

ABSTRACT

There are an estimated, “7 – 10 billion laboratory tests performed each year in the United States” and at least 70% of all medical decisions are made through the use of laboratory test results. However, there is currently a shortage in the laboratory workforce. This past year, the Laboratory Science profession was rated as one of the top one hundred jobs in healthcare by US News & World Report. Moreover, the Bureau of Labor Statistics estimates that the need for trained laboratory professionals will increase 22% from 2012 to 2022. Consequently, we developed an innovative summer program aimed at teaching young, STEM-oriented individuals about laboratory science, diagnostic medicine, and other health professions. This program was offered to local high school and community college students and included 6 hours of daily hands-on, interactive activities along with relevant instruction and foundational knowledge. To assess program success, a pre and post-test was implemented. Students achieved significantly ($p < 0.05$) higher scores on the post-test compared to the pre-test, indicating that they learned key information during the program. Furthermore, 90% of students felt that the program stimulated their interest in laboratory medicine and 99% felt that they were more knowledgeable about health science than they were before. The program, now in its third year, has successfully exposed the laboratory medicine and broader aspects of health care to the local population of future health care professionals, igniting interest, and afforded us an opportunity to provide outreach to the local community.

METHODS

AIM ONE: DESIGN A ONE-WEEK MLS IMMERSION PROGRAM

A team consisting of faculty and staff collaborated in developing and implementing MLS laboratory sessions. Focus was placed on creating hands-on exercises that mimicked real-world clinical practice so students could get the feel for what it was like working in the laboratory science field and practicing various techniques, including: WBC differentials, blood typing, bacterial gram staining, urinalysis, and agarose gel electrophoresis. Once the exercises were developed, the team created a schedule to fit the activities into a, intensive, one-week immersion experience. Supplies and reagents were ordered and the exercises were tested for functionality and for fitting within the allotted time schedule.

AIM TWO: ASSESS EFFICACY OF THE IMMERSION PROGRAM

Students were given a pre-test prior to attending the laboratory sessions to determine baseline knowledge. All students were given a post-test following the last laboratory session. The post-test contained the same questions as the pre-test in order to assess the amount of learning achieved after attending the program.

AIM THREE: ASSESS STUDENT PERCEPTION

Questions were developed to determine if the students felt that the laboratory sessions were helpful to their comprehension of laboratory medicine and diagnostic testing. Questions also covered whether the program stimulated their interest in diagnostic medicine and whether going through the program increased their learning of human disease. The survey, with answers based on a likert scale (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, or not applicable), was implemented in Google docs.

LAB ACTIVITIES

	Day 1	Day 2	Day 3	Day 4	Day 5
9:00 - 10:00	safety presentation	White and Red Blood Cell Lecture and Demos	Hematology Lecture	Analysis of biochemistry results, BUN analysis, Hemoglobin analysis	Agarose gel electrophoresis
10:00 - 11:00	Pre-test, lab overview, PPE hand-out	Normal WBC Differentials	Abnormal WBC Differentials and Cases		DNA and PCR result analysis using Gel doc
11:00 - 12:00	Pipetting exercise			Blood Typing	Post-test
12:00 - 12:30	LUNCH	LUNCH	LUNCH	LUNCH	LUNCH
12:30 - 1:30	Parasitology and Mycology lecture	Macroscopic, Chemical, and Microscopic Urinalysis	Bacteriology Streak for Isolation/ Gram Staining and Spot Tests	Molecular Diagnostics	Case Study Presentations and Exit Survey
1:30 - 2:30	Parasite/Fungal Cases using Microscopes			DNA Extraction	
2:30 - 3:30	Blood Donation and Blood pressure	Urine Confirmatory Testing	Discuss Group Case Projects and Hand out cases	Agarose Gel Loading and Polymerase Chain Reaction	

Lab Activity: Urinalysis



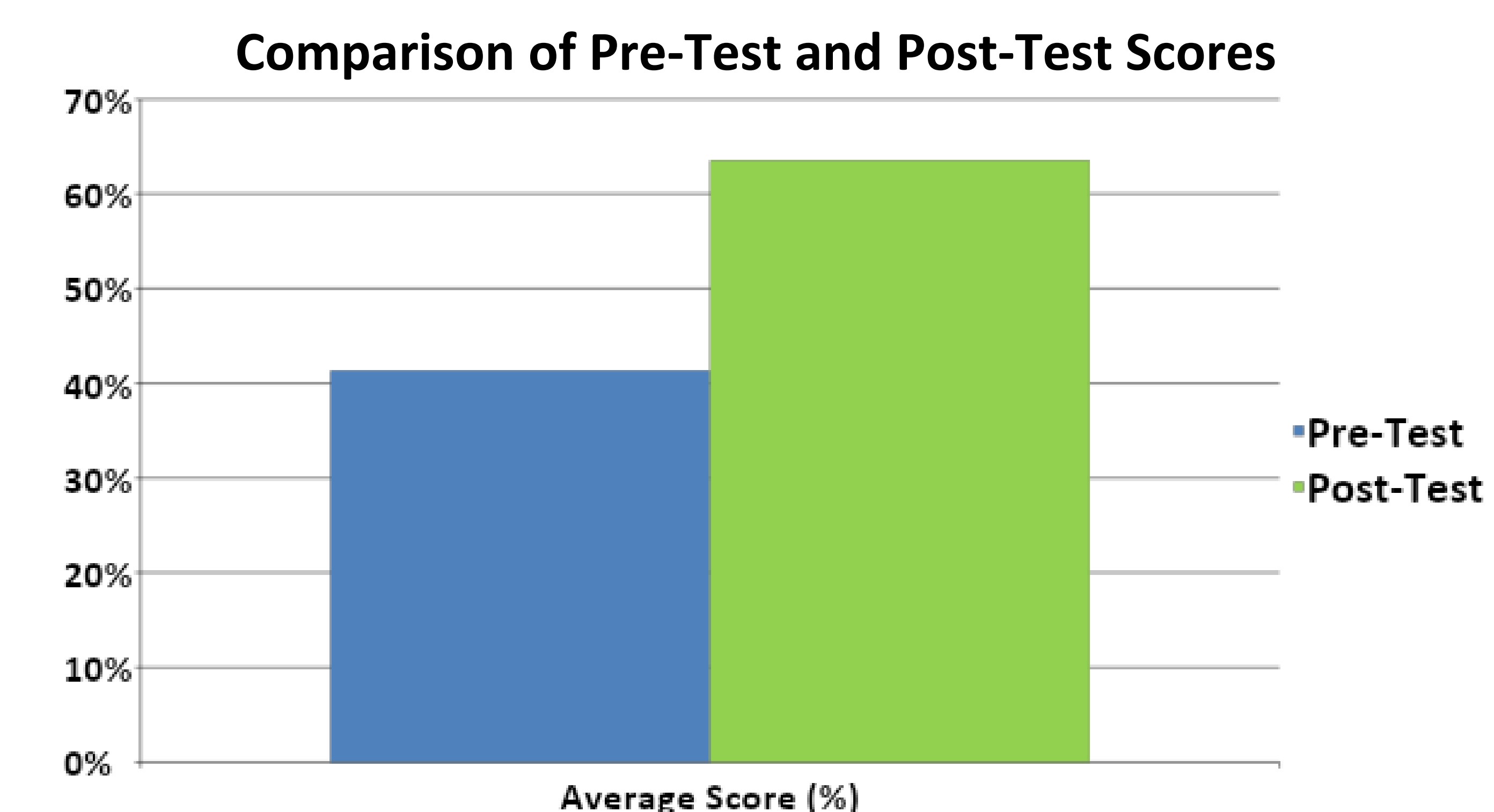
Lab Activity: Microbiology



Lab Activity: Molecular Diagnostics



RESULTS



Student Perception Survey Questions	% Strongly Agree or Agree (N=166)
The program provided a safe environment	99.2%
I know more lab techniques than I did before the summer immersion program	95.4%
I know more about diagnostic medicine than I did before the summer immersion program	96.3%
The program has stimulated my interest in learning more about diagnostic medicine	84.2%
Overall satisfaction with the summer immersion program	94.2%
The instructors were knowledgeable in the subject area that they led	96.28%
The program provided a variety of learning and skill building activities	95.55%

CONCLUSIONS

- The program enhanced student comprehension of the medical laboratory science concepts covered in the program as indicated by the pre- and post-test scores and the student perception survey.
- The program successfully ignited interest and exposed laboratory medicine and broader aspects of health care to future health care professionals.
- Most students know more about the laboratory science profession and the technical skills required to work in the lab than they did prior to attending the program.
- Overall, almost 95% of students were satisfied with the program.