Background

The NASA Task Load Index (NASA-TLX) subjective workload assessment is typically used immediately following a participant’s performance in an experimental task to assess the workload experienced (Hart & Staveland, 1988). Due to budget, time, or safety constraints some tasks necessitate assessment of workload before the task is actually performed, based solely on verbal or pictorial descriptions of the tasks. This study compares the workload assessments of participants who performed two minimally invasive surgical training tasks to participants who only saw descriptions of the two tasks.

Tasks

Cannulation:
“Imagine (or perform) the task of threading a pipe cleaner through a rubber tube as quickly as you can. The pipe cleaner is 5 inches long and the tube is ¼ inch in diameter. Performance is judged on how many times you can thread the pipe cleaner through the tube in a trial lasting a couple of minutes.”

Cobra Rope Task:
“Imagine (or perform) the task of holding a string that has white and colored sections. Then pass the string from grasper to grasper along its entire length, only touching the white sections of the string. The string must not touch the mat. Performance is measured by how far down the string you can move in a couple of minutes.”

Method

Prospective Condition:
- Ninety-six undergraduates from an introductory psychology course
- Printouts containing pictures and written descriptions of minimally invasive surgical training tasks
- Tasks were randomized
- Participants imagined they were performing the tasks and then assessed their imagined workload using NASA-TLX

Retrospective Condition:
- Sixty-four undergraduates from an introductory psychology course
- Participants performed tasks using a Stryker 888 Endoscope, a Stryker Quantum 300 light source, a Stryker 888 zero-degree 10mm camera and two Maryland dissectors
- Trials lasted 90 seconds and were presented in random order
- After completing the trial, participants used the NASA-TLX to assess their perceived workload

Results

A mixed-factor (task x condition) ANOVA showed interactions for the following:

- No interactions for temporal demand or physical demand, and no main effect were found.

Discussion

- Participants underestimated workload for the tube task and overestimated for the rope task.
- Interactions between task and condition were found for mental demand, effort and frustration.
- Physical facets of workload appeared to be more accurately assessed than cognitive facets.

Implications

- Prospective measures of workload may be useful for predicting workload when key task components involve temporal and physical demand.
- Anticipated workload measures may help us to better understand how people evaluate new tasks, devise strategies, compare consumer products and become motivated to learn new skills.
- Prospective measures of workload may help us understand how expertise evolves and how to define and predict expertise in a particular context by studying differences in anticipated workload between novices and experts.

References