

# The Presence of Gender Performance Differences in Secondary Mathematics Competitions

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## Abstract

The presence of mathematics competitions originates from the International Mathematics Olympiad (IMO). The IMO began in 1959 in Romania and is the largest, most prestigious scientific Olympiad for high school students around the world [1]. The competition consists of six, 42-point problems varying in subject. The questions are primarily based on pre-calculus, which is a common level of mathematics for high school students. Subjects beyond high school level are also incorporated into the competition such as projective and complex geometry, functional equations, and number theory [2]. MATHCOUNTS and the American Mathematics Competitions are just two examples of mathematics competitions open to middle school students. MATHCOUNTS is a multilevel national program established in 1983 that provides students the opportunity to compete with their peers [4]. The American Mathematics Competitions (AMC) is a series of examinations based on curriculum materials that focus on building problem-solving skills and mathematical knowledge [5]. The most important value of a math contest is to kindle student's interest in mathematics while encouraging them to value intellectual activities. Students will often turn an activity into a contest; they love games and always want to be the best at what they do. Mathematics competitions can inspire them to become good at mathematics in the same sense that sports encourage physical fitness. Competitions train students to deal with success, failures, and prove that practice is effective to their performance. In our daily lives, we often have to deal with elements of pressure. Competitions can be a model by which students learn how to cope with and overcome pressure [3]. The discussion of our research is focused on extending friendly mathematics competitions to local and surrounding high school students in the 9th grade, examining how their mathematics knowledge plays a role in their competition performance, and discussing the importance of student participation in mathematics competitions.

## Keywords

Mathematics Competitions, Student Performance, Problem-Solving Skills, Gender Performance

## Objectives

Our research focused on four specific areas:

- The importance and benefits that mathematics competitions hold
- The presence of gender dominance in mathematics
- The role of parents and teachers in the students involvement in mathematics competitions
- The result of implementing mathematics competitions in the classrooms.

## Methodology

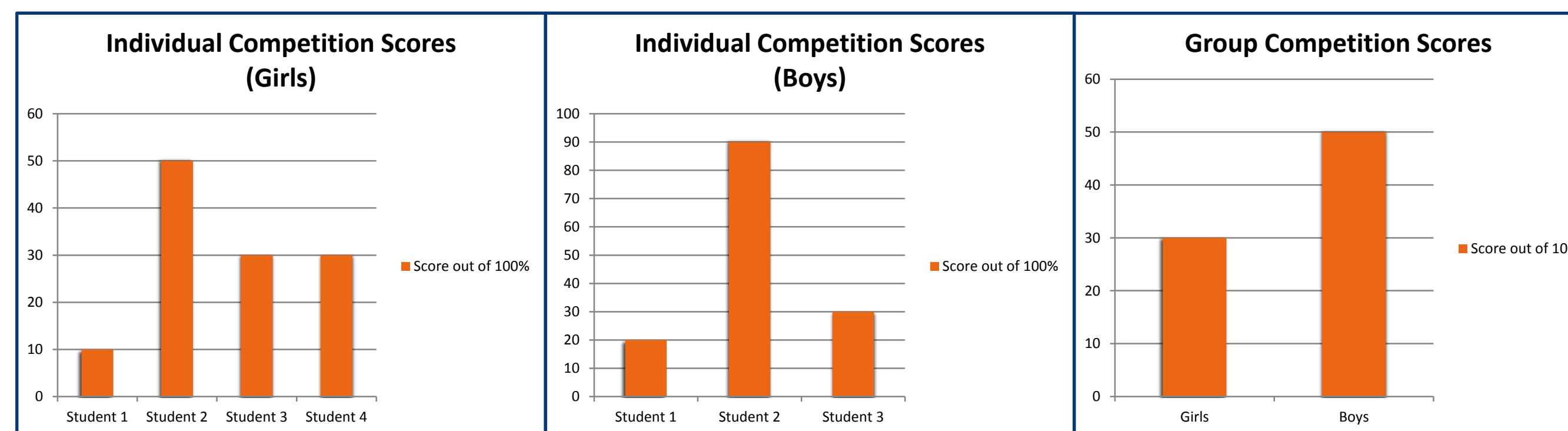
This study was conducted at three participating high schools. Namely, the schools were Northeastern and Pasquotank County High Schools in Elizabeth City, North Carolina, and Perquimans County High School in Hertford, North Carolina. The math teachers at each school were asked to select at most 8 (4 boys and 4 girls) 9th grade students, each of average mathematical ability, as determined by their performance in the classroom, and from different ethnic backgrounds. The selected students were given a total of 20 multiple choice questions to complete within two 30-minute sessions. These questions were obtained from a variety of resources used in preparing students for the SAT. During session one, a mini math competition was held between the male and female teams. Each team was required to answer a set of ten questions. On the timer's mark, the students worked out each question, the team runner then turned in their answer to the appropriate competition leader, and in return, received the next question. This cycle continued until all 10 questions were answered by both teams, in the allotted time frame. In the second session, each individual was given a set of 10 questions that mirrored those in the first session. Students recorded their answers and turned in all 10 upon completion. Students used calculators only in the second session.



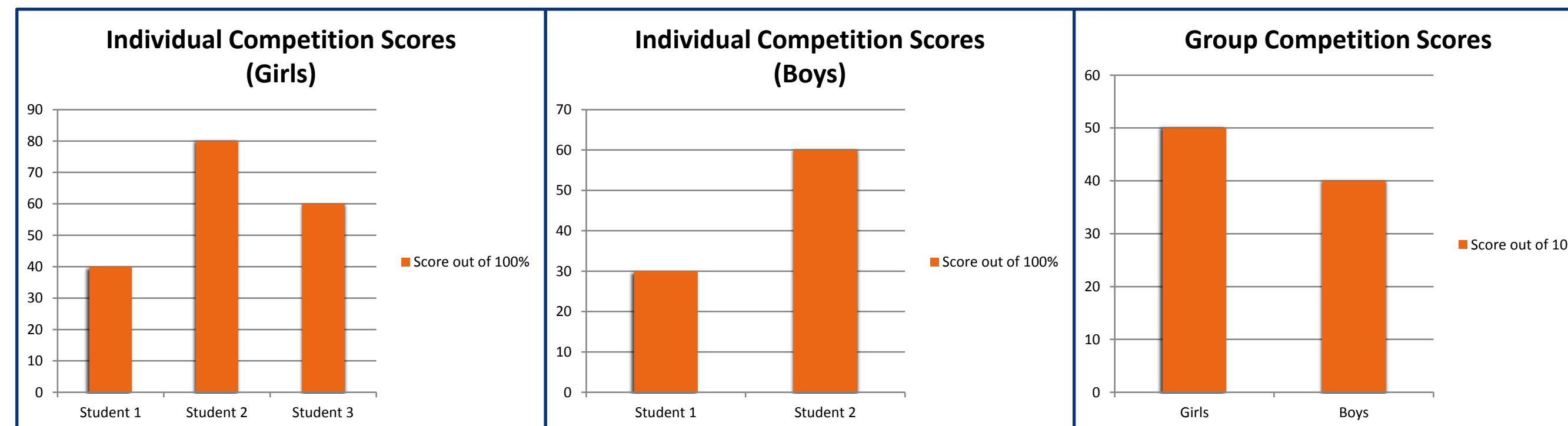
## Results

The figures shown below represent the comparison of scores based on school, gender, individuals, and groups.

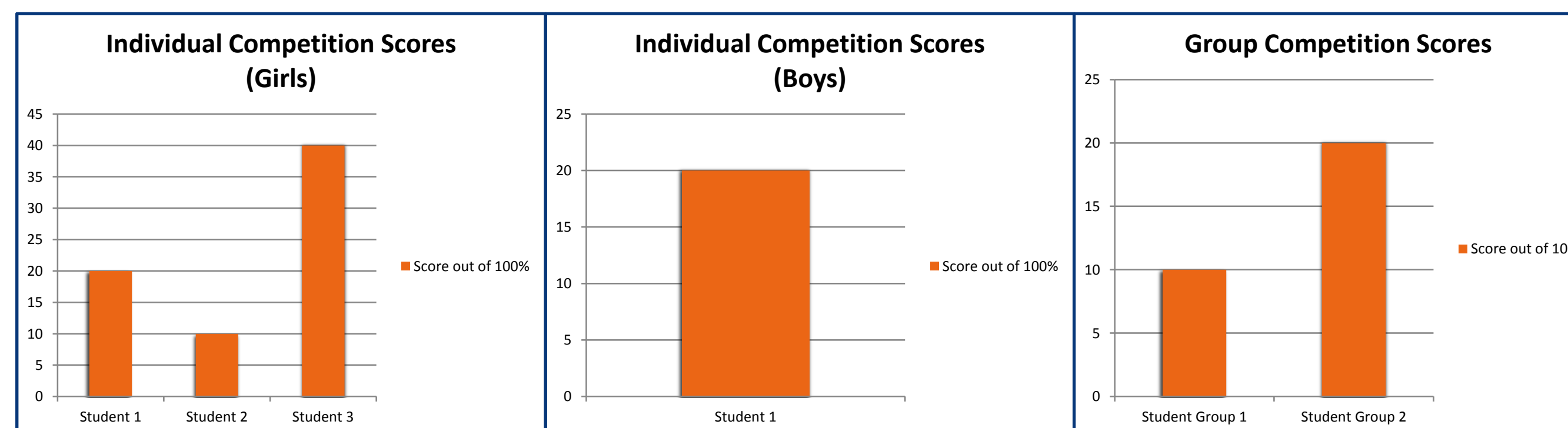
### Northeastern High School



### Perquimans County High School



### Pasquotank County High School



## Conclusion

After analyzing the data of the students scores, we found that the students, both girls and boys, performed higher as a group than individually. The difference in the individual average score versus the group average score for the girls was 3.0. The difference in the boys individual average score versus the group average score was 3.3. When we compared the compared the average scores of the group portion, the girls scored 40.0 while the boys scored 45.0. The maximum score out of all of the girls was 80.0 and the maximum score out of all the boys was 90. We also found that the boys performed higher overall than the girls. (The averages for individual and group scores is shown below)

### Girls (10)

- Average for Individual = **37.0**
- Average for Group = **40.0**
- Maximum Score for Individual = **80.0**

### Boys (10)

- Average for Individual = **41.7**
- Average for Group = **45.0**
- Maximum Score for Individual = **90.0**

## Future Work

In the future, the team has the ability to extend the research into mathematics competitions being used as an indicator of student growth in the classroom. One goal might be to consider opening our pool of competitors to those that attend STEM high schools. Since these schools implement more mathematics and science in their classes, the comparison between the STEM high schools and the regular high schools would show if the students perform higher in mathematics competitions while attending a STEM high school. Another option would be to extend the research to high schools in Virginia. With Chesapeake, Virginia being the closest major city in Virginia, the opportunity would allow us to compare student performance under different state standards. The final goal would be to compare students performance based on same-sex classrooms. Based on the data we collected and seeing that the males performed better than the females in the competition, we would like to see if performance of females in mathematics increases while working in an all female setting. This has been done in a local school and would be beneficial to research in order to improve students mathematical performance.

## Acknowledgements

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(For an extended list of references, please refer to the team re:

