Training Retention
(Effects of Long-Duration Spaceflight on Training Retention: ISS Investigation)

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Science Background

- To date, we have not been able to collect data inflight to document the effectiveness of pre-flight crew training. Crewmembers have been largely successful in their performance, but that success could have primarily been the result of excellent innate capabilities, extreme motivation, and "as needed" support from mission control.

- Zero-G is only one aspect of the difference that cannot be properly simulated in Earth-based training, but it is a feature of space operations that may have significant impact on the effectiveness of Earth-based training, and on the ability of crewmembers to retain their knowledge and to acquire new skills in space.

- There is little to no data available on how people learn in space or how retention and retrieval of Earth-based training are affected by being in space over a long period of time.

- To develop the operational understanding of the relevancy of Earth-based research results for the design of crew training, we must study crewmembers' experience, and must utilize ISS missions to study the retention, transfer, and generalizability of skills in long-duration space operations.

Objectives

- Aim 1
  - Test the retention and transfer of specific technical content learned pre-launch to assess the need for (and possible schedule of) onboard refresher and just-in-time training.
- Aim 2
  - Compare the processes of knowledge/skill retention and transfer on orbit with that of participants on Earth and to the ISS crewmembers.
- Aim 3
  - Collect naturalistic data on training-related events.

Experiment Design Overview

Preflight BDC	Inflight	Postflight BDC
L-360 to Launch: Science Overview and Pre-Test (60 min)	Retention Quizzes: FD 90 and FD 150 (40 min each) (+/-14 days)	R+30: Retention Quiz and Debrief Discussion (+/-7 days)
L-360 to Launch: Training Sessions (2 sessions 60 min each)		
L-360 to Launch: Refresher Session* (60 min)		

* The refresher training is scheduled if the first training sessions begin more than one year prior to launch and/or the last session is scheduled more than 3 months prior to launch.

Test/Session Descriptions

Each in-flight session will consist of:

1. The crewmember starting up the HRF PC (5 min)

2. The crewmember completing a Training Retention Session. (30 min)

    – The retention quizzes consist of performing the same tasks as during training.

    – The transfer quizzes consist of performing a variation on the tasks used in training

3. The crewmember shutting down the HRF PC (5 min)

Risks and Discomforts

Test	Risks/Discomforts	Mitigation
Training Retention	None	None

Testing Constraints

Test	Constraints
Training Retention Quiz	Training Retention BDC sessions have a +/- two week scheduling window.

Experiment Training Schedule

Session Title	Session Type	Timeframe	Duration	Location	Required for Operators	Required for Subjects
N/A						

No training required – sessions
are completed as BDC

Experiment Benefits

- ## Earth-based Benefit:
    - Data obtained in this study will shed light on the degree to which results from Earth-based studies conducted with university students as test subjects accurately predict the performance of astronauts in space operations in particular, and of mature, skilled, and experienced adults in professional settings in general.

- ## Space Exploration Benefit:
    - Data obtained from this study will aid in the design of pre-flight training and proper intervals for onboard refresher training, as well as suggest domains best served by Just-In-Time (JIT) training.

Experiment Summary

Preflight BDC	Inflight	Postflight BDC
L-360 to Launch: Science Overview and Pre-Test (60 min)	Retention Quizzes on FD90 (+/-14 days) and FD150 (+/- 14 days), (40 min each)	R+30: Retention Quiz and Postflight Debrief Discussion (60 min)
L-360 to Launch: 2 Training Sessions scheduled between L-360 to Launch (60 min each)	Data Downlink (TBD)	
L-360 to Launch: Refresher Training Session (60 min)		
Total Time: 240 min (4 hrs)	Total Time: 80 min (1.33 hrs)	Total Time: 60 min (1.0 hrs)