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Programmed Instruction and Interteaching: Applications to Java Instruction

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- **Learning objective**

- Write a Java applet to display a text string as a JLabel object in a browser window.
 - Understand a general rule for applying each item of code, and understand the interrelationships among the items.

Applicable Events

- **Programmed Instruction Tutoring System**
 - Master Java symbols and meanings
 - Write a program with no errors
- **Lecture**
 - Involved running the program on the Web
 - Repeat the material within an interpersonal interaction with the teacher
- **Interteaching Session**
 - Collaboration between classmates
 - Classmates divided into pairs

Performance Assessments

- **Assessment Measurements:**
 - **Software Self-Efficacy (SSE)**
 - 22 Items evaluated
 - **Rule-Governed Problem Solving**
 - 14 Items evaluated
 - **Concept Formation**
 - Classification/Functionality Determination
 - 4 Pairs of key terms evaluated
- **Four Occasions of Assessment:**
 - Pre-Tutor
 - Post-Tutor
 - Post-Lecture
 - Post-Interteaching

Procedure

IS 413: Graphical User Interface Systems Using Java	Fall 2005 $n = 12$ IS Undergraduates (3 Females, 9 Males) Age Range: 21-28; Age Median: 23 11 Without Prior Java Experience; Prior Programming Classes Median: 4
	Sequence of Events
75-min Classes	
Class 1: 8/31	1.Pre-Tutor Questionnaires
Homework	1.Tutor 2.Post-Tutor Questionnaires • Submit to Blackboard
Class 2: 9/7	1.Lecture • Run the Program
Homework	1.Post-Lecture Questionnaires • Submit to Blackboard 2.Access Interteaching Report from Blackboard
Class 3: 9/12	1.Interteaching Session: 45 minutes 2.Post-Interteaching Questionnaires

Program and Consequence

1. `import javax.swing.JApplet;`
2. `import javax.swing.JLabel;`
3. `public class MyProgram extends JApplet {`
4. `JLabel myLabel;`
5. `public void init() {`
6. `myLabel=new JLabel("This is my first program.");`
7. `myLabel.setVisible(true);`
8. `getContentPane().add(myLabel);`
9. `}`
10. `}`



Setting the Stage

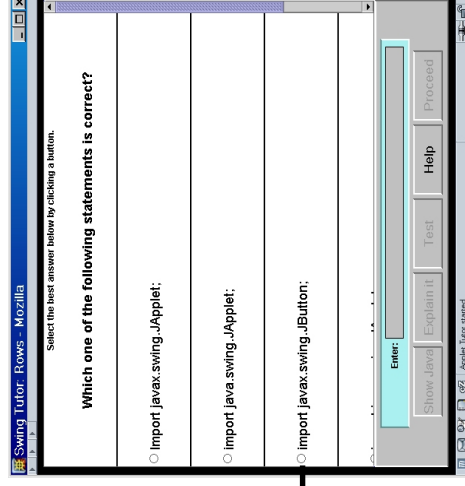
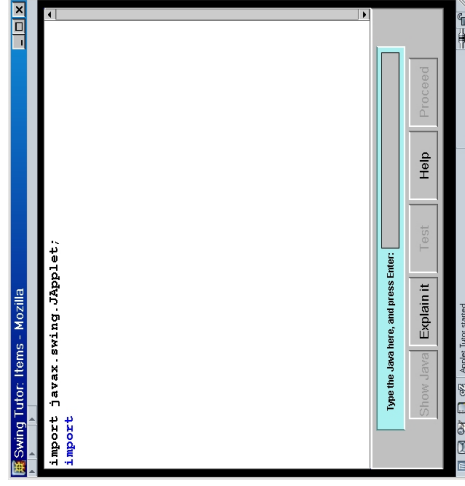
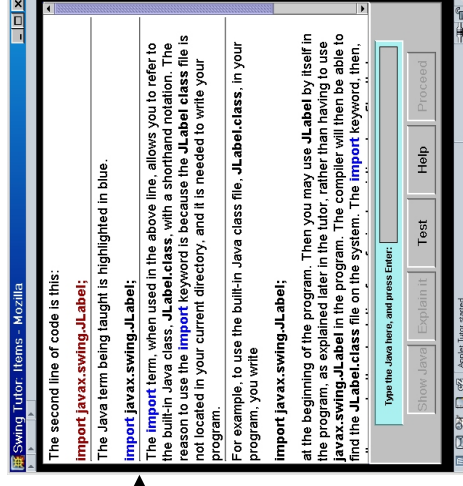
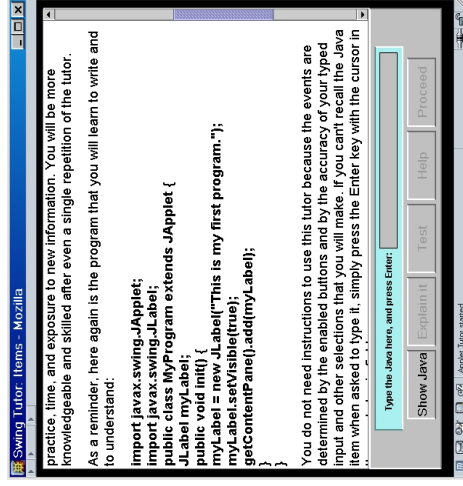
Programmed Instruction

1. A set of **structured interactions** between a learner and a tutor.
2. Occasions **disciplined study behavior** that is focused on the individual learner.
3. Manages the **moment-by-moment interactions** between a learner and a tutor.
4. A **step-wise progression** from elementary facts to the achievement of a meaningful learning.

Interteaching

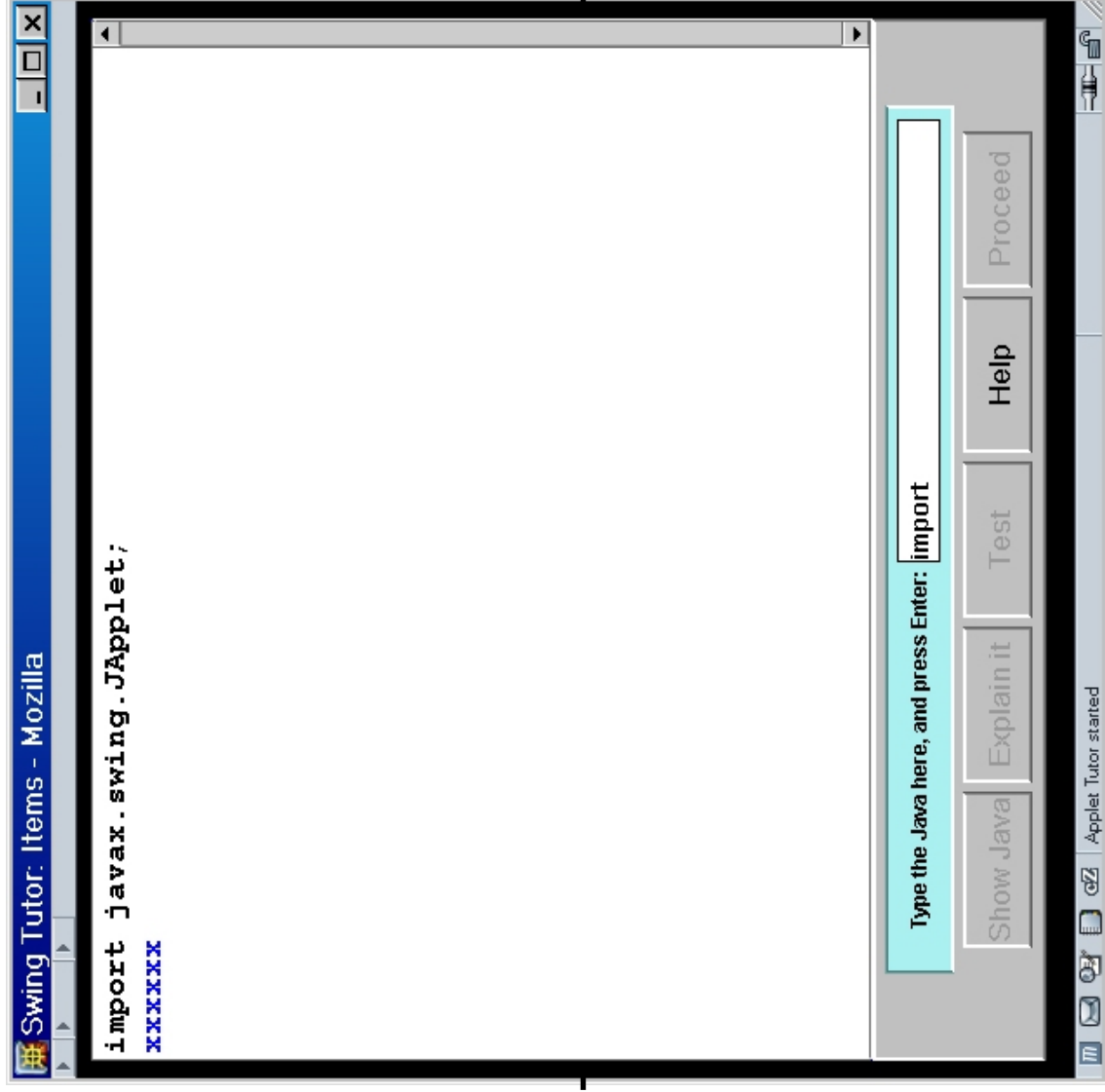
1. A **mutually probing, mutually informing conversation between two people** (Boyce & Hineline, 2002, p. 220).
2. The questions on a topic to be addressed by the participants during a dialogue are prepared in advance by the teacher, and the **students come prepared to interteach**.
3. Has the objective of insuring, by the participants as a team, that **each member of the dyad** can answer the questions with understanding.

Java Tutor: Item Learning

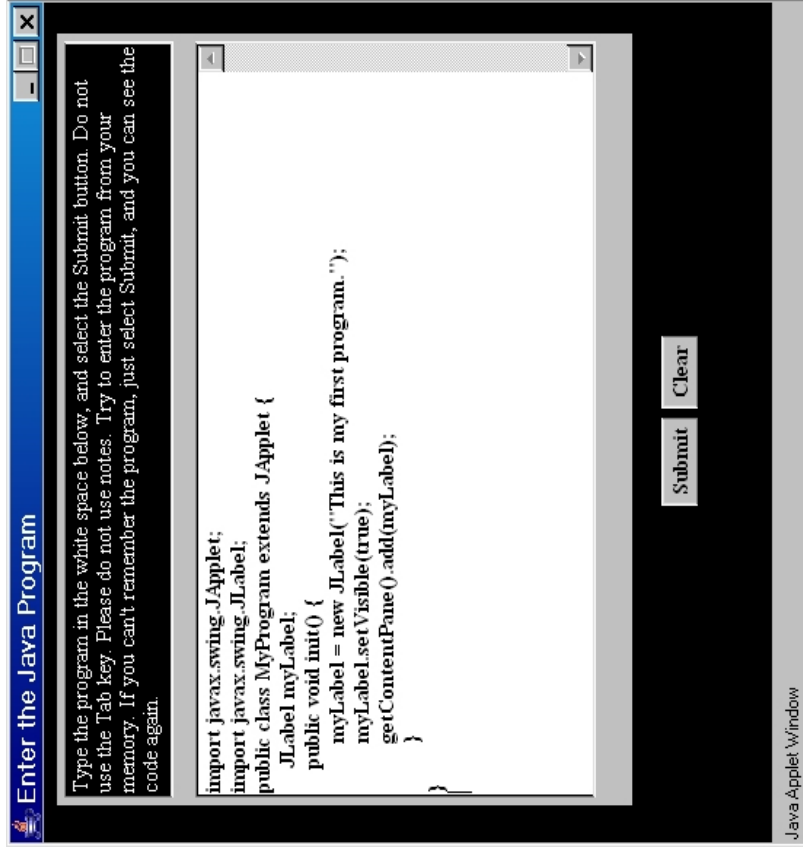
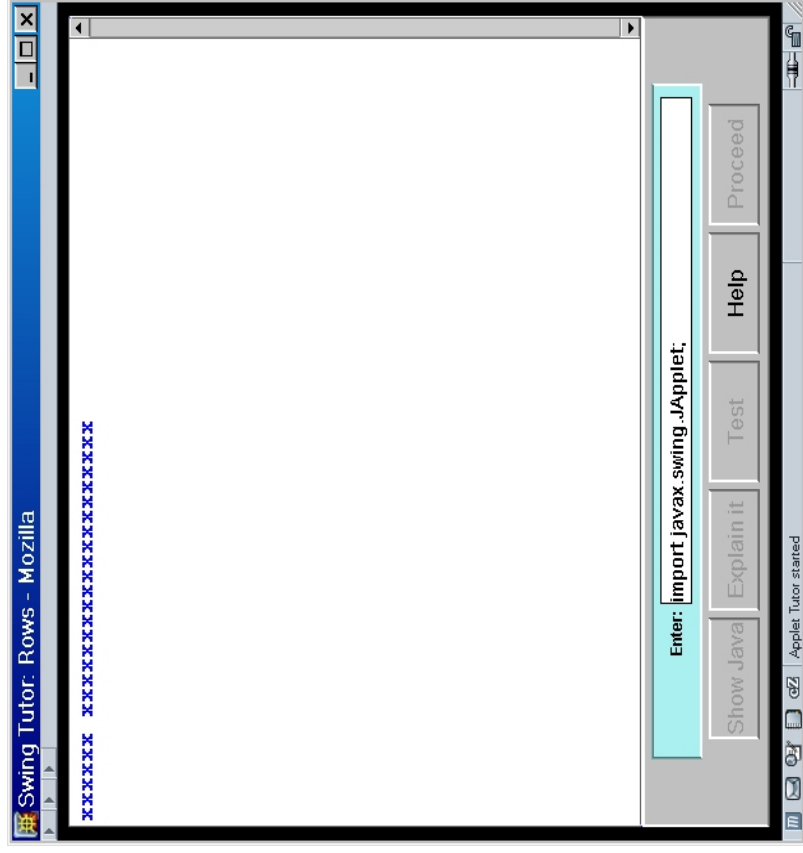


Incorrect

Correct



Line Learning and Program Recitation



Interteaching Instructions

- IS 413
- Interteaching Report #1
- Your name _____ Date _____
- Your partner's name: _____
- You should understand the components of the below program at a level given in the Java Tutor. Discuss these components with the intention to understand the specific item and any general principle that is reflected in an item or collection of items. An example of a general principle would be to begin the name of a class with a capital letter.

```

1. import javax.swing.JApplet;
2. import javax.swing.JLabel;
3. public class MyProgram extends JApplet {
4.     JLabel myLabel;
5.     public void init() {
6.         myLabel = new JLabel("This is my first program.");
7.         myLabel.setVisible(true);
8.         getContentPane().add(myLabel);
9.     }
10. }
```

Interteaching Report

How effective was this session in helping you to learn the material?

1 = Not at all effective. The session did not contribute to my learning of the material.
10 = Totally effective. The session contributed to my learning of the material.

(Not effective) 1 2 3 4 5 6 7 8 9 10 (Totally effective)

Enter one number that describes the effectiveness for you: ____.

How confident are you that you could answer all questions correctly if you were tested on this program right now?

1 = Not at all confident. I could not answer any question correctly.
10 = Totally confident. I could answer all the questions correctly.

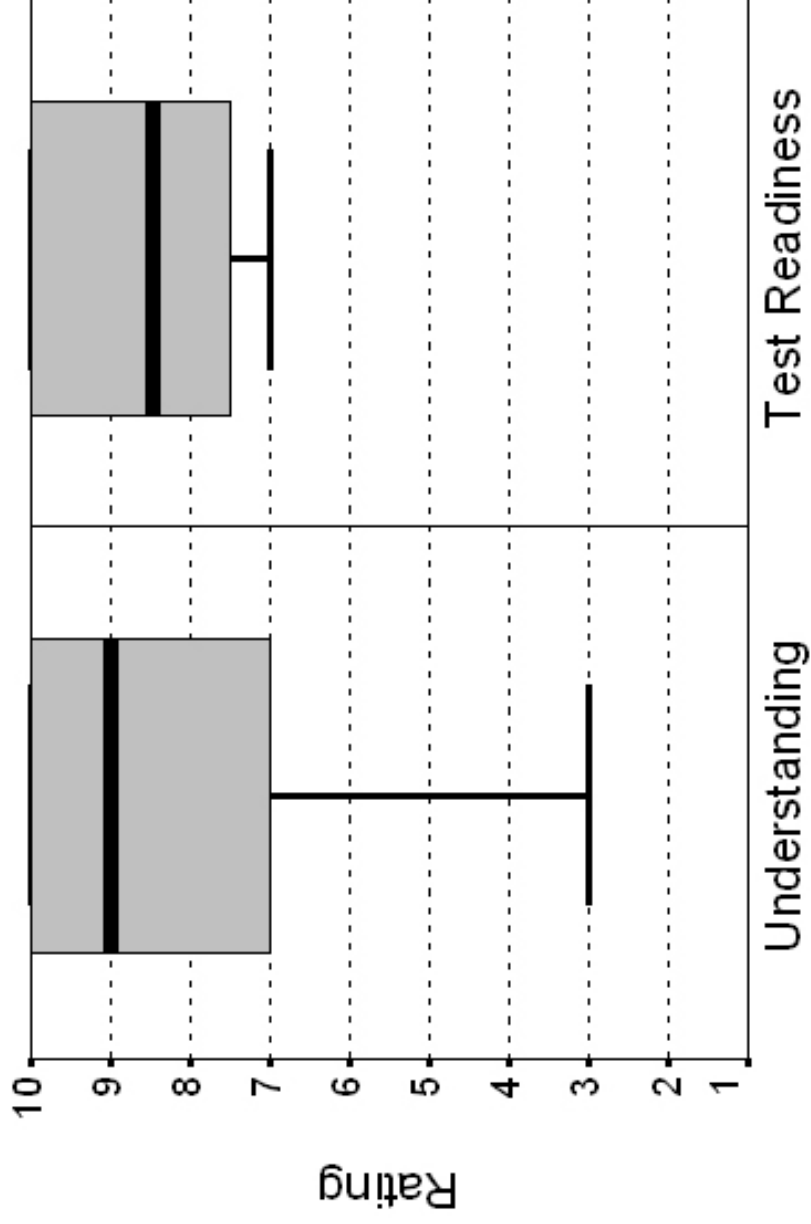
(Not confident) 1 2 3 4 5 6 7 8 9 10 (Totally confident)

Enter one number that describes your confidence: ____.

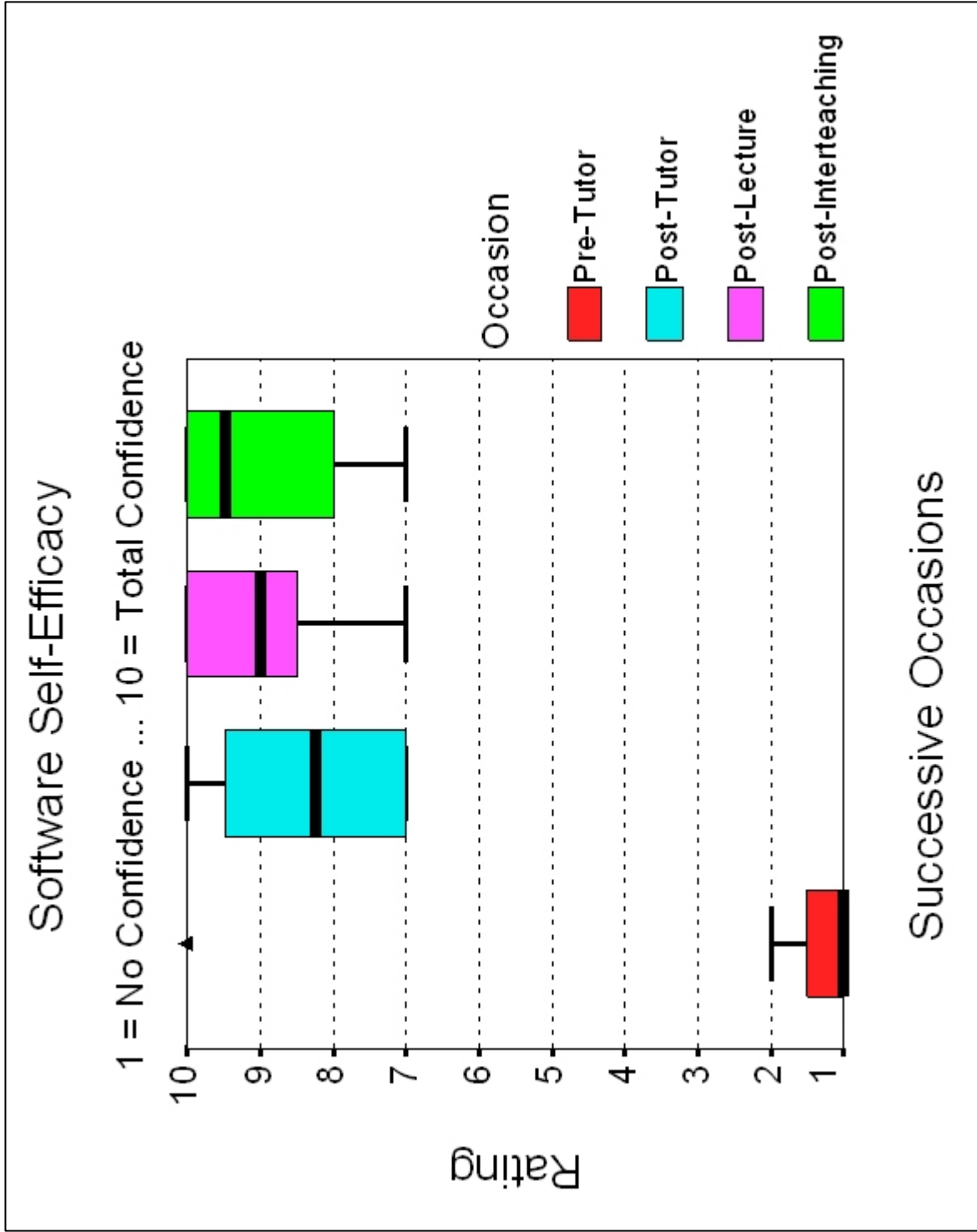
If you have questions that need to be answered in the lecture today, please post them on the Discussion Board now.

Interteaching Report

1 = Not Effective ... 10 = Totally Effective



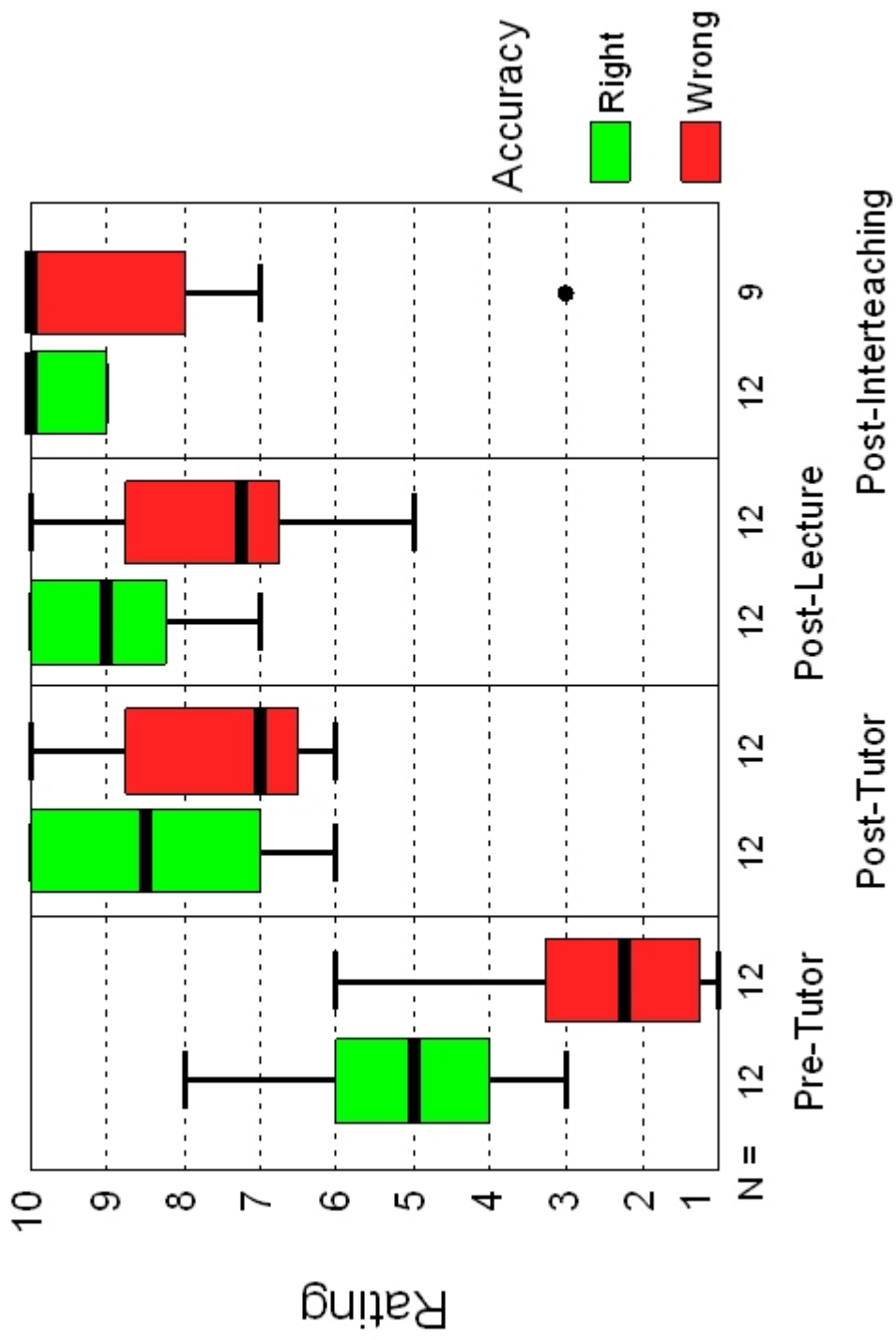
Difference not significant (Friedman's Test: $p > .10$)



Friedman's Test: $p < .001$

Confidence in Rules Test Answers

1 = No Confidence ... 10 = Total Confidence

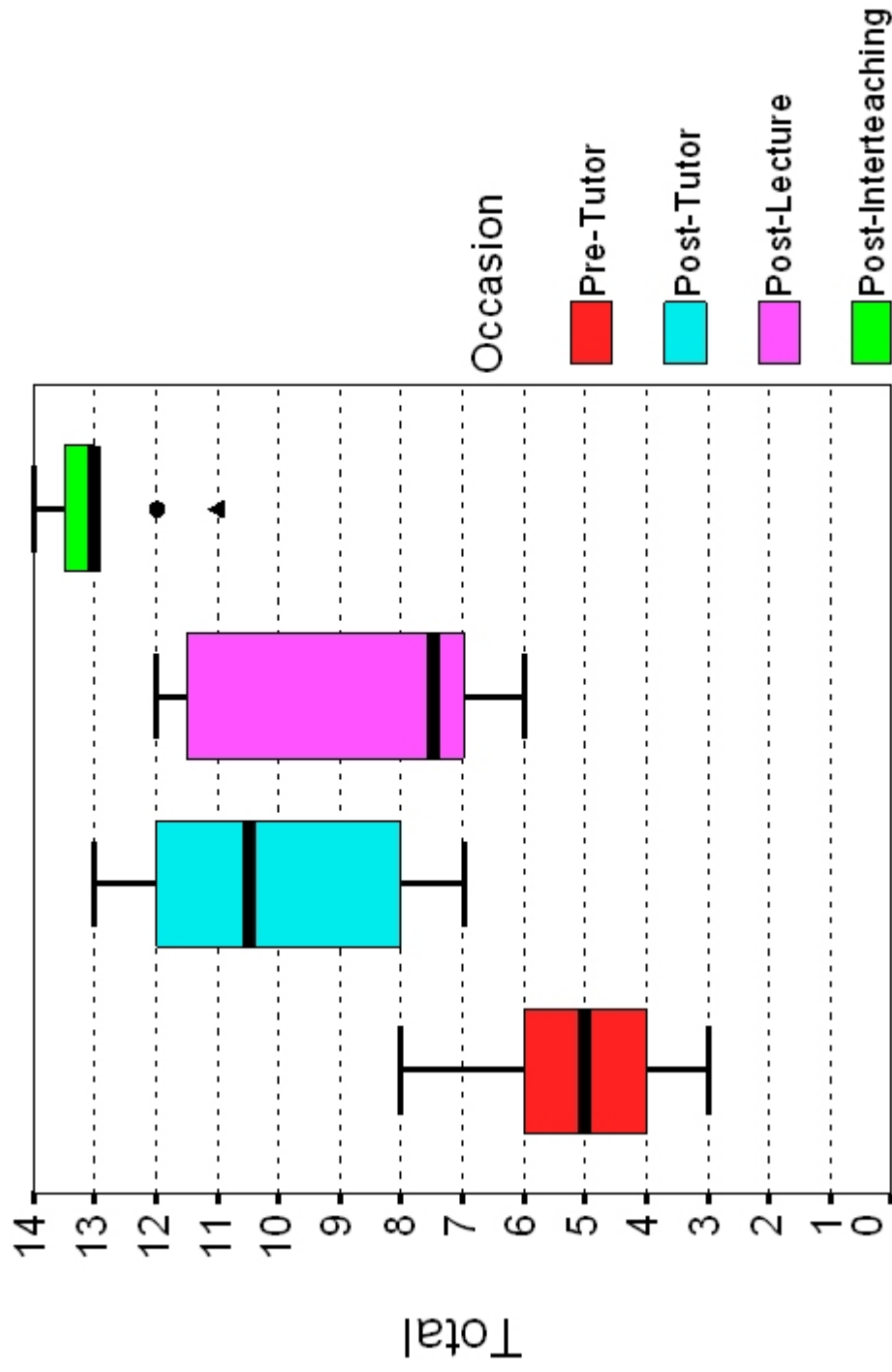


Right (Friedman's Test: $p < .001$)

Wrong (Friedman's Test: $p < .001$)

Right vs Wrong (Friedman's Test: $p < .001$)

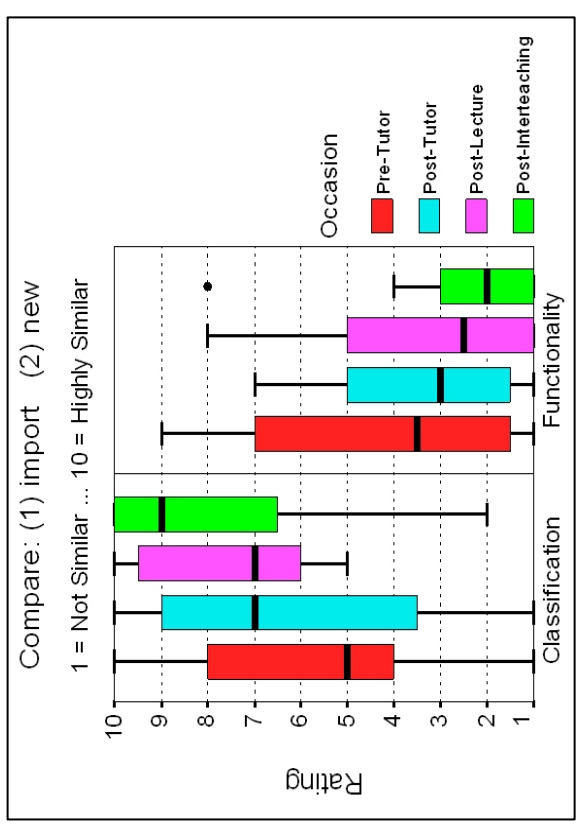
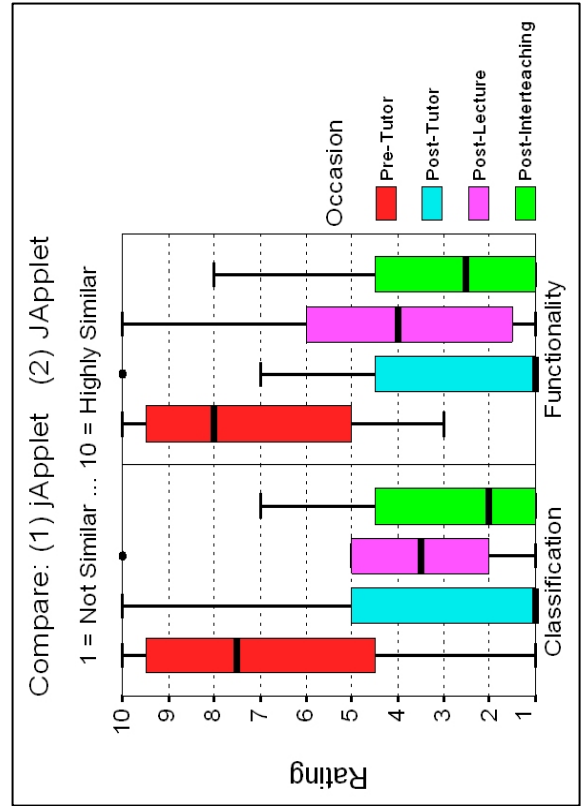
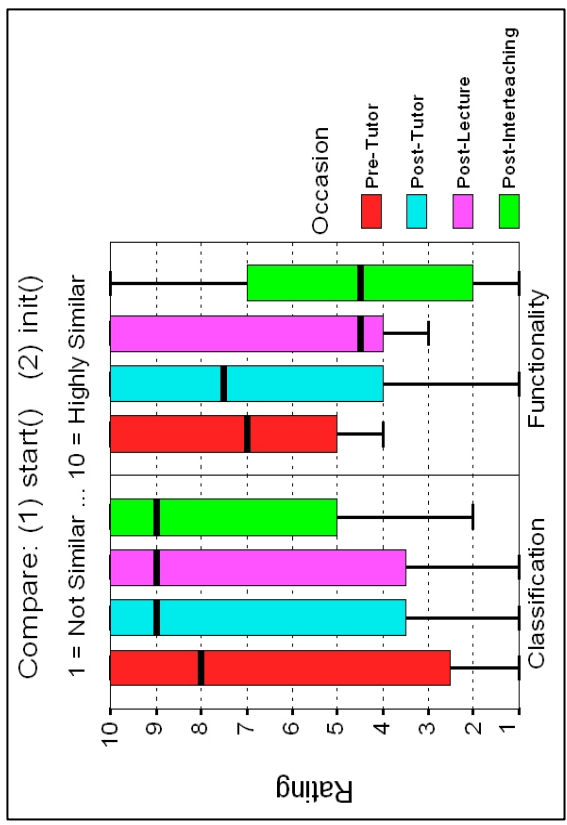
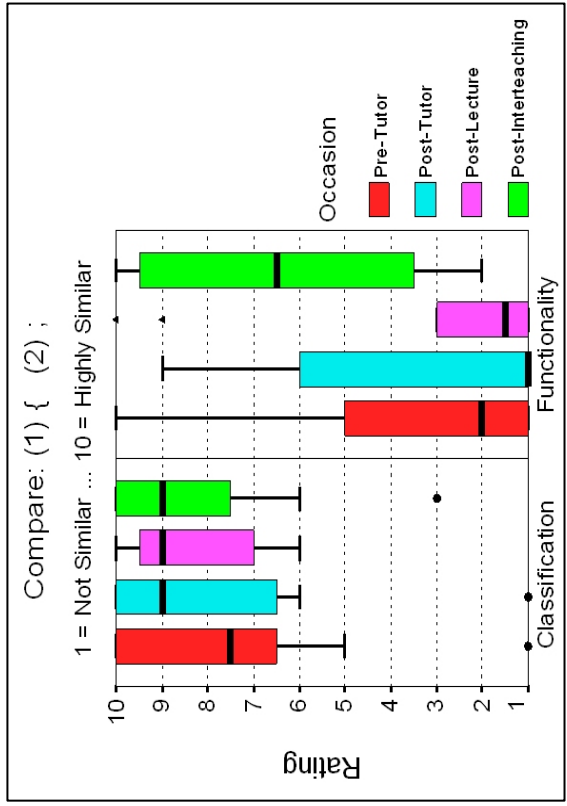
Correct Answers on Rules Test



Successive Occasions

Friedman's Test: $p < .001$

Java Scale Results



Conclusion

- Programmed instruction is an effective tool in technology education.
 - It meets the needs of the individual learner.
 - The instructional design can promote meaningful learning and self-confidence.
 - The tutoring system is well-received by novitiate learners.
- Interteaching may add value.
- The competency attained sets the occasion for advanced learning with enthusiasm.
- Students like the tutor and the interteaching.
- <http://nasa1.ifs.umbc.edu/learnJava/tutorLinks/TutorLinks.html>