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HYPERMEDIA AND INTELLIGENT TUTORING APPLICATIONS IN A MISSION OPERATIONS ENVIRONMENT

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Overview

The Automation Technology Section at Goddard Space Flight Center is investigating hypermedia, hypertext, and Intelligent Tutoring System (ITS) applications to support all phases of mission operations. Current NASA/Goddard research is addressing:

- Research into the application of hypermedia and ITS technology to improve system performance and safety in supervisory control - with an emphasis on modeling operator's intentions in the form of goals, plans, tasks, and actions.
- Review of hypermedia and ITS technology as may be applied to the tutoring of command and control languages.
- Development of a hypertext based ITS to train Flight Operations Teams (FOT) the Systems Test and Operations Language (STOL).

This presentation highlights specific hypermedia and ITS application areas, including: computer aided instruction of flight operation teams (STOL ITS) and control center software development tools (CHIMES and STOL Certification Tool)

STOL ITS

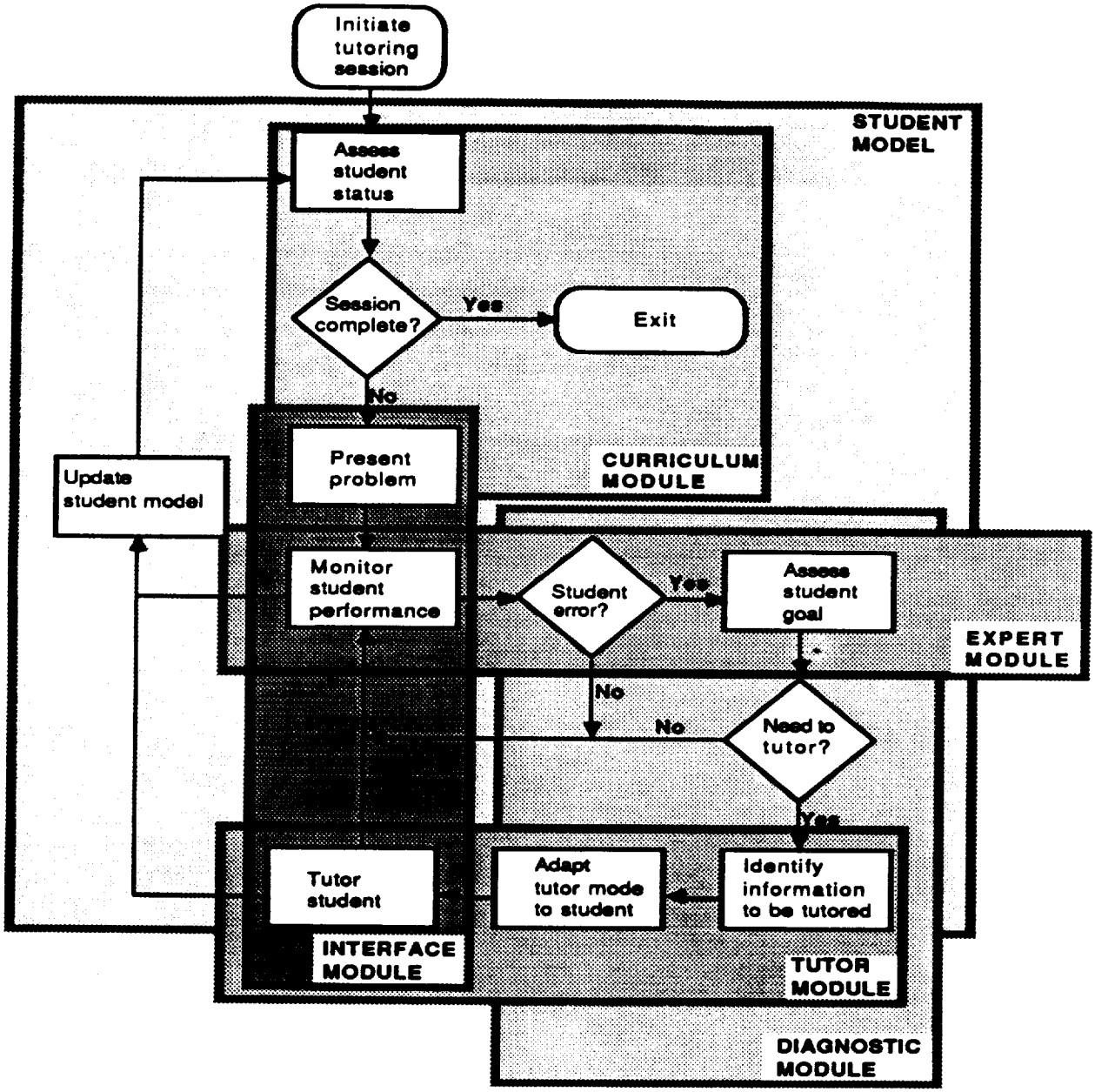
The STOL Intelligent Tutoring System (ITS) has the following design objectives:

- STOL ITS will be designed to assist NASA control center personnel in learning Systems Test and Operations Language (STOL).
- The STOL ITS will be designed to provide the Gamma Ray Observatory (GRO) Flight Operations Team (FOT) with introductory and refresher training/tutoring on STOL and its applications to the GRO/FOT.
- Develop a user interface, employing aspects of hypermedia, for an ITS to assist NASA control center personnel in learning Systems Test and Operations Language (STOL).
- Modules may serve as an ITS for other control languages such as the User Interface Language (UIL).

ITS/Hypermedia Functions

FUNCTION	FOCUS OF THIS PHASE	LEVEL OF IMPLEMENTATION Simple	Complex
Initiating the tutoring session		●	
Assessing the student's status			●
Presenting the problem	●		●
Monitoring the student's performance		●	
Assessing the student's goal		●	
Identify the information to be tutored	●		●
Adapting tutor mode to student	●		●
Tutoring the student	●		●
Updating the student model		●	

User Interface is a Central Issue in the STOL ITS Development



STOL ITS Interface Issues

Emphasize the user interface:

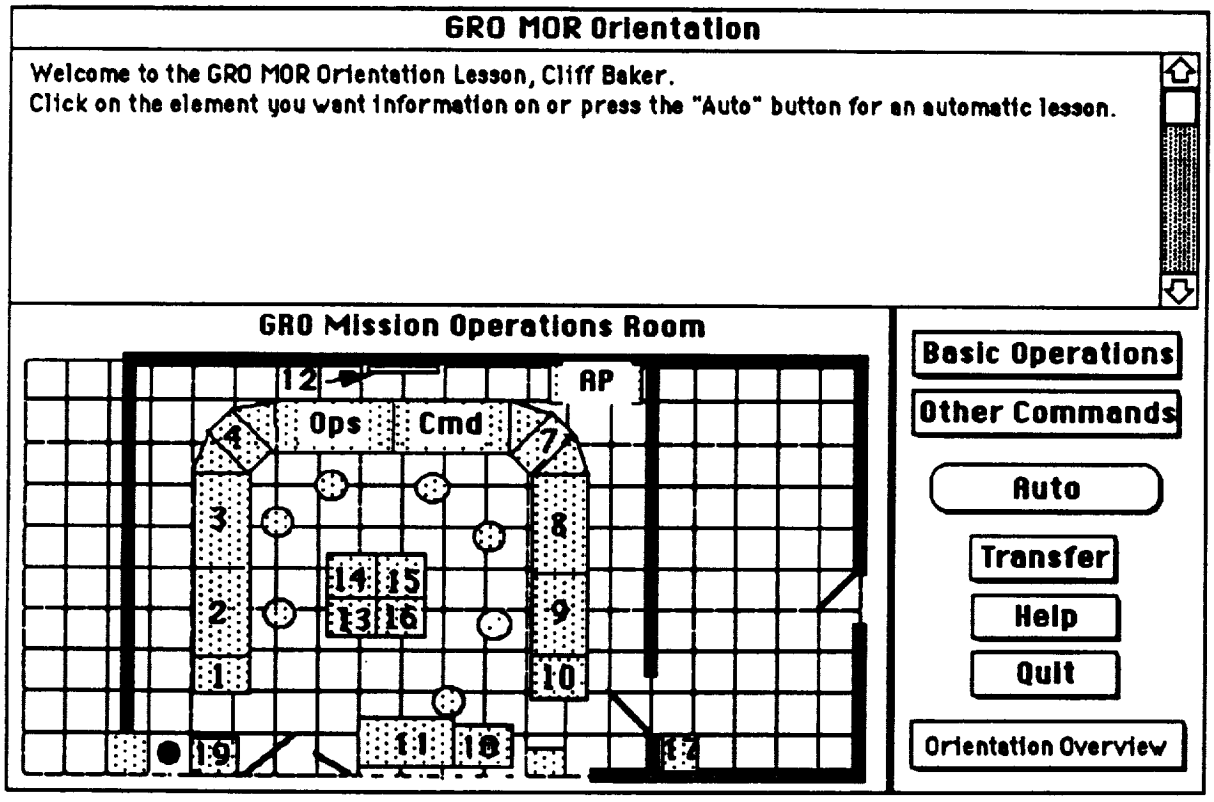
- ITS development matured to the point of becoming user-centered
- complex, relational information to be presented
- use the user interface prototype to gather user data
- use the prototype to evaluate different tutoring strategies
- use the prototype in the knowledge acquisition phase

The STOL ITS uses a hypertext interface, currently expanding towards a hypermedia environment

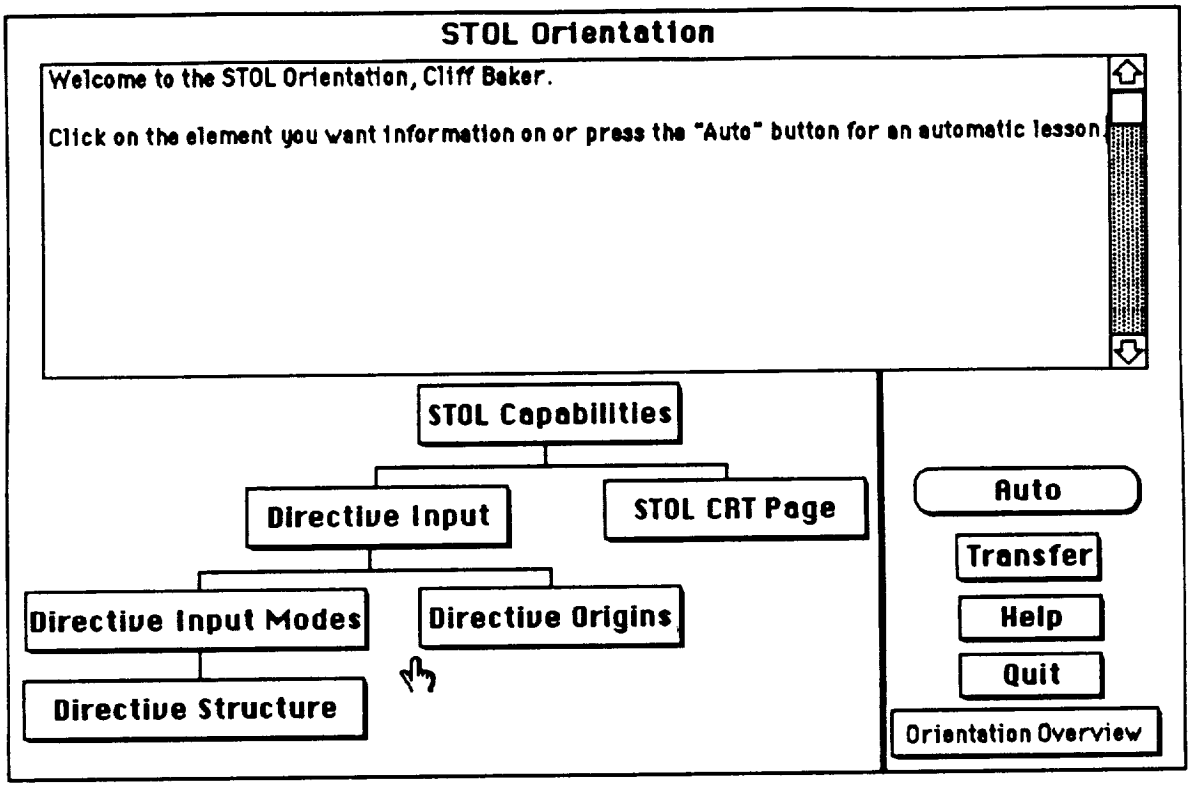
STOL User Interface

The STOL ITS user interface is:

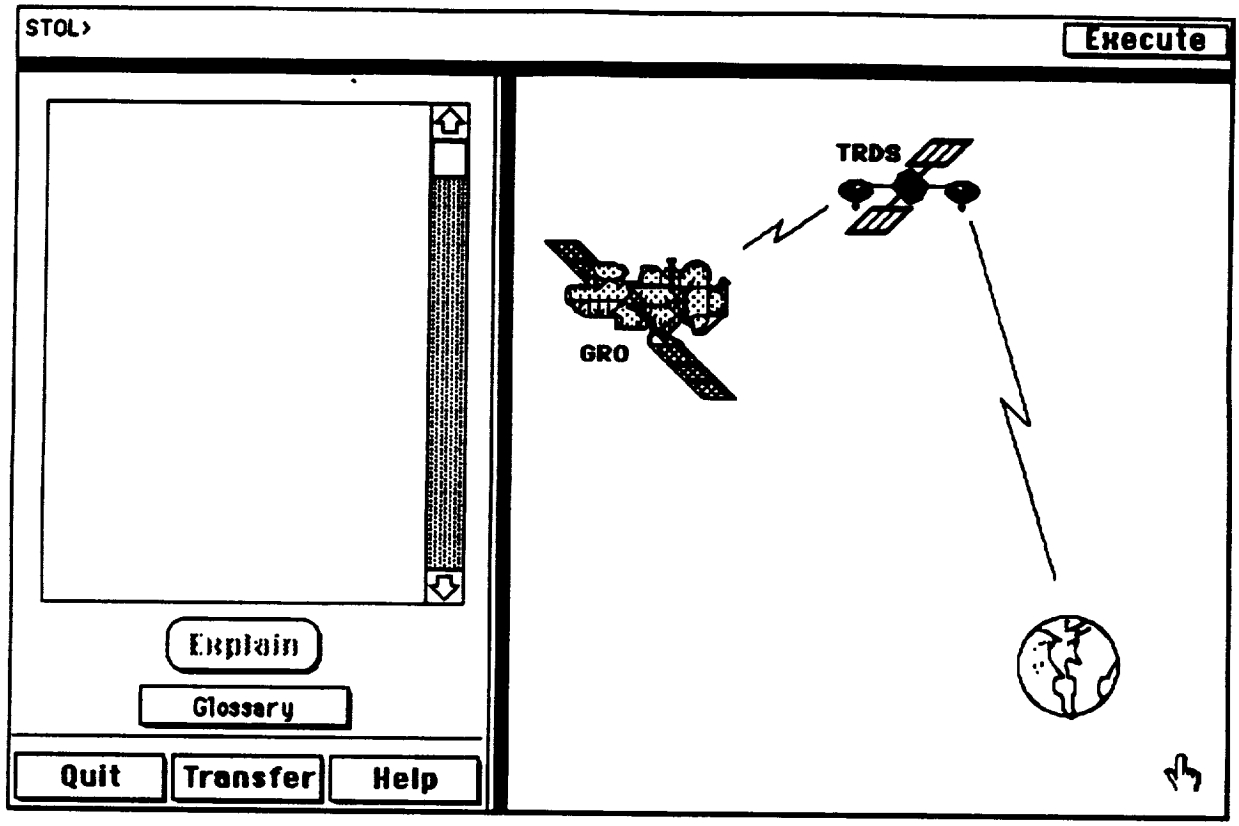
- Graphic
- Relational
- Employs animation
- Hypertext presentations
- Tending towards hypermedia



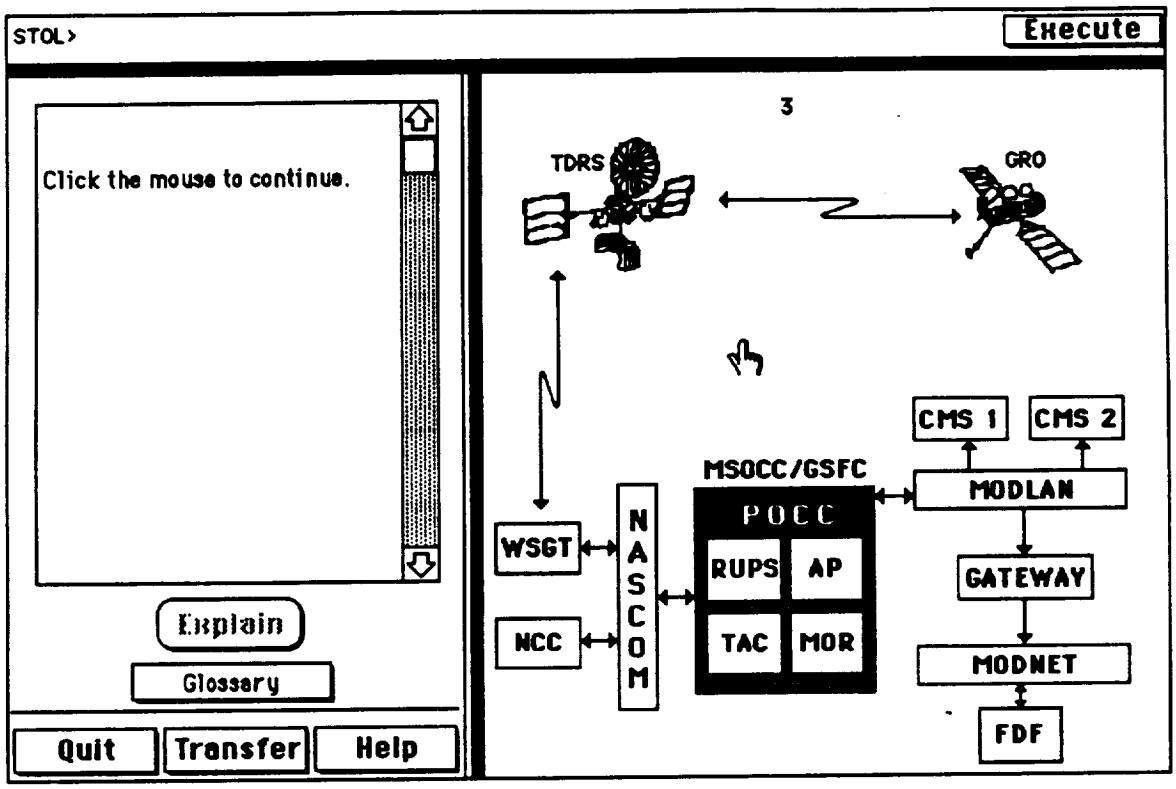
STOL ITS Orientation



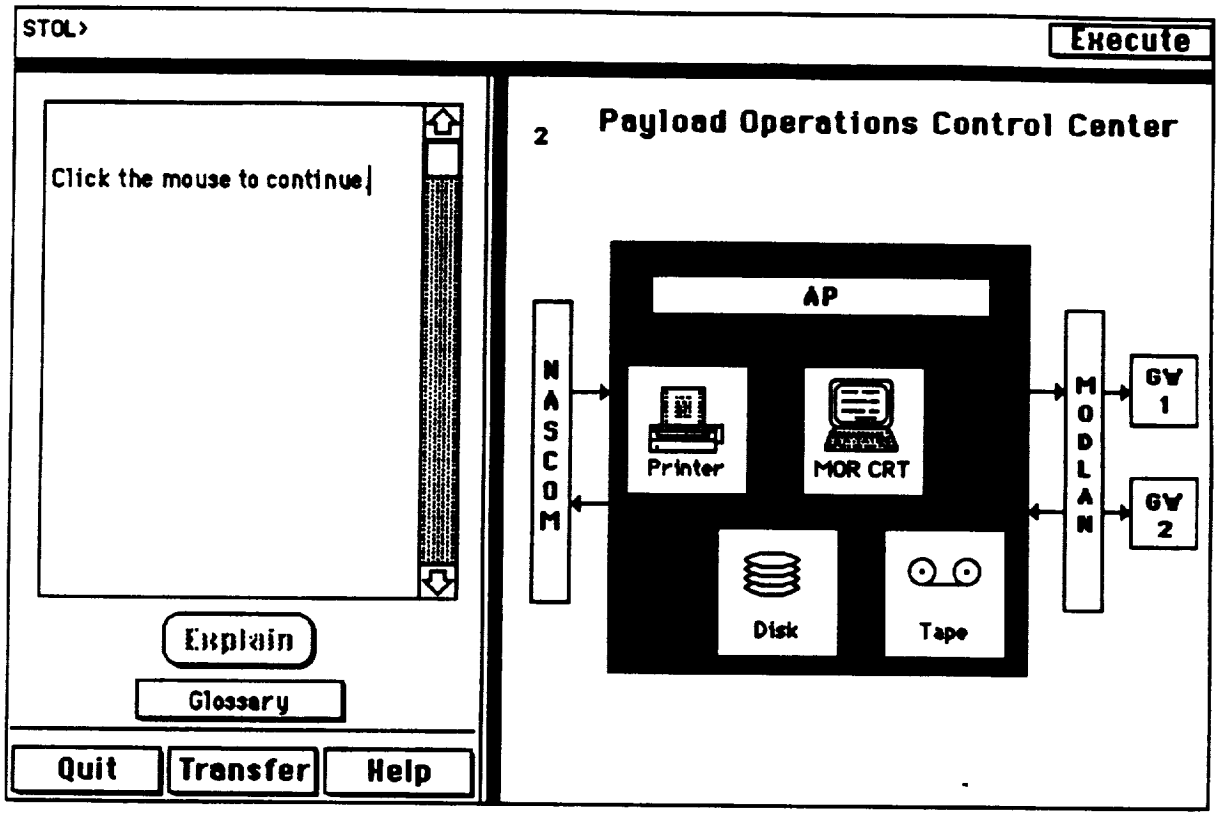
STOL Problem Presentation



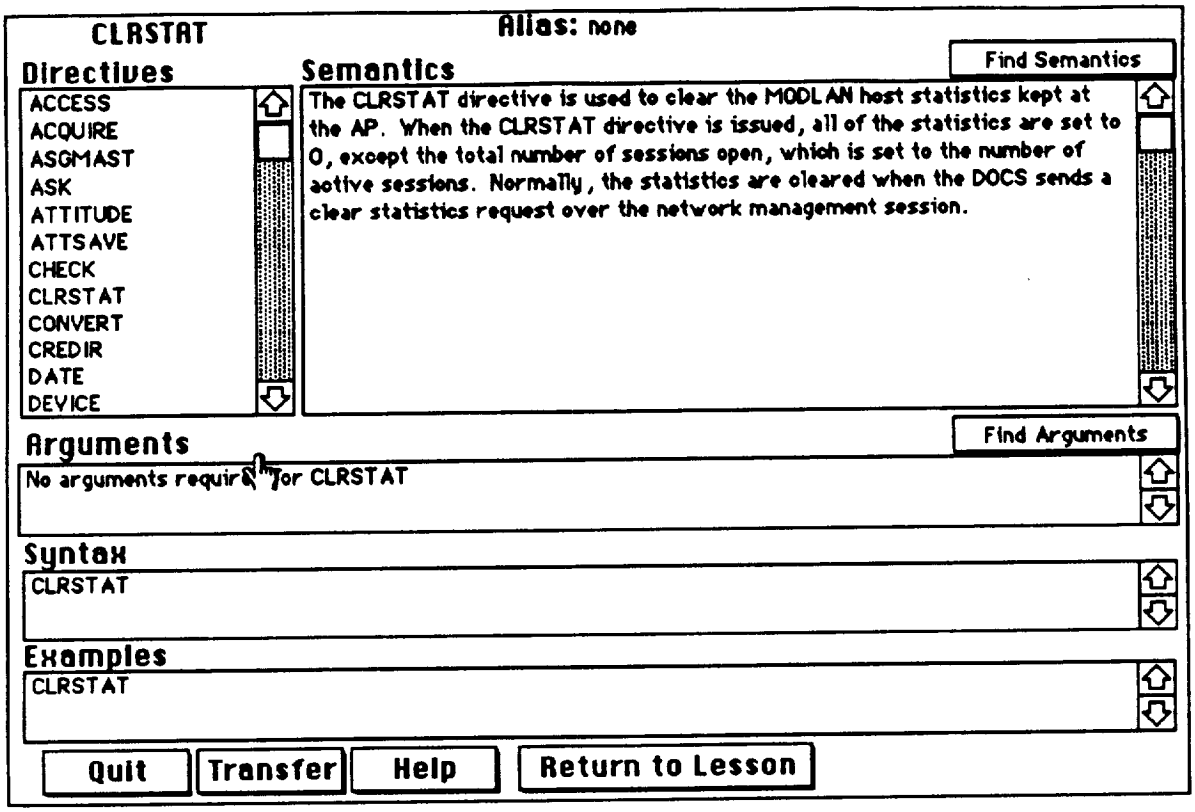
Animated Feedback Provided



Animated Feedback (continued)



Hypertext Glossary



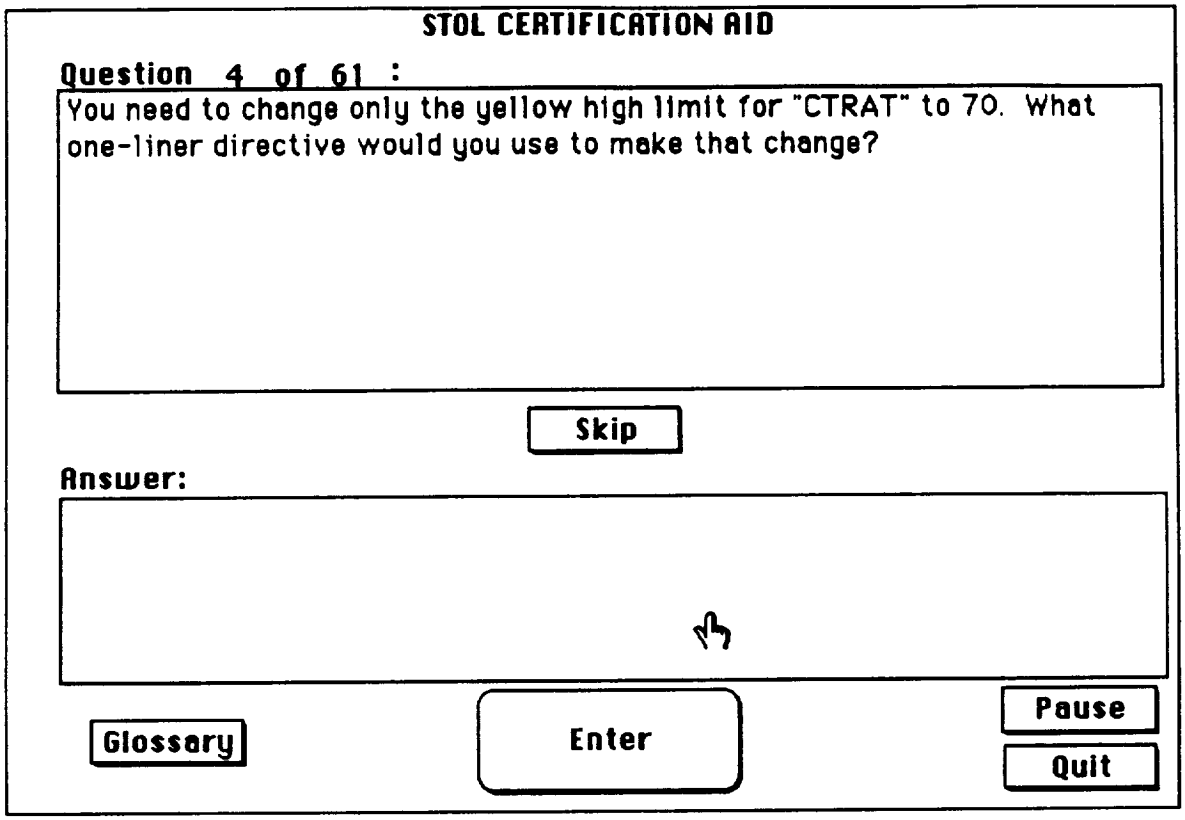
STOL Certification Tool

The STOL Certification Tool was developed to:

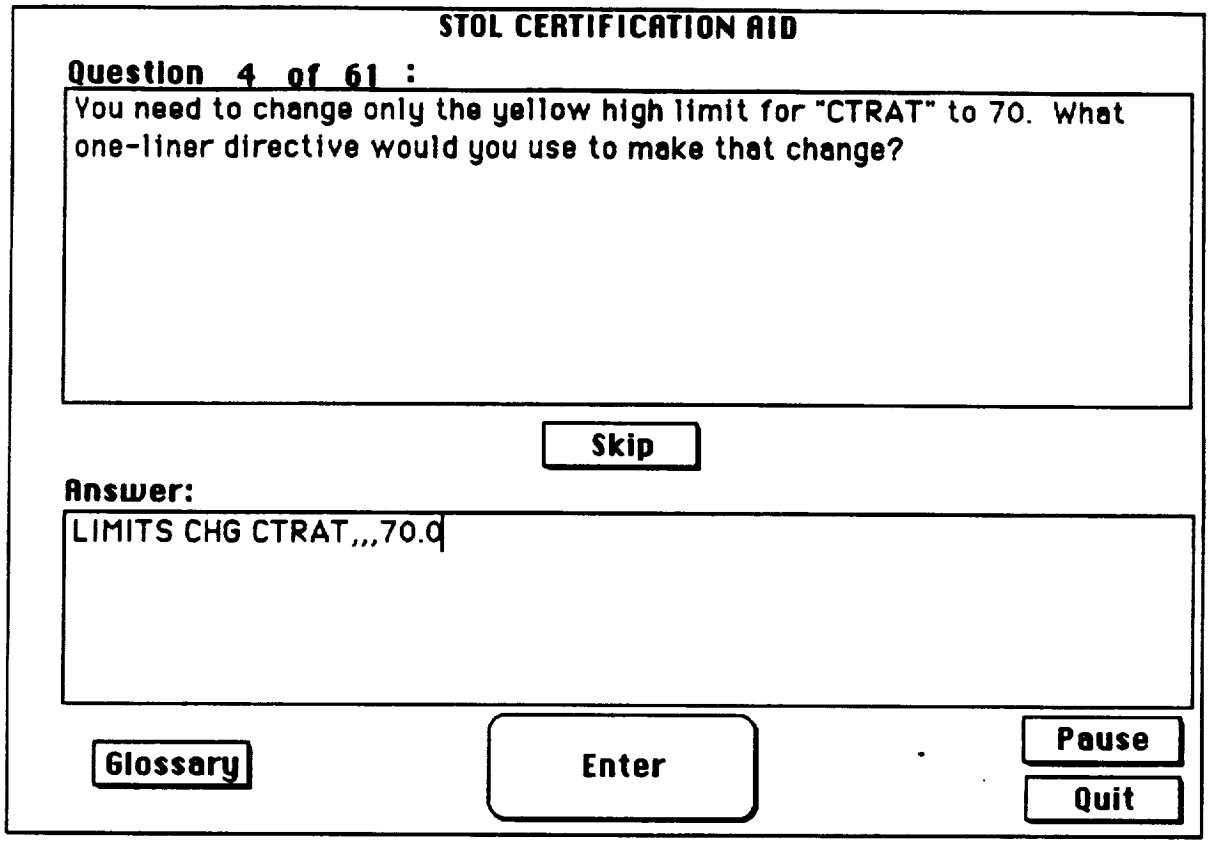
- collect error data on STOL users (commands, aliases, arguments, syntax)
- provide a basis for developing and validating STOL ITS student models
- provide a tool for certification of STOL users after and during training (including STOL ITS training)
- develop algorithms/rules for student assessments

The certification tool has a simple interface and architecture. . .

Certification Tool Poses a Problem. . .

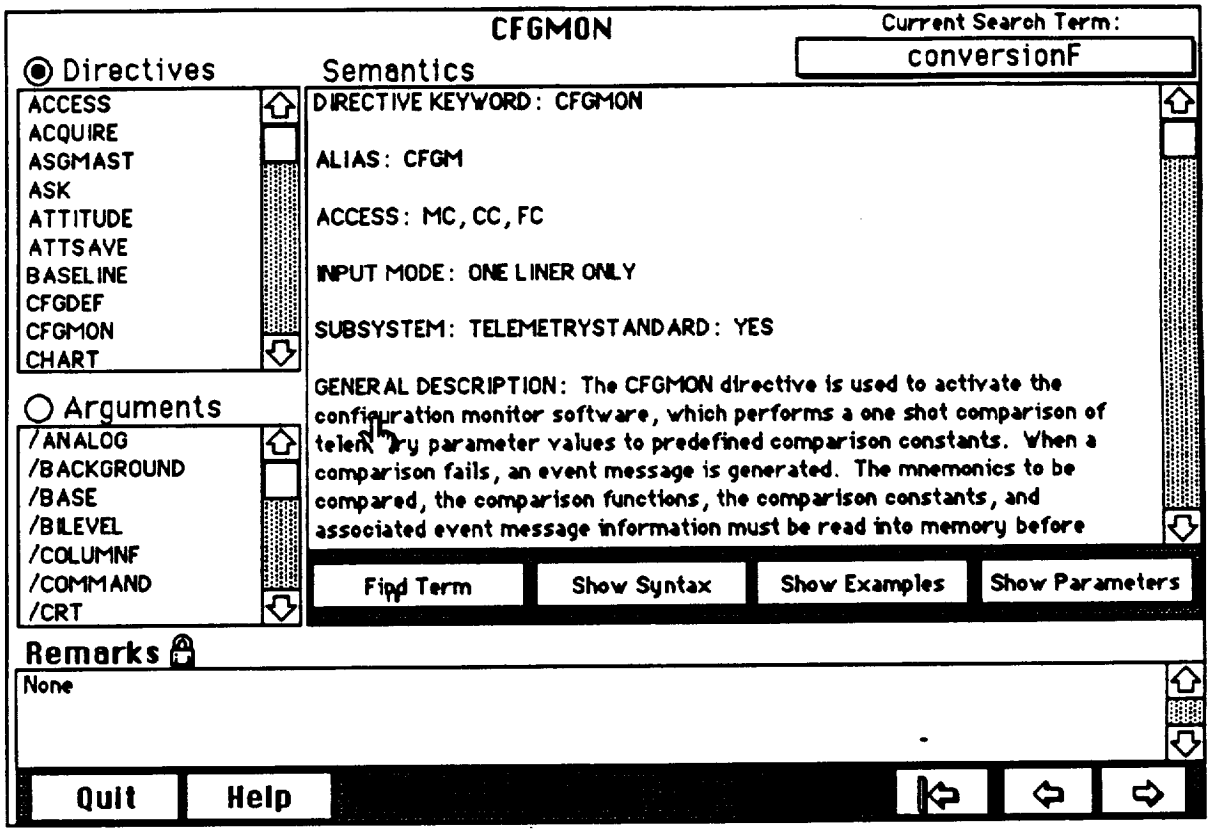


And the Student Responds. . .



After which the tool determines whether the response is correct, logs the data, and poses a subsequent problem.

The Student May Also Access a Detailed STOL Glossary



Computer-Human Interaction Models (CHIMES)

CHIMES is a prototype expert system under development which evaluates/analyzes user-computer interface designs.

CHIMES:

- accepts interface descriptions (tasks, operations)
- accepts interface designs
- initiates interface design evaluations
- summarizes interface design deficiencies
- provides recommendations for modifying/improving interfaces

CHIMES is directed at detailed interface design evaluation, addressing concerns such as:

- screen density
- visual demand
- readability
- target identification
- object manipulation