

Data Visualization as a Transformative Modality for Teaching Clinical Reasoning

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Rationale

- While clinical reasoning (CR) is the core competency in OT education, research has consistently shown that students and novice clinicians lack critical CR skills compared to expert clinicians (Robertson, 2016; Staal & Unsworth, 2004; Unsworth, 2001).
- Teaching CR in a classroom is problematic due to difficulty replicating the clients' unique circumstances (Wall, 2019).
- There is a need for innovative and more rigorous learning opportunities for students to acquire CR skills (Boyt Schell, 2013; Moruno-Miralles, 2020; Unsworth & Baker, 2016).

Purpose

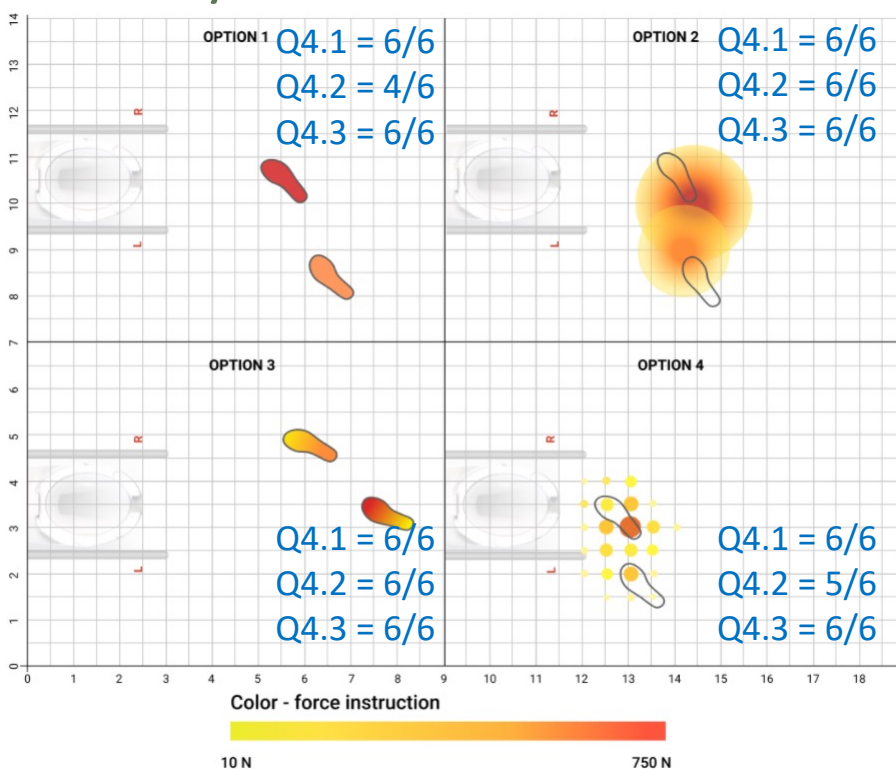
- Pilot study to evaluate the usability and utility of graphic representations of quantitative toilet transfer performance data from force sensors in the floor, grab bar, and toilet seat of GA Tech's SmartBathroom laboratory.
- Identify the most useful sensor data and the most effective ways to convey that data to enhance clinical reasoning of OT students.

Methods

Online survey with six occupational therapy practitioners and educators to evaluate the usability (comprehension of visualized data) and usefulness (perceived increase in students' ability to assess performance).

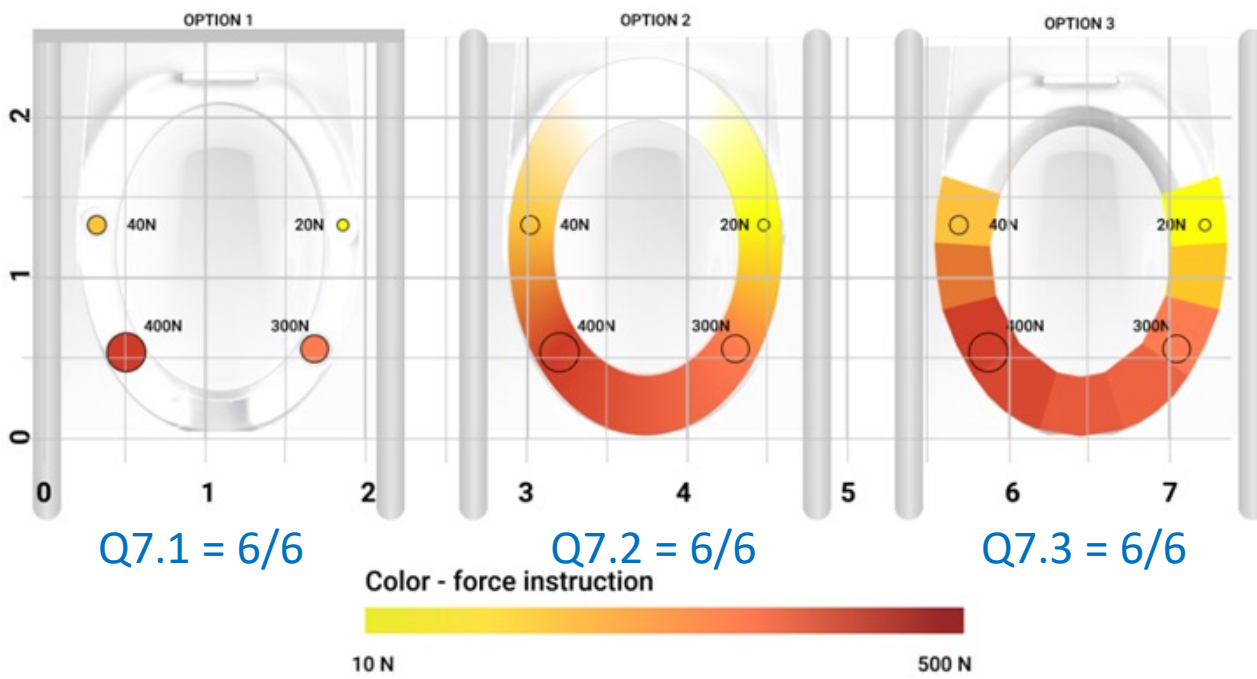
Results

Usability of SmartFloor Visualizations



- Weight Distribution
Q4.1 - which foot bears the most weight (i.e., exerts the most force)?
Q4.2 - which foot has a greater difference in force between heel and toe?
- Foot Location
Q4.3 - what are the x,y coordinates of the greatest amount of force exerted on the floor?

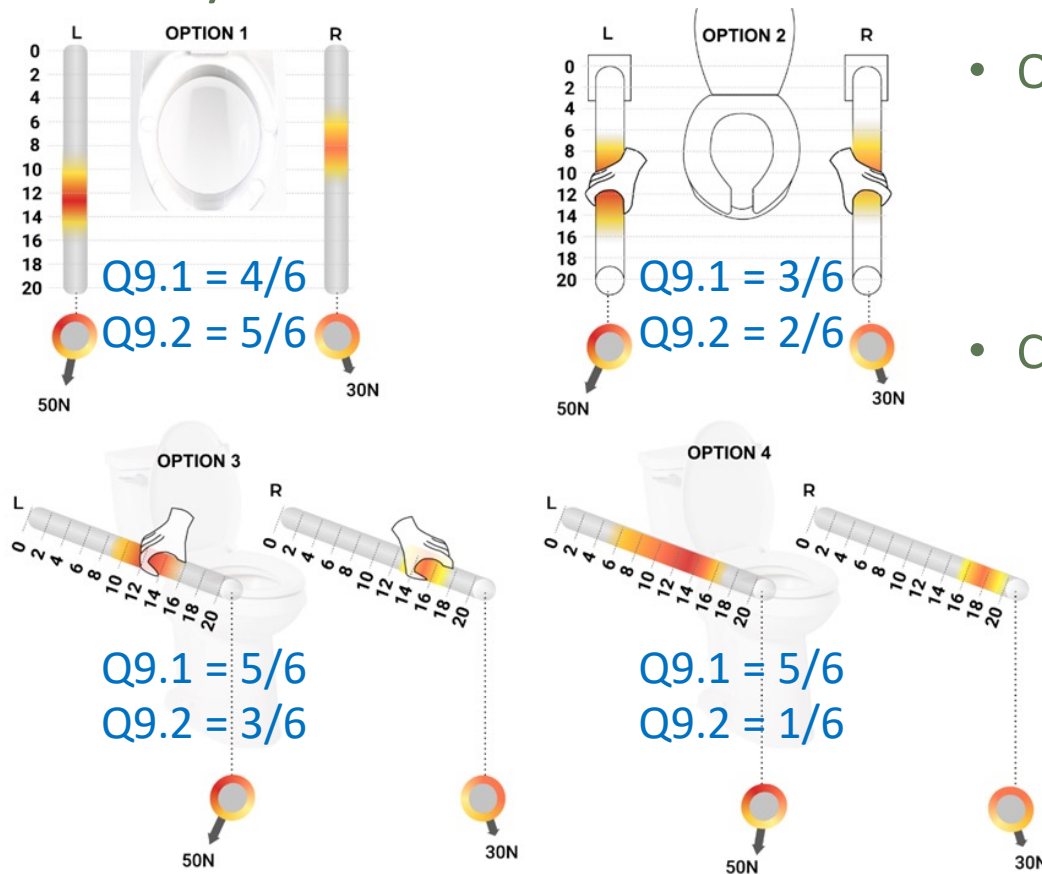
Usability of SmartSeat Visualizations



Weight Distribution/Balance

Q7. What are the (x, y) coordinates of the greatest amount of force exerted on the seat?

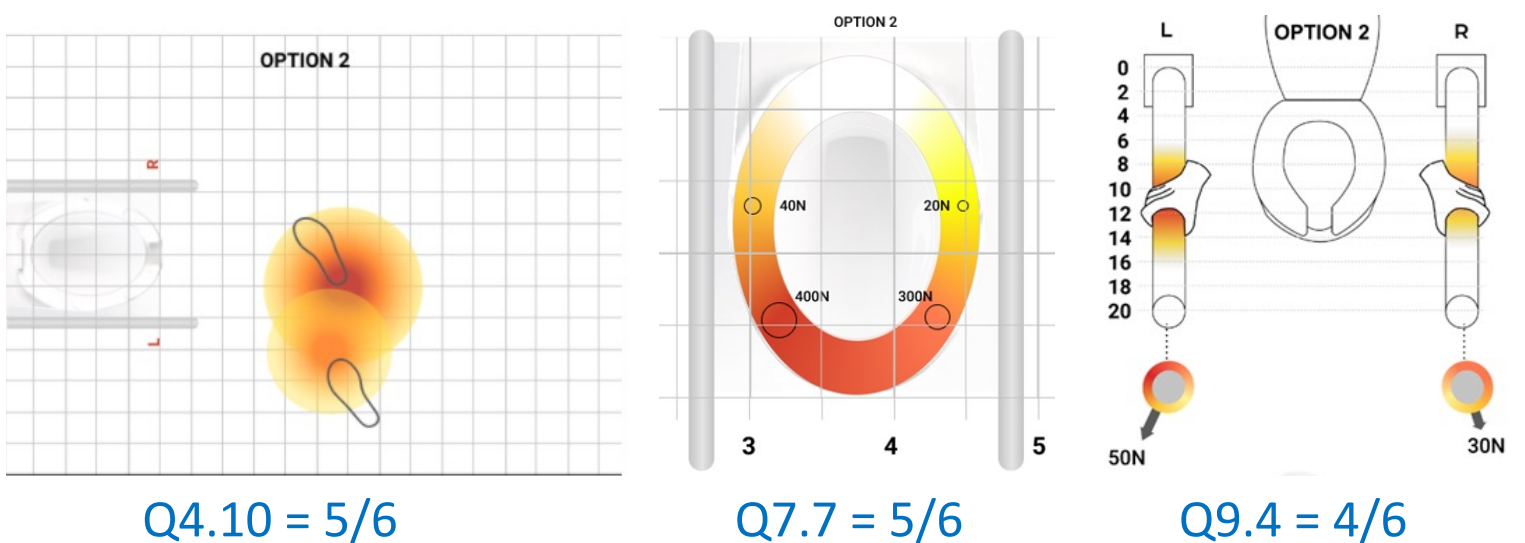
Usability of Grab Bar Visualizations



- Overhead/Side views
 - Q9.1 - location of maximum forces along the right grab bar
- Cross section
 - Q9.2 – location of max gripping force applied around the circumference

Usefulness of Visualization Options

Q 4.10, 7.7, 9.4 - Which of the visualization options presented below do you think would be the most useful in training OT students to assess transfer performance?



Conclusion

- All respondents were able to correctly identify the weight distribution on all visualizations of floor and toilet
- The majority were only able to correctly identify hand placement on one of the grab bar options.
- Only 1 visualization of each fixture was considered useful by the majority of respondents for increasing CR skills.

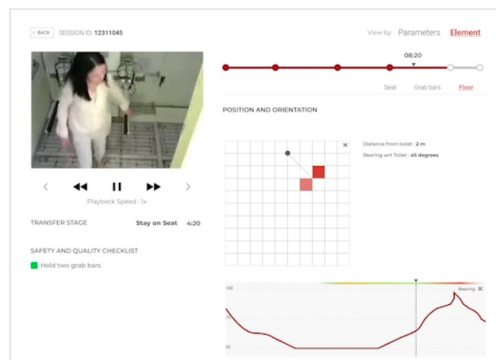
Future Directions: Real Time Performance Dashboard

A data visualization tool to provide OT students with the practical experience, repetitive tasks and pattern recognition necessary to enhance their CR skills (Carrier, et al., 2010; Higgs, et al, 2008).

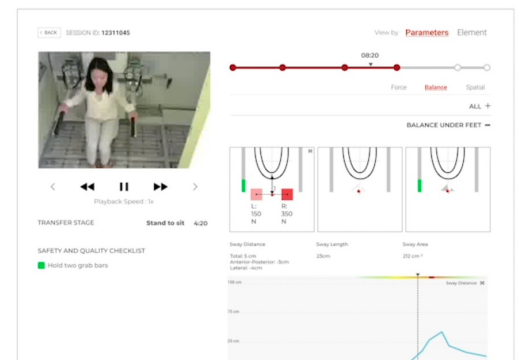
Stage1 Approach Toilet



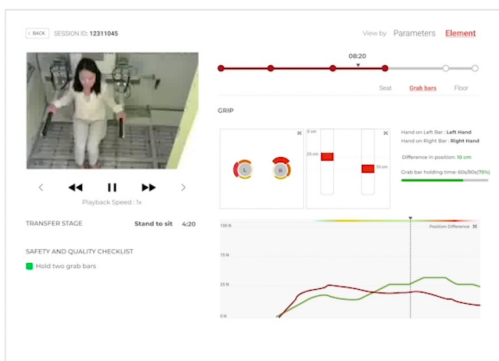
Stage2: Orient towards the toilet



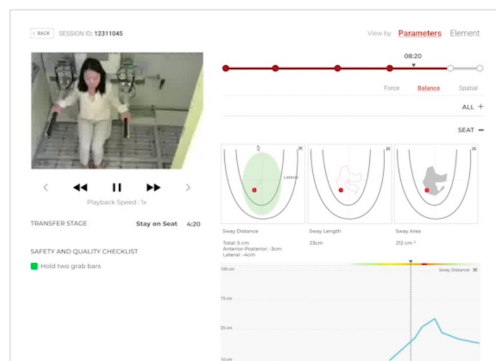
Stage3: Stand to sit(Parameter view)



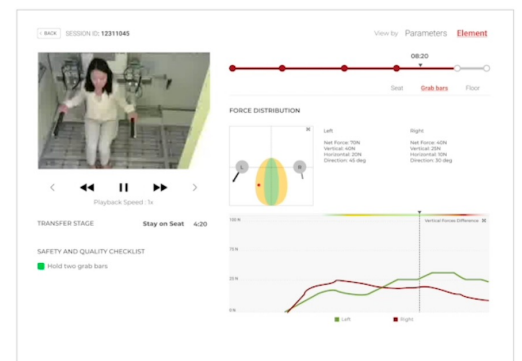
Stage3: Stand to sit(Element view)



Stage4: Stay on seat(Parameter view)



Stage4: Stay on seat(Element view)



Contribution

Integrating real-time quantitative performance data with video-based observational data from simulated toilet and bathing transfers has the potential to improve and accelerate clinical reasoning skills of OT students.

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