

THE EFFECTS OF INCREASED VOCATIONAL HANDS-ON INSTRUCTION IN AN ACADEMIC SCIENCE/TECHNOLOGY CLASSROOM

Research Focus Questions
1. How does increased hands-on integrated activities between vocational and academic areas improve student understanding and help encourage higher-order thinking?
2. How do student’s attitudes towards technology/engineering change with more hands-on activities?
3. How has student understanding changed about engineering after hands-on activities have been implemented in the classroom?

Introduction & Background

- Pathfinder Regional Vocational Technical High School (PRVTHS) is located in Palmer, Western Massachusetts.
- Four integration projects with 9th grade technology/engineering students working in collaboration with vocational shop areas to provide hands-on instruction:

1. Thermal Systems	↔	Heating , Ventilation and Air Conditioning Dept.
2. Electrical Systems	↔	Electrical Dept.
3. Fluid Systems	↔	Automotive Dept. (hydraulics and pneumatics)
4. Communication Tech	↔	Electronics Dept. (fiber optics and digital v analog signals)

Data

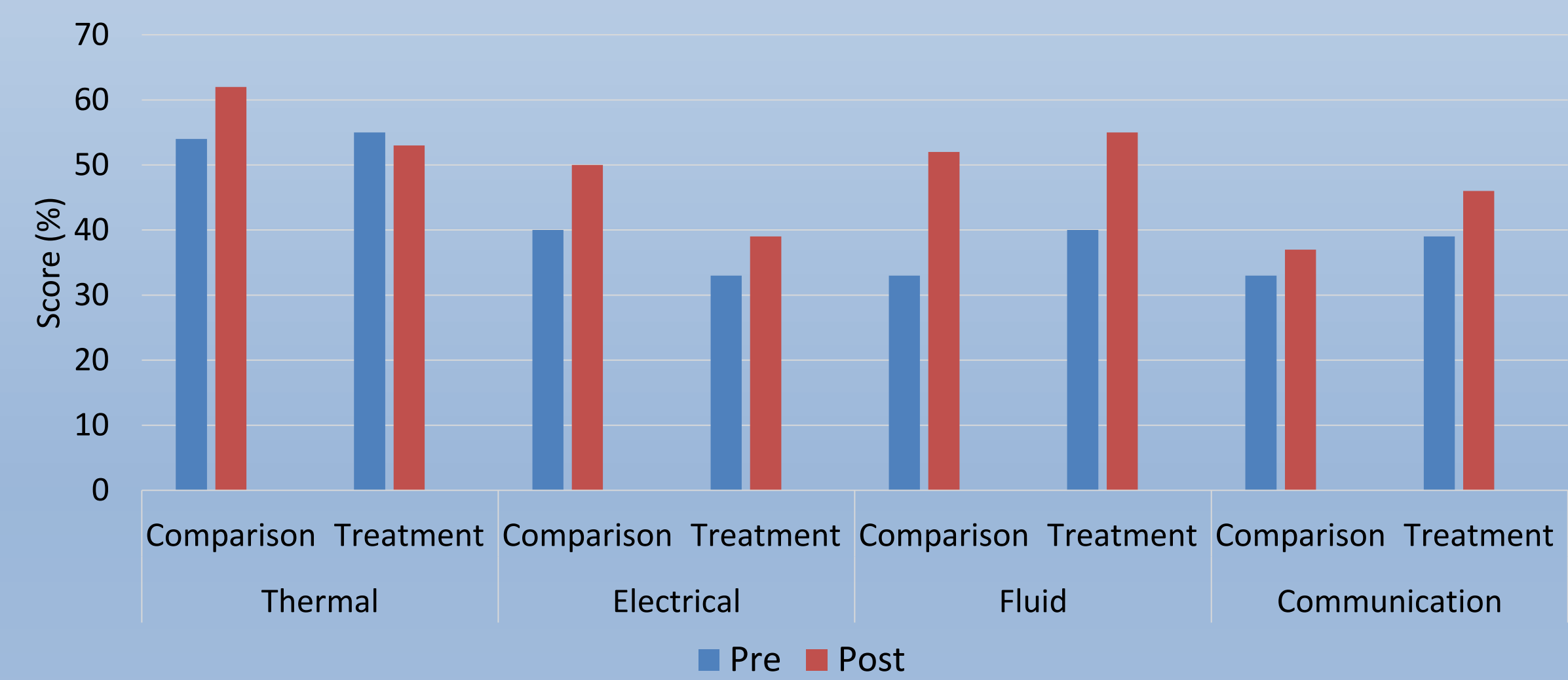


Figure 1. Pre and post assessment scores, (N = 73). Normalized gains for the control and treatment groups were 0.26 and -0.04 for the thermal unit, 0.18 and 0.24 for electrical, 0.28 and 0.25 for fluid, and 0.06 and 0.11 for the communication unit.

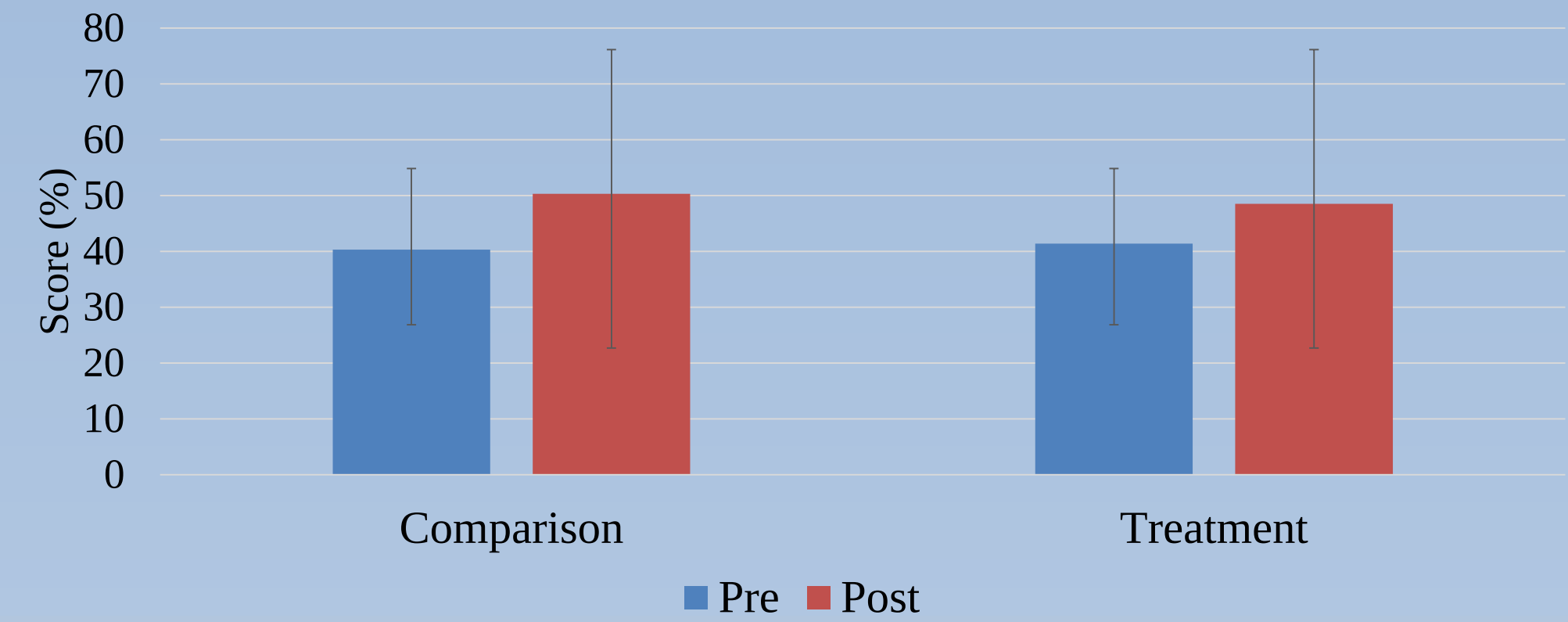


Figure 2. Mean pre and post assessment scores, (N = 73). Error bars = standard deviation of the mean.

Student Quotes

“I thought it was pretty cool because we were not doing it in any other classes.”
“I liked that idea because I like hands on activities.”
“This should be interesting and maybe not too boring.”
“Yes, I think there should be both academic and shop for classes like science because everyone learns differently, like for the people who are more book learners, the academic part is for them and for the others who are hands-on they can also do something they like and enjoy.”

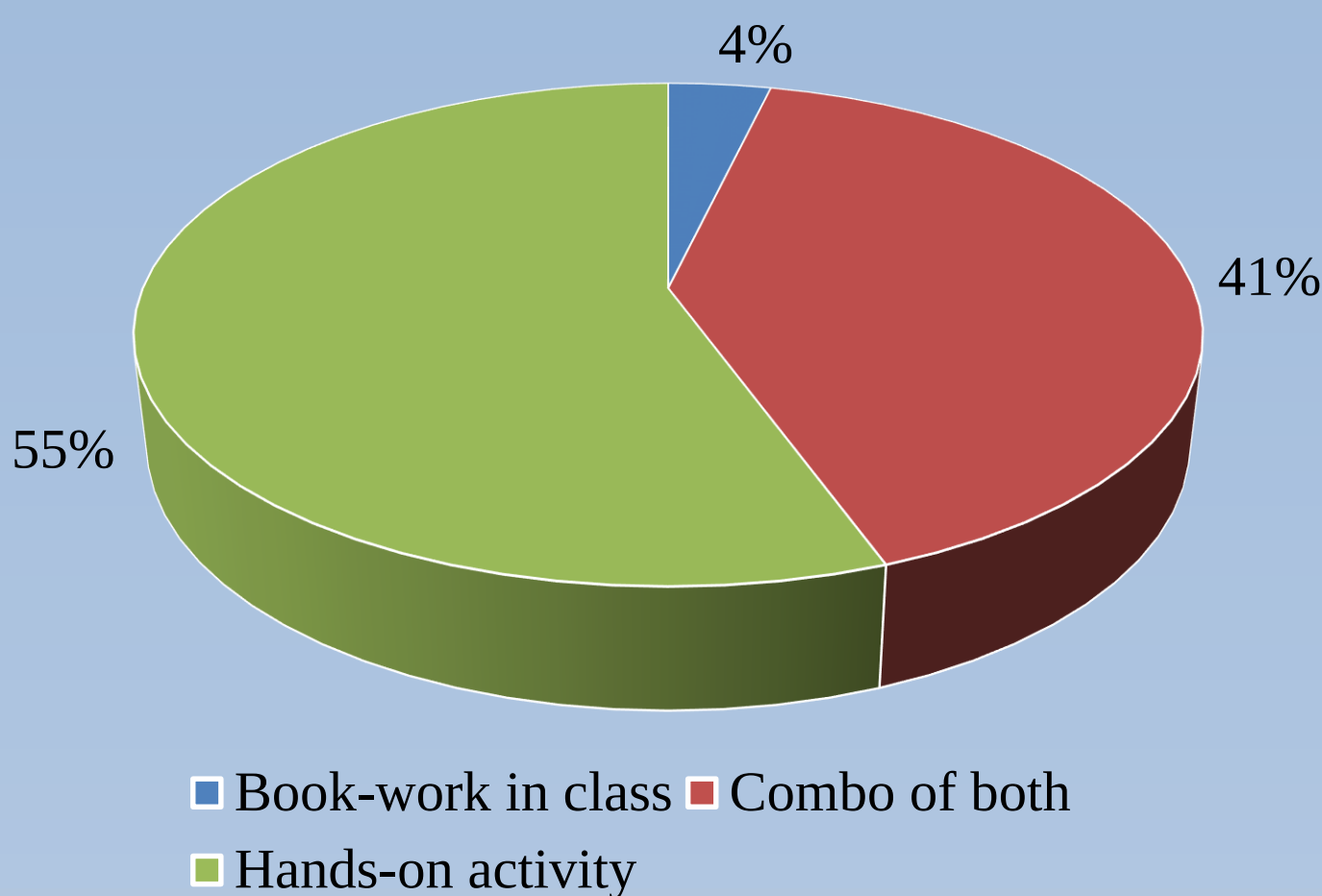


Figure 3. After intervention survey question asking students what method of instruction they would prefer, (N = 54).

Analysis

- Quantitative data not conclusive in determining whether hands-on instruction is more effective.
- Every normalized gain value was low.
- Qualitative data overwhelmingly supports a role in some form for hands-on activities in instruction of technology/engineering course.

Value

- Instructional “eye-opener” for educators, administrators and students in the school.
- Integration helps maximize the student’s learning experience at PRVTHS.
- Helped steer the move towards “cluster” style STEM learning.

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