A CLUSTER ANALYSIS EXPLORING ABSTRACTION LEVEL OVER PROPERTIES OF EVEN, ODD, AND CONSECUTIVE NUMBERS AMONG TEACHERS AND THEIR STUDENTS

Most people recognize even numbers as 2, 4, 6, odd numbers as 1, 3, 5, and consecutive numbers as 1, 2, 3. As mathematics educators, we believe that students need to transition from this type of empirical observation, based on examples, to one grounded in mathematical structures removed from observations in the empirical world. The National Council of Teachers of Mathematics and the Common Core State Standards agree learning to make generalizations about patterns is important and should be emphasized. There is little doubt that students have difficulty with generalization and research in this area seeks to identify contributing factors. This study explores the possibility that teacher abstraction level is a contributing factor by analyzing the abstraction level of students and their teachers within school systems in north Alabama. Three hundred and forty-five students and thirty-eight teachers were participants in professional development lessons using computer programming to teach abstraction and generalization as part of a Math/Science Partnership grant. The instruction focused on properties of even, odd, and consecutive numbers. Participants were taught to find general expressions in their code and use these to make conjectures and form arguments about the concepts. Improvement was measured through pre-and post-test assessments, using APOS theory to gauge the level of abstraction. We use proximity measures to represent nearness among students and teachers, and explore whether high similarity occurs among school districts. The metric for our cluster analysis will be the distance from student and teacher pre-and post-test scores. Results will show found relationships between teacher and student abstraction levels.