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## OBJECTIVE

To develop effective approaches and identify limitations of teaching the musculoskeletal module online to first-year medical students during the covid-19 pandemic

## DESIGN

- A class of 185 first-year medical students participated in the musculoskeletal education module using remote teaching.
- Zoom was used for all small group problem-based learning, virtual anatomy dissection labs, and musculoskeletal physical exam sessions (see figure 1).
- Zoom, Panopto, and Poll Everywhere were utilized for formal lectures and clinical integration lab.
- Effectiveness of these sessions was determined by the final computer exam, anatomy identification exam (see figure 2), and musculoskeletal video physical exam scores (see figure 3). These results were reviewed and compared with scores from prior years.

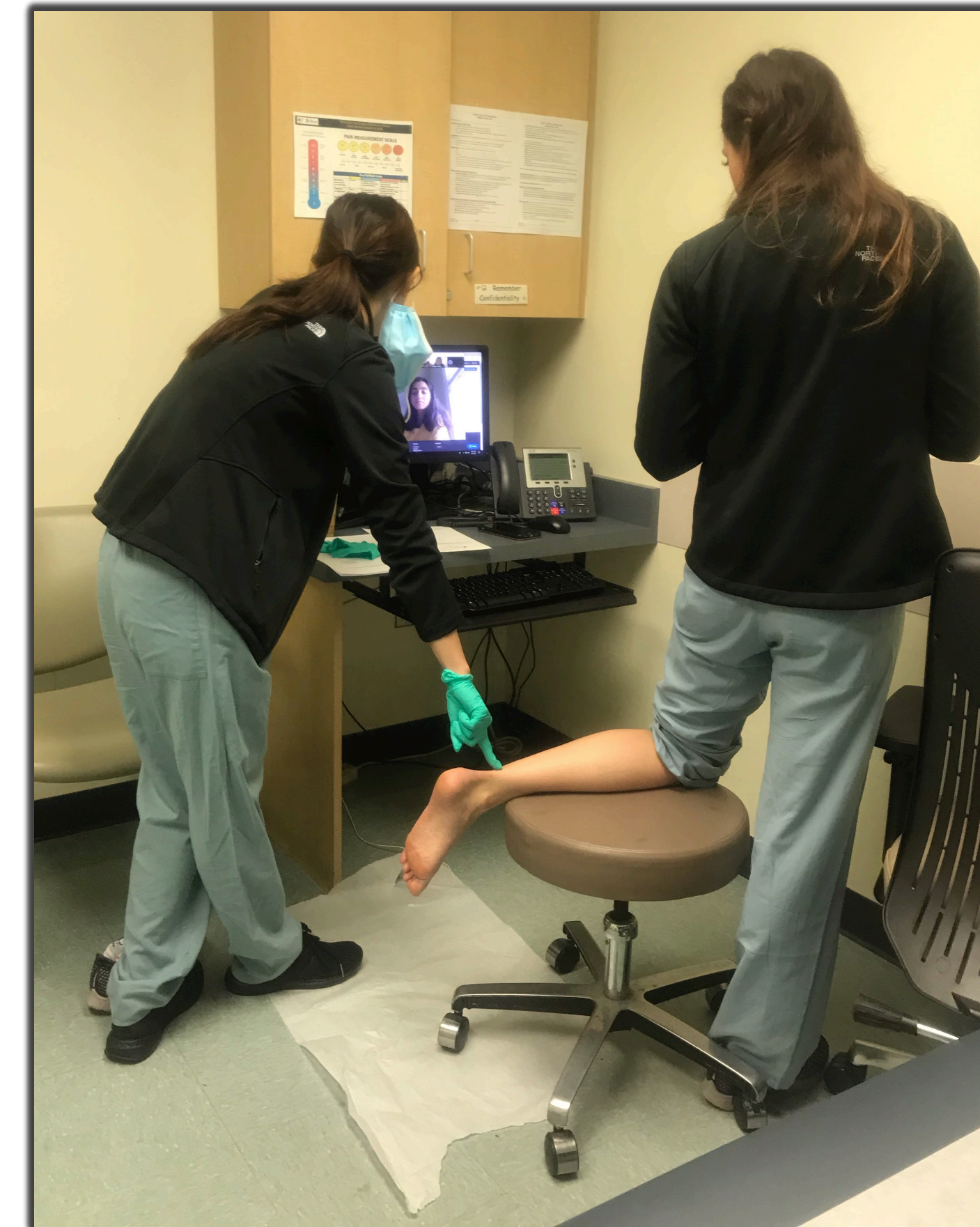


Figure 1. PM&R residents teaching surface anatomy via zoom.



Figure 3. Screenshot from the musculoskeletal video physical exam.

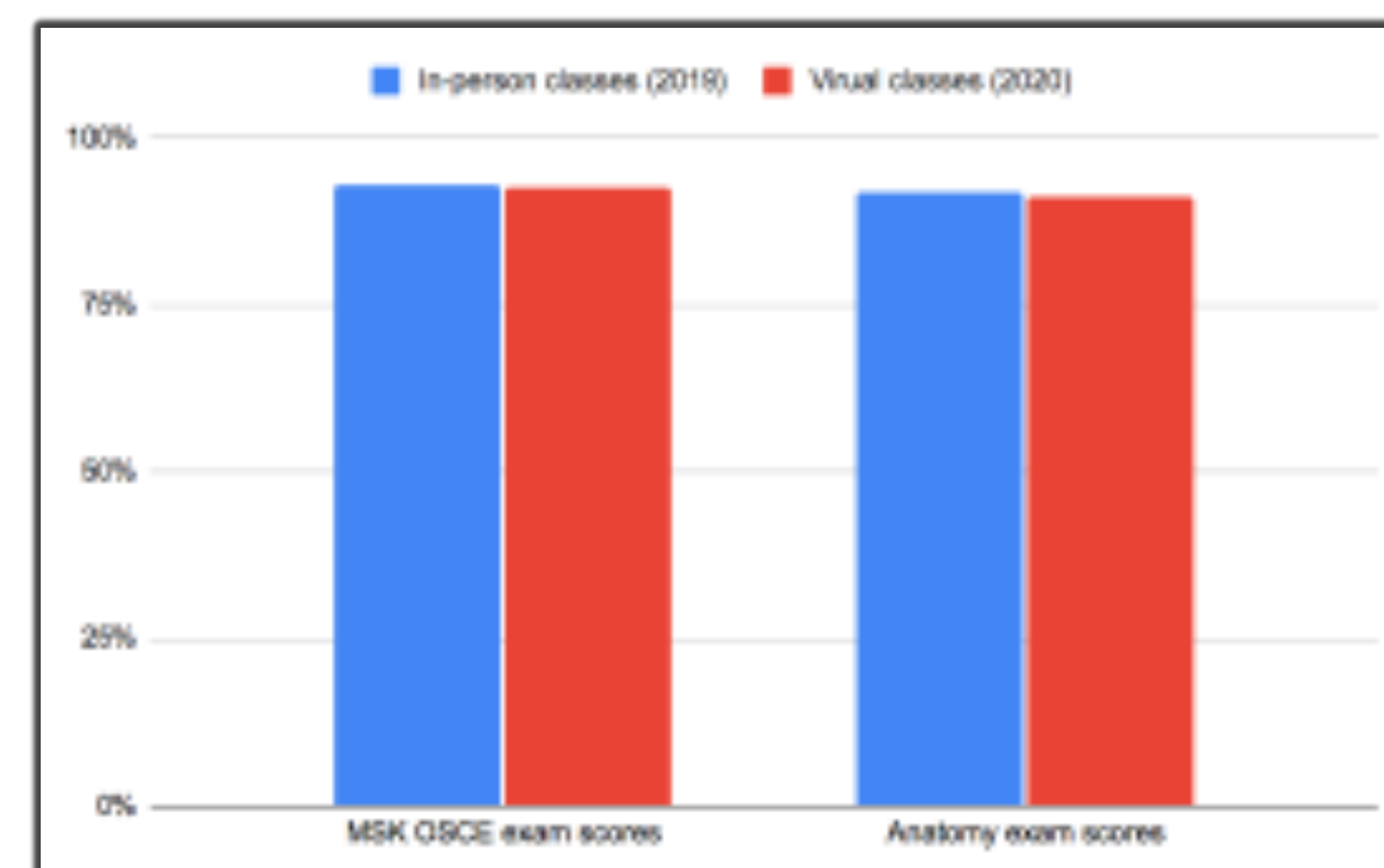


Figure 4. A comparison of anatomy identification and physical exam scores from in-person and virtual classes.



Figure 2. Screenshot from the anatomy identification exam.

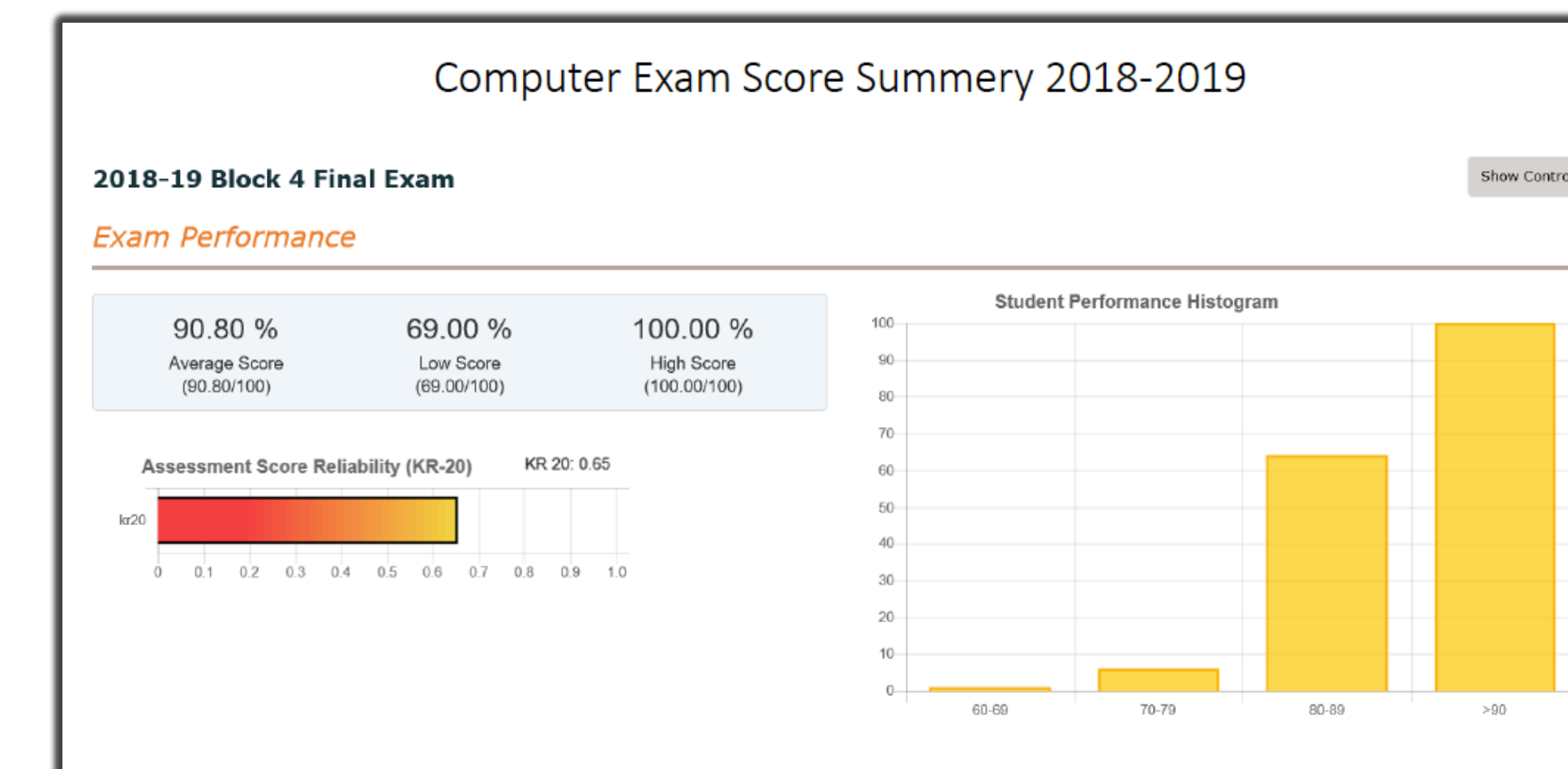


Figure 5. Final exam scores for in-person classes (2018-2019).

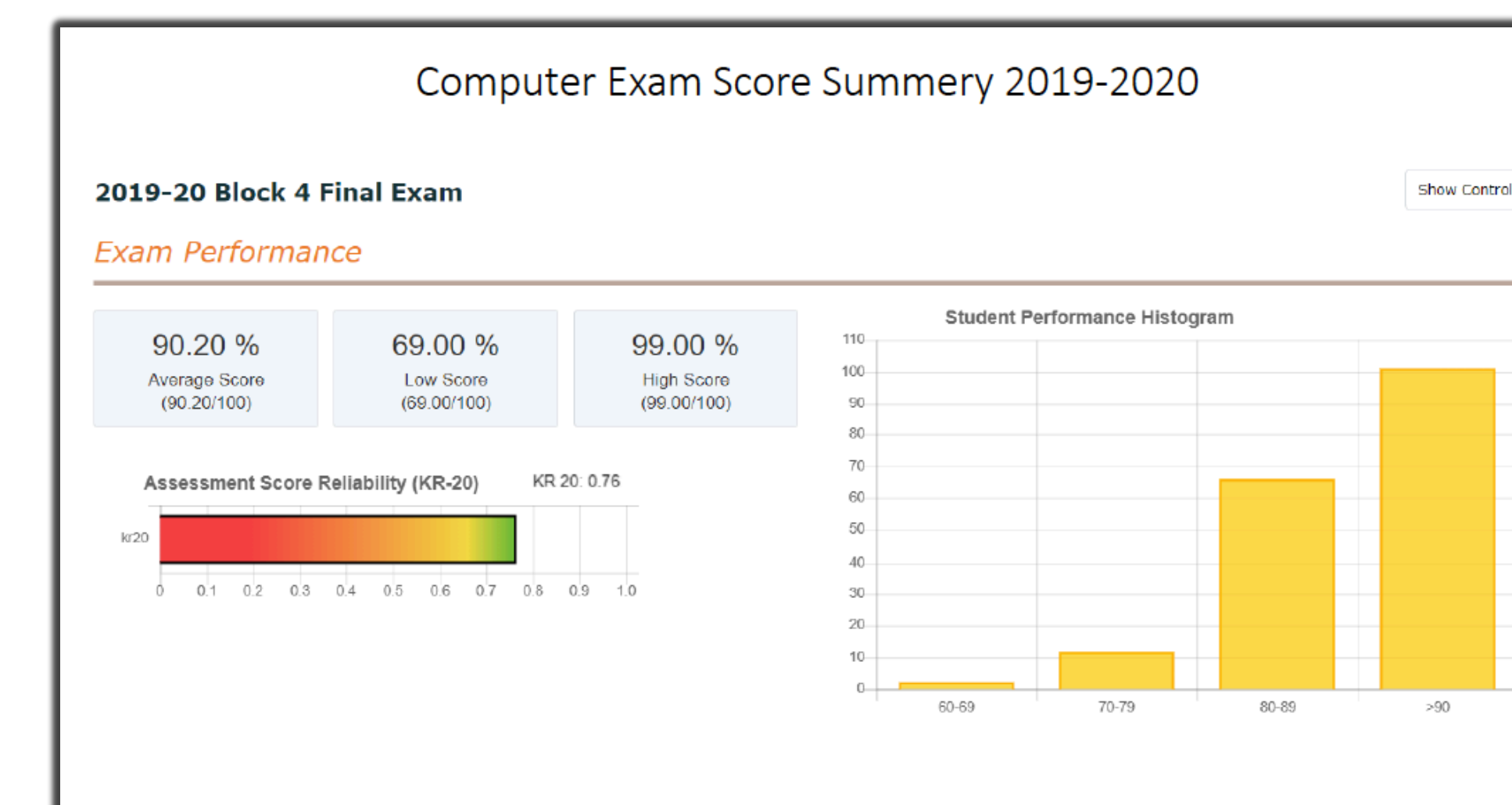


Figure 6. Final exam scores for online classes (2019-2020).

## RESULTS

Final exam scores (including the multiple-choice exam, anatomy exam, and video physical exam) were not significantly different than scores from prior years of in-person classes (see figures 4-6). Furthermore, students' course satisfaction was similar to previous years. Surveys showed most students welcomed learning musculoskeletal medicine through a virtual platform during the covid-19 pandemic. Students generally found online learning to be safe, easily accessible, convenient, and efficient with reduced time spent commuting to classes. Virtual learning is inherently dependent on Internet capability and can be burdened by technical difficulties; however, having a consistent course coordinator minimized these disruptions. Students expressed less confidence with their physical exam skills because they were unable to practice these clinical skills on each other or perform maneuvers on a test examiner.

## CONCLUSIONS

Remote learning during the covid-19 pandemic is valuable learning option to all medical students studying musculoskeletal medicine given its safety, convenience, and similar curriculum and exam scores to in-person classes. The online physical exam course is limited given inability to practice special maneuvers, use palpations skills, observe skills in-person, or appreciate variations in surface anatomy; however, first-year medical students will have ample opportunity to master and refine these physical exam skills during their clerkship years.