

**Learning probability in the Arts Stream Classes: do colour balls with STAD- cooperative learning help in improving students' performance?**

**Abstract**

Aims: 1. To investigate the effects of concrete learning aids (Colour Balls) with Student Teams-Achievement Division (STAD) cooperative learning (CBCL) method on Form Four Arts Stream students' performance in probability; 2. To find out students' perception towards the use of CBCL method in learning probability. Study Design: Quasi experimental pre-test post-test control group design. Two treatment groups were employed in this design, they were CBCL (experimental group), and STAD cooperative learning (CL) (control group). Place and Duration of Study: The study was carried out in two rural secondary schools in the District of Tambunan, 90 km from Kota Kinabalu city, Sabah, Malaysia for a period of 170 minutes. Methodology: The sample consisted of 160 Form Four Arts Stream students (mean age 16 years old). The students were randomly assigned to one of the two conditions - CBCL method (N= 80) and CL method (N= 80) as intact groups. The Probability Performance pre test and post-test, and open ended questions had been used to collect data. The student's performance mean scores were analysed using Independent-samples t-test and Paired- samples t-test at  $\alpha = 0.05$  level of significance. The student's written comments on their learning experience in CBCL method were categorized into three parts, namely a positive perception, negative perceptions and suggestions for improvement. Results: The findings revealed that students taught with the CBCL method performed significantly higher than the students who were taught with CL method ( $t(158) = 3.148, P = .002$ ). The findings also showed that students in both CBCL and CL groups performed significantly better on the post test compared to the pre test ( $t(79) = 42.382, P = .000$  and  $t(79) = 70.726, P = .000$  respectively). A majority of students had positive perception towards the use of CBCL method in learning probability as it: (i) helped linking learning activities to probability concepts; (ii) boost their confidence in answering questions; (iii) helped them better understand and remember the concept of probability; and (iv) fostered their cooperation and discussion in solving problems. Majority of the students also felt that the CBCL activities conducted made learning fun and enjoyable. However, one big concern about the CBCL activities was that it had taken a longer time to complete. Conclusion: This study shows that the Colour Balls concrete learning aids, when incorporated with the STAD cooperative learning (CBCL) method and implemented appropriately in the classrooms, is an effective method in improving the performance of Form Four Arts Stream students in the topic of probability.