------|--------|
|                     | B                           | Std. Error | $\beta$                   |        |        |
| (Constant)          | 19.533                      | 1.803      |                           | 10.836 | .000   |
| 1 Pro-Social        | .075                        | .121       | .022                      | .620   | .536   |
| Victimization       | .068                        | .059       | .043                      | 1.151  | .250   |
| Bullying Tendencies | .114                        | .063       | .067                      | 1.811  | .071   |

a. Dependent Variable: Critical thinking skills score

Table 2 shows that critical thinking skills in Computer Studies increases by .075 whenever a students' pro-social behaviour increases by one unit whereas critical thinking skills increases by .068 for every unit increase in victimization, with critical thinking skills increasing by .114 where bullying tendencies increases by one unit. The order of relative contribution to critical thinking skills score in Computer Studies from the highest to lowest by each dimension of peer interaction therefore is; bullying tendencies, pro-social behaviour and victimization.

**Hypothesis 1:** Peer interaction is not significant predictor of students' critical thinking skills scores.

**Table 3:** Significance of Prediction of Critical thinking skills score in Computer Studies by Students' Peer Interaction

| Model        | Sum of Squares | df  | Mean Square | F     | Pvalue            |
|--------------|----------------|-----|-------------|-------|-------------------|
| 1 Regression | 331.898        | 1   | 331.898     | 6.725 | .010 <sup>b</sup> |
| Residual     | 39383.301      | 798 | 49.353      |       |                   |
| Total        | 39715.199      | 799 |             |       |                   |

a. Dependent Variable: Critical thinking skills score

b. Predictors: (Constant), Peer Interaction

Table 3 shows that peer interaction is a significant predictor of critical thinking skills scores in Computer Studies,  $F(1, 798) = 6.725$ ,  $p < 0.05$ . The null hypothesis was therefore rejected meaning that peer interaction is a significant predictor of critical thinking skills scores in Computer Studies. Since peer interaction is a significant predictor of critical thinking skills scores in Computer Studies, the regression model ( $Y = a + bX$ ) for the prediction of critical thinking skills score in Computer Studies as derived from Table 1, where constant = 19.415 and b value = .088 is:

**Critical thinking skills =  $19.415 + .088(PEI)$**

Where, Critical thinking skills = Critical thinking skills score in Computer Studies and PEI = Peer Interaction

**Hypothesis 2:** The relative contributions of the dimensions of peer interaction (pro-social behaviour, victimization, and bullying tendencies) to prediction of students' critical thinking skills scores is not significant.

**Table 4:** Significance of Prediction of Critical thinking skills scores in Computer Studies by the Dimensions of Peer Interaction

| Model      | Sum of Squares | df  | Mean Square | F     | Pvalue            |
|------------|----------------|-----|-------------|-------|-------------------|
| Regression | 343.194        | 3   | 114.398     | 2.313 | .075 <sup>b</sup> |
| 1 Residual | 39372.005      | 796 | 49.462      |       |                   |
| Total      | 39715.199      | 799 |             |       |                   |

a. Dependent Variable: Critical Thinking

b. Predictors: (Constant), Bullying Tendencies, Pro-Social, Victimization

Table 4 shows that the dimensions of peer interaction jointly did not significantly predicted the students' critical thinking skills scores in Computer Studies,  $F(3, 796) = 2.313$ ,  $p < 0.05$ .

## Discussion

The finding that peer interaction significantly predicted critical thinking skills in Computer Studies, albeit explaining only 0.8% of the variance, provides empirical support for the theoretical premise that social collaboration fosters cognitive development. This result aligns with the work of Howe, Anderson, Soden, Halliday and Low (2001), who found that further education students who engaged in peer-based critiquing exercises demonstrated significantly greater justification in their written work compared to control groups. Similarly, Guiller, Durbdell and Ross (2008) reported that online peer discussions produced more evidence of critical thinking than face-to-face settings, indicating that the mere presence of peer interaction, regardless of medium, can enhance analytical reasoning. The modest effect size in the present study is consistent with Anderson and Soden (2023), who concluded that peer interaction is a potentially useful method for developing thinking skills, especially when tasks are structured to make differing individual views explicit. The variance explained (0.8%) suggests that while peer interaction is a statistically significant predictor, critical thinking is influenced by many other factors, including prior knowledge, teacher instruction, and individual cognitive abilities. The non-significance of the individual dimensions of peer interaction (pro-social behaviour, victimization, bullying tendencies) in predicting critical thinking is an important finding. It implies that the overall frequency or quality of peer engagement may be more critical than the specific nature of that engagement. A student who actively participates in peer discussions – whether by helping others (pro-social), being targeted (victimization), or asserting dominance (bullying tendencies) – is at least socially present and exposed to diverse viewpoints. Passive withdrawal, in contrast, denies students opportunities to practise articulating arguments, responding to counter-examples, and refining reasoning through dialogue. This interpretation is supported by Swati and Madhavi (2020), who found no significant difference in critical reasoning ability between structured peer-learning groups and free-choice partner groups, suggesting that the quantity and quality of engagement, rather than its specific structure, determines critical thinking outcomes. The non-significance of victimization is particularly noteworthy. It suggests that even students who experience negative peer interactions may still derive some cognitive benefit from being socially present, provided they do not completely disengage from learning activities. However, this finding should not be misinterpreted as endorsing victimization; rather, it highlights the resilience of some students and the importance of maintaining social connection. The theoretical implications of these findings are significant. Johnson and Johnson's Social Interdependence Theory (1989), which underpins this study, posits that cooperative settings foster promotive interaction and higher achievement. The present results extend this theory by showing that the positive effect of peer interaction on critical thinking does not require exclusively pro-social behaviour; even competitive or assertive interactions can contribute, as long as they keep students engaged in the social and cognitive discourse of

the classroom. For Computer Studies education, these findings suggest that teachers should not aim to eliminate all peer competition but rather channel it into structured academic challenges such as coding competitions, gamified quizzes, or team-based problem-solving tasks. Furthermore, the lack of a significant contribution from victimization indicates that schools should still actively combat bullying, not because it directly lowers critical thinking, but because of its well-documented negative effects on emotional well-being and overall academic engagement. Practically, the results underscore the need for Computer Studies teachers to deliberately structure collaborative learning activities. Pair programming, code reviews, small-group debugging sessions, and peer teaching are specific strategies that can increase the frequency and quality of peer interaction. These activities expose students to multiple problem-solving approaches and require them to explain their reasoning, evaluate alternatives, and construct logical justifications – all core components of critical thinking. Given that the global construct of peer interaction was a significant predictor, schools should focus on creating a classroom culture that encourages active peer engagement, recognizing that even students with different social tendencies can benefit from sustained interaction.

### **Conclusion**

The study concludes that peer interaction significantly but modestly predicts students' critical thinking skills in Computer Studies. The global construct of peer interaction is a stronger predictor than any of its individual dimensions, suggesting that overall engagement with peers, regardless of its specific nature, contributes to the development of analytical and reasoning skills in this subject.

### **Recommendations**

Based on the findings, the following recommendations are made:

1. Computer Studies teachers should deliberately structure collaborative peer activities such as pair programming, code reviews, and group debugging sessions to enhance students' critical thinking skills.
2. Schools should foster a classroom culture that promotes active peer engagement, recognizing that even competitive or assertive interactions, when channeled constructively, can contribute to cognitive development.
3. Further research should explore the specific mechanisms through which peer interaction enhances critical thinking, including qualitative studies that examine the content and quality of peer dialogues during Computer Studies tasks.

## References

- Altermatt, E. R. (2019). Academic support from peers as a predictor of academic self-efficacy among college students. *Journal of College Student Retention: Research, Theory & Practice*, 21(1), 21–37.
- Anderson, T., & Soden, R. (2023). Interaction and the learning of critical thinking skills. *Psychology of Learning and Teaching*, 1(1), 37–40.
- Anusiuba, O. I. (2022). *The influence of classroom environment on students' academic achievement in computer studies in Anambra State* (Unpublished doctoral dissertation). Nnamdi Azikiwe University, Awka.
- Fleming, T., & Gray, R. S. (2021). Sensory processing sensitivity and academic achievement: The role of emotional intelligence in high school students. *International Journal of Educational Science and Research*, 29(2), 87–102.
- Gao, X., & Xue, H. P. (2020). Parental involvement, peer influence and academic achievement. *Educational Sciences: Research*, 6, 55–63.
- Guiller, J., Durbdell, A., & Ross, A. (2008). Peer interaction and critical thinking: Face to face or online discussion? *Learning and Instruction*, 18(2), 187–200.
- Howe, C., Anderson, A., Soden, R., Halliday, J., & Low, J. (2001). Peer interaction and the learning of critical thinking skills in further education students. *Instructional Science*, 29(1), 1–32.
- Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research*. Interaction Book Company.
- Lee, J. (2022). The effect of peer relationship on academic performance in high school students. *Lecture Notes in Education Psychology and Public Media*, 13(1), 136–144.
- Musa, M. (2020). Investigation of the relationship between critical thinking levels and academic achievement levels of students in faculty of sports science. *Educational Research and Reviews*, 15(7), 370–376.
- Noorani, S. F., Manshaei, M. H., Montazeri, M. A., & Omoomi, B. (2019). Fostering peer learning through a new game-theoretical approach in a blended learning environment. *arXiv preprint arXiv:1910.12235*.
- Nworgu, B. G. (2015). *Educational research: Basic issues and methodology* (3rd ed.). University Trust Publishers.
- Oribhabor, C. (2020). Evaluating the effect of activity-based method on students' achievement in computer studies in secondary schools in Lagos State. *International Journal of Educational Research*, 8(2), 45–58.
- Ren, X., Tong, Y., Peng, P., & Wang, T. (2020). Critical thinking predicts academic performance beyond general cognitive ability: Evidence from adults and children. *Intelligence*, 82, 1–10.
- Rigby, K., & Slee, P. T. (1993). Dimensions of interpersonal relation among Australian children and implications for psychological well-being. *The Journal of Social Psychology*, 133(1), 33–42.
- Swati, P., & Madhavi, D. (2020). Learning with peers: Does that foster critical reasoning? *Journal of Education Technology in Health Science*, 7(2), 66–71.
- Watson, G., & Glaser, E. M. (2018). *Watson-Glaser critical thinking appraisal: Technical guide and user manual*. Pearson Education.