

Completed in coordination with Dover Area School District as part of the Master of Science in Science Education program at Montana State University

# The impact of increasing middle school science class size on student achievement and teacher burnout



As schools nationwide face teacher shortages, many turn to increasing class size as a potential solution. The goal of this research was to examine the potential impacts of increasing class size in the modern day, rural classroom.



Figure 1: A crowded classroom generated by the author using Canva AI (2024).

## 01. Introduction

In the 2023-2024 school year, the researcher was put in a unique position to study increasing class sizes due to staffing shortages in the middle school science department. The researcher's student load increased by 57% going from 79 to 124 students. This action research project explores how that change impacted student behavior, work completion, and achievement in the hope that a better understanding can help identify negative ramifications so that they may be anticipated and mitigated for others facing similar shifts in classroom dynamics.

## 02. Research Sub Questions

- What impact did the increased class size have on feelings of teacher burnout?
- When both educators were present, student teacher and original teacher, did the extra support mitigate the impact of the increased class size or did any disparities remain?
- What impact did the changes in class parameters have on student perspectives of teacher availability and support?

## 03. Treatment

Variation of class size was the treatment. Course rigor and assessments remained consistent throughout all phases. A planned student teacher experience also occurred. The treatment can be broken into four phases: initial small class size, student teacher's addition, a 57% increase in students, and finally, the increased class size without the student teacher.

## 04. Methodology

In order to examine these factors in depth, a variety of data collection tools were developed. As part of a true action research project, the collection tools were both qualitative and quantitative in nature.

- Quantitative:
- gradebook analysis
  - work completion tracking
  - the Zager Teacher Burnout Scale
  - post testing achievement and growth comparisons
  - behavior report

- Qualitative
- teacher journaling
  - student interviews

## 05. Results

In line with much of the literature, the changes to class size did not affect all factors equally with some aspects barely changing and others shifting significantly.

- A t-test demonstrated no difference to student achievement of standards on standardized testing ( $p=0.49$ ) and a marginal effect was noted on student growth ( $p=0.14$ ).
- For the top 25% of students, the effect was minimal with many reporting that they "enjoyed hearing more opinions and having more people to work with."
- For the bottom 25% of students, scores dropped dramatically when the new students joined. 57% of students interviewed noted decreased focus with the larger group.
- Presence of the student teacher in addition to the regular teacher did not improve class grade scores but did lead to higher work completion rates for students.
- Disruptive behaviors only escalated to write ups during the larger class period.
- 65% of students would have preferred to keep the class smaller with many citing increased wait time and lack of comfort with the large group as their reasoning.



Figure 2: Students raising hands for help generated by the author using Adobe Express (2024).

## 06. Analysis

As class size increased, work completion rates declined noticeably with late and missing work peaking in the large group with only one teacher. With the student teacher, this effect was lessened suggesting that teacher support impacts students' abilities to meet deadlines and produce quality work. Teacher burnout rates were significantly higher with the large classes compared to a normal size group post treatment.

Figure 1: Work completion rates by students over the four phases of treatment.

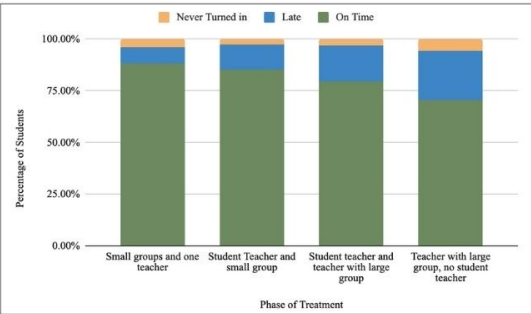
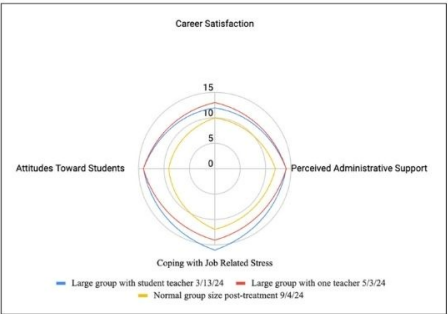


Figure 2: Teacher Burnout Scale results from three different stages of treatment. Higher scores indicate higher burnout.



## 07. Conclusion

This study reiterates strongly that class sizes have a differential effect on student achievement. The bottom 25% of learners experienced the greatest impact. Smaller class sizes have a positive correlation with higher work completion and lower teacher burnout rates. These findings maintain the importance of manageable class sizes and highlight the struggles of the bottom 25% of learners in large class situations further informing targeted interventions in the future.



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