Assessment of student performance in Frontiers Cs program

An Interactive Qualifying Project Report

Submitted to the Faculty

Of the

WORCESTER POLYTECHNIC INSTITUTE

In partial fulfillment of the requirements for the

Degree of Bachelor of Science

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Date: December 18, 2001

1 Abstract

The goal of this project was to assess student learning in the Computer science section of the Frontiers program. The goal was obtained by collecting data regarding student knowledge prior to and after the program. Survey responses along with student input were used to decide on which section of the material a student would start. Survey responses after program completion were used to gauge student learning. Extra data was collected to attempt to draw correlations between student type (background, Myers Briggs Type Indicator, etc.) and achievement.

2 Executive Summary

The Worcester Polytechnic Institute (WPI) frontiers program is designed to teach advanced science and mathematics to high-school students entering their senior year. Most students entering the program have demonstrated superior academic ability and a strong interest in mathematics and science. The program is taught by college professors and offers an insight into college education. This Interactive Qualifying Project (IQP) was concerned with the Computer science Frontiers program conducted in 2000.

The computer science program offers students the opportunity to programming concepts from basic constructs to more advanced techniques like object oriented programming. Students get to use languages varying from java/c++ to perl and html. The core section of the course is programming in java and creating web pages. In addition students are allowed to explore a plethora of other material in programming and web development depending on their interest.

The objective of this IQP was to assess what students were learning during the Computer science Frontiers program. This IQP was undertaken because in an IQP carried out in 1999, the test results showed barely any improvement in a test which was given before and after the program. Even though the test was identical and aimed to test the knowledge of concepts that were actually taught in the course, the results of the test did not show a significant improvement in student comprehension after the program. Based on the results of the IQP carried out in 1999 certain aspects of the course were modified.

With the updated progress monitoring and assessment we were able to see a statistically significant improvement in student performance. Also with the aid of the expanded written test at the end of the course, new suggestions for improvement were developed.

A secondary objective of this IQP was to find correlations between student type and their achievement in the frontiers program. We failed to find any statistically significant connections between the psychological type of the student as specified by their Myers-Briggs Type indicator (MBTI) and their performance. However, we did notice some patterns emerge across the different sections of the test. We also found an expected correlation between the previous programming experience of students and their performance in Frontiers.

3 Introduction

The WPI Frontiers program is designed to give high school students a two week introduction to college life. This program helps them to choose their Majors in college and get a feel for life in the dorms as well. The teaching staff for this program consists of WPI faculty members as well as college students. This IQP was involved with the computer science section of the frontiers program.

The Computer science program goes a step further to give students a taste of WPI where "we love projects". At the end of the program students do a Frontiers Qualifying Project (FQP) which can best be described as a scaled down version of a WPI Major Qualifying Project (MQP). Students were allowed to choose from a group of projects and work in groups to achieve their goals.

The goal of this project was to improve the assessment of student progress in the frontiers program. This was achieved through improved assessment techniques and closer monitoring of the students during the program. A secondary goal was to find connections between student background and their performance in Frontiers.

To accomplish the goal of assessing student progress the survey used in the project carried out the previous year (1999) was adapted to create a pre-test which would give us a better idea of the ability of students coming into the project. This was then compared with their score on the same test, at the end of the project to gauge how much the students actually learned. Progress of students was monitored on a personal basis to make sure students were progressing through their material in an orderly fashion and to restrain them from skipping sections they hadn't completed.

In addition to determining the knowledge of students, the survey allowed us to gather additional background information. To make use of this plethora of information we used three pieces of software. We used Excel to organize and view the information, Bayesware Knowledge Discoverer to find correlations and Minitab to perform statistical analysis.

4 Background

Since this project involved finding a relationship between the types of students and performance in the Frontiers program, research was conducted on: various models of learning styles. techniques for designing an assessment and statistical techniques appropriate for analyzing the type of data to be collected.

4.1 Learning Styles

A number of models of learning styles have been developed to categorize the way people acquire information. Learning style inventories were formulated as early as 2500 years when people were seen as active or passive and as emotional or thoughtful. [Claxton,1987]. One of the earliest tools for classification of learning styles was the MBTI.

The Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator (MBTI) personality inventory was designed to make the theory of psychological types described by C.G. Jung understandable and useful in people's lives. The essence of the theory is that seemingly random variations in behavior are actually orderly and consistent when one takes into account the way people use their perception (the way they acquire information) and their judgment (the way they chose to make decisions). [Myers, 1998]

The MBTI has 4 basic dimensions. All four dimensions are considered dichotomous as proposed by C.G. Jung's theory. These dichotomies are believed to reflect innate psychological or mental dispositions analogous to one's preference to use the right or left

hand over the other even though at times both hands may be used to perform a task. Therefore, even though the indicator obtains a numerical score it is converted into the letters E or I, S or N, T or F, and J or P to indicate which or the opposite sides are preferred [Myers, 1998]. Of the 4 dimensions the first 3 are as postulated by Jung's theory while the fourth was added by Myers and Briggs. Annotations written by Felder are presented along with definitions provided by Myers and Briggs:

1) Domain: Attitudes or orientation of energy

- Extroverts (E): have the following attributes: like to try things out, act before they think, derive their energy/focus on the outer world of people

- Introverts (I):have the following attributes: think things through, derive their energy/focus on the inner world of ideas

2) Perception: Functions or processes of perception

- Sensors (S): have the following attributes: practical, detail-oriented, focus on facts and procedures

- Intuitive (I): have the following attributes: imaginative, concept-oriented, focus on meanings and possibilities, look for the big picture

3) Judgment: Functions or processes of judging

- Thinkers (T): have the following attributes: skeptical, value logic, objective.

- Feelers (F): have the following attributes: appreciative, value human harmony, subjective

4) Attitude: Attitudes or orientations toward dealing with the outside world

- Judgers (J): have the following attributes: set and follow agendas, seek closure even with incomplete data, organized.

- Perceivers (P): have the following attributes: adapt to changing circumstances, resist closure to obtain more data, flexible, spontaneous [GSU]

These 4 dimensions combine to give a total of 16 different MBTI types. This model has been successfully used in education and in the workplace

Kolb's learning style

Kolb's model is developed from a theory of learning called "experiential learning". The theory deals with questions of learning and individual development in addition to learning styles.

Kolb's learning style model divides learners into 4 different types:

1) Concrete Reflective (CR): People who like to learn from specific examples and like to think things over.

2) Concrete Active (CA): People who like to learn from specific examples and then try things out for themselves.

3) Abstract Reflective (AR): People who like to learn the theory and analyze it themselves.

4) Abstract Active (AA): People who like to learn the theory and then apply it in the real world.

[Felder, 1996]

Kolb's model has two dimensions. The dimension Concrete vs. Abstract can be shown to correspond directly to the Sensor vs. Intuitive in the MBTI while the Active vs. Reflective is connected to the Extrovert vs. Introvert in the MBTI. However, while the MBTI emphasizes these dichotomies as being innate predispositions or modes of

operation, "Kolb's thesis of human development is that increasing competence and experience in all four adaptive modes lead to greater complexity, relativism and integration" [Claxton, 1998].

Hermann Brain Dominance Instrument (HBDI)

The Hermann Brain Dominance Instrument combines the left/right brain theory with triune model (rational brain, intermediate brain and primitive brain) to produce a quadrant model of the brain [Leonard, Sue]. The quadrants are:

1) Theorists: Theorists have the following attributes: Logical, analytical, quantitative, factual, critical. "These are people who like lecture, facts, and details, critical thinking, textbooks and readings, etc". The brain dominance for theorists is the left cerebral (Quadrant A).

2) Organizers: Organizers have the following attributes: Organized, planned, detailed, structured. "These are people who prefer to learn by outlining, checklists, exercises and problem solving with steps, policies and procedures". People with these preferences have left limbic (Quadrant B) brain dominance.

3) Innovators: Innovators have the following attributes: Visual, holistic, innovative. "Innovators prefer brainstorming, metaphors, illustrations and pictures, mind mapping and synthesis, and holistic approaches". The brain dominance for innovators is right cerebral (Quadrant C).

4) Humanitarians: Humanitarians have the following attributes: Emotional, interpersonal, sensory, kinesthetic, symbolic. "Prefer cooperative learning and

group discussion, role-playing, and dramatization". Their brain preference is

right limbic (Quadrant D)

[Leonard, Sue]

There is a strong correlation between the
four quadrants of the HBDI and the types of
the MBTI. The strongest correlations exist
between Introverted Thinking and Cerebral
Left (theorists) and Extraverted Intuition and
Cerebral Right (innovators) [Leonard, Sue].

Correlating the HBDI to the MBTI
Power, Kummerow, Lundsten – 1999
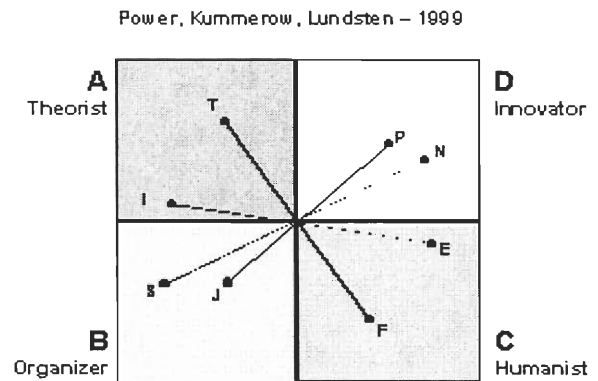
Felder-Silverman Learning Model

Felder classifies learners based on their preferred mode of acquisition of knowledge into
the following categories:

1) Sensing vs. Intuitive: This corresponds to the S vs. I dichotomy of the MBTI.

- Sensing learners : People who are concrete, practical, oriented toward facts and
  procedures

- Intuitive learners : People who are conceptual, innovative, oriented toward
  theories and meanings

2) Visual vs. Verbal learners: The preferred mode for acquisition of knowledge
varies among people.

- Visual learners: People who prefer visual representations of presented material--pictures, diagrams, flow charts.

- Verbal learners: People who prefer written and spoken explanations.

3) Inductive vs. Deductive learners:

- Inductive learners: People who prefer presentations that proceed from the specific to the general.

- Deductive learners: People who prefer presentations that go from the general to the specific.

4) Active vs. Reflective learners: This corresponds to MBTI's Extrovert vs. Introvert dimension.

- Active learners: People who learn by trying things out, working with others

- Reflective learners: People who learn by thinking things through, working alone

5) Sequential vs. Global learners:

- Sequential learners: People who prefer to learn in linear, orderly, small incremental steps

- Global learners: People who are holistic systems thinkers and prefer to learn in large leaps

[Felder, 1996]

This model has been developed recently and a test to classify students on the four of five Felder-Silverman dimensions (all but inductive/deductive) is currently in a beta version. [Felder, 1996]

4.2 Multiple Intelligence and Cognition

Apart from an individuals learning style a couple of other factors will impact their performance in an academic arena. The ability of the person to retain the knowledge and their intelligence will play a role in the person's performance on a test. Intelligence is defined as the ability of a person to apply knowledge to manipulate one's environment or to think abstractly as measured by objective criteria (as tests) [Webster]. There are a number of theories on how retention of concepts and knowledge can be improved in the field of cognition and neuroscience.

Multiple Intelligence

Gardner defines intelligence as "the capacity to solve problems or to fashion products that are valued in one or more cultural setting" [Learning Styles and Multiple Intelligence] . Another way to put this would be: Intelligence is the ability to use what one has learned to be productive. Gardner proposes the following seven intelligences while emphasizing that there are others as well:

"Logical-Mathematical Intelligence--consists of the ability to detect patterns, reason deductively and think logically

Linguistic Intelligence--involves having a mastery of language, ability to express oneself and manipulate language

Spatial Intelligence--gives one the ability to manipulate and create mental images in order to solve problems.

Musical Intelligence--encompasses the capability to recognize and compose musical pitches, tones, and rhythms.

Bodily-Kinesthetic Intelligence--is the ability to use one's mental abilities to coordinate one's own bodily movements.

The Personal Intelligences--includes interpersonal feelings and intentions of others--and intrapersonal intelligence--the ability to understand one's own feelings and motivations." [Brualdi, Amy, 1996]

Gardner also argues that the development of these different intelligences will vary depending on the value assigned by a society upon the ability to perform certain tasks.

Neuroscience and Cognition

"Neuroscience is the study of the human nervous system, the brain, and the biological basis of consciousness, perception, memory, and learning.

When educators take neuroscience into account, they organize a curriculum around real experiences and integrated, "whole" ideas. Plus, they focus on instruction that promotes complex thinking and the "growth" of the brain. "[Funderstanding]

Another tool in improving curriculum is to promote review of material studied by the student through the use of cumulative courses to improve retention of concepts. According to the curve of forgetting, at the end of a lecture one knows 100 % of whatever

one knows (however well one knows it, at which point the curve is at its highest point). By Day 2, if one has done nothing with the information one has learned in that lecture, hasn't thought about it again, read it again, etc. one will have lost 50%-80% of what one learned. According to the theory our brains constantly record information on a temporary basis and when this information isn't deemed necessary it is dumped by the brain. A key sign for our brains to remember information is when the information reappears in front of the brain. The curve for example explains why sometimes people have the feeling that they have never seen material learned in a class because they review the material after around 30 days when it is time for mid terms. Unfortunately by then the brain only retains about 2%-3% of the original hour long lecture! [The Curve of Forgetting]
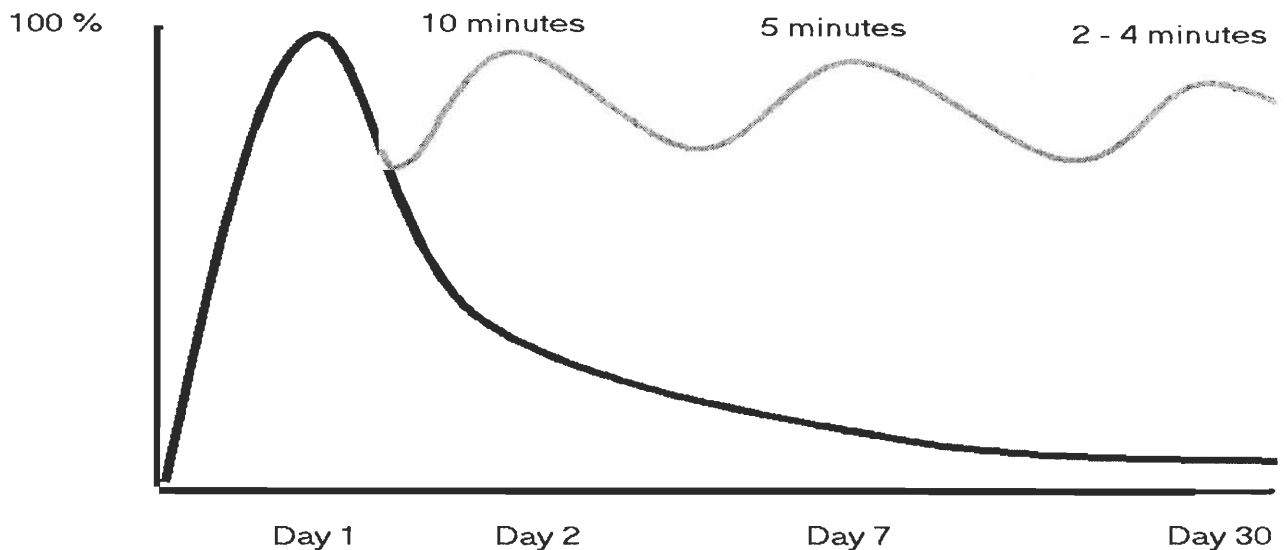
In this chart the dark curve shows typical retention when no review after the 1 hour lecture takes place. The lighter curve shows how retention can be improved over time by reviewing for the labeled periods of time.

4.3 Assessment

The goal of assessment is to determine knowledge. Assessment can be divided into a number of different categories based on the purpose/type of assessment or the type of questions/style of the assessment.

Types of assessment based on purpose

There are 3 basic types of assessment based on their purpose: Low stakes, Medium stakes and High stakes.

1) Low Stakes Assessment: Examples of low stakes assessments are self, assessment, quizzes and tutorials. These items and issues on a low stakes assessment are minor. The identity of the individual is not important for this type of test and usually these tests require no proctoring. Decisions if any are made on the basis of the result of such a test are easily reversed. These tests are generally used to motivate learning and guide the individual to relevant knowledge by analyzing gaps in the skill-set of the individual. Statistics aren't generally collected on these assessments

2) Medium Stakes Assessment: Examples of medium stakes assessments are College tests and skills assessment. The items and test issues on these assessments are significant. The identity of the individual is important for this type of assessment and usually these tests require proctoring. Decisions based on these tests can be reversed and results indicate whether a person passes, fails or needs to work harder. The results are used to determine the knowledge or pool of skills to determine grade level or

determine training requirement. Statistics are checked from time to time on this form of assessment.

3) <u>High stakes Assessment</u>: Examples of high stakes assessment are certification, job interviews. These tests are significant to the life of a candidate. The identity of the individual is accordingly very important as the decisions based on these tests are very difficult to reverse. The only result is whether one passes or fails and statistics are checked by a psychometrician.

Types of Assessment based on methodology

Another way to categorize assessments is by looking at the types of questions that are used. They are as follows:

1) <u>Multiple choice</u>: The simplest type of question from the point of view of validating the response. This is also the reason for their use in standardized tests such as those published by the ETS ™. Multiple choice questions may further be separated by the number of choices permitted, either single answer or multiple answer.

2) <u>Written response</u>: These tests allow the candidate to freely express themselves and may allow or even require lengthy explanations and diagrams. This comes at the cost of more manpower being required to grade these questions. These questions may be subdivided into short answer or essay type questions.

3) <u>Oral Response</u>: Oral responses give the candidate more freedom of expression and provide the interviewer with the ability to clarify or request clarifications.

Performance Assessment

Performance assessment, also known as alternative or authentic assessment, is a form of testing that requires application of knowledge, skills, and work habits through the performance of tasks that are meaningful and engaging to students [Buraldi, 1998] rather than selection of an answer from a ready-made list. This form of assessment in a sense encapsulates written response and oral response questions with an emphasis on going beyond simple memory recall and using higher-level, problem-solving skills [M. Kulieke … et al, 1990]. Performance assessment is designed to be criterion-referenced rather than norm-referenced. Such evaluation identifies strengths and weaknesses, but does not compare or rank students. [Funderstanding]

The benefits of the multidimensional aspect of authentic assessment are depicted in the following figure:

Figure 1. Type of Assessment

Authenticity

decontextualized, atomistic   contextualized/using skills in concept

Number of
Measures

single   multiple

Dimensions of
Learning

simple   complex

Dimensions of
Intelligence

few   many
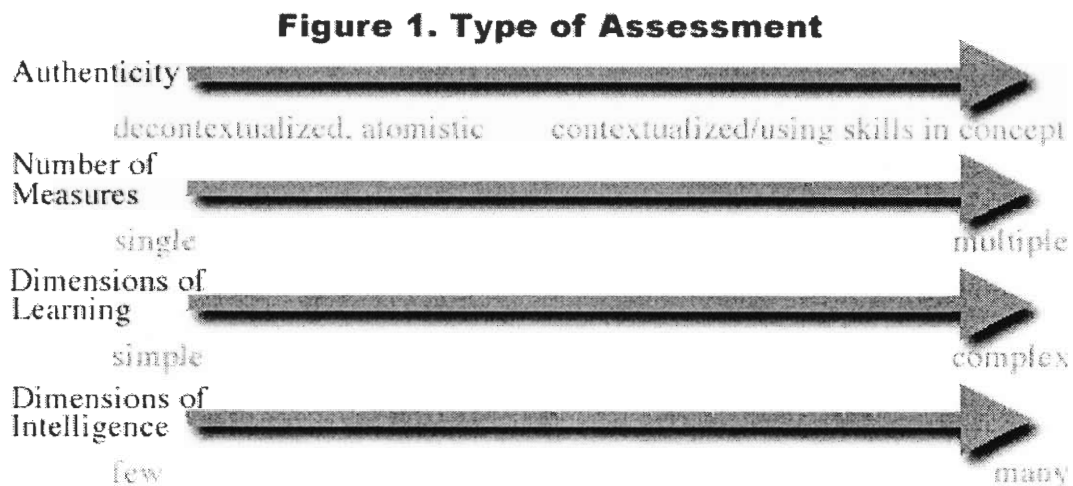
[M. Kulieke … et al]

In addition, performance assessment accomplishes the following goals according to Funderstanding:

- Requires students to develop responses rather than select from predetermined options

- Elicits higher order thinking in addition to basic skills

- Directly evaluates holistic projects

- Synthesizes with classroom instruction

- Uses samples of student work (portfolios) collected over an extended time period

- Stems from clear criteria made known to students

- Allows for the possibility of multiple human judgments

- Relates more closely to classroom learning

- Teaches students to evaluate their own work

This form of assessment is the least used because a great deal of time is required to create activities/questions to be assessed along with the fair grading criteria. In addition a lot of time has to be spent to assess the candidate's performance according to the criteria. However proponents of authentic testing like Williams Grant suggest that , "while the scoring of judgment-based tasks seems expensive when compared to multiple-choice tests (about $2 per student vs. 1 cent) the gains to teacher professional development, local assessing, and student learning are many". Examples are states like California and New York that have observed improvements locally in the teaching and assessing of writing and science when teachers were involved and invested in the scoring process (with their writing and hands-on science tests). [Grant, 1990]

Most companies pick candidates for training and for promotion by using performance assessment [Berk, 1986]. This raises the question why similar assessment techniques are not used more often in education.

Designing an Assessment

The first step in designing an assessment is determining the purpose of the assessment. Accordingly, appropriate type of questions can be chosen and a suitable blueprint determined. The two most important criteria for assessment are reliability and validity: Reliability has 3 important characteristics:

1. Temporal stability: The same form of a test on separate occasions to the same group of examinees (Test-retest) should provide similar results. However, this approach is not practical. Repeated measurements are likely to change the results because examinees may adapt to the test format and thus tend to score higher in later tests.

2. Form equivalence: Two different forms of test, based on the same content, on one occasion to the same examinees should also provide similar results

3. Internal consistency: When no pattern is found in the students' responses one may conclude the test is too difficult and students are just guessing the answers randomly. One way to fix this on multiple-choice questions is to provide an "I don't know" response in addition to the other choices. [Reliability and validity].

Validity is defined as something being well grounded or justifiable. In the context of assessment it indicates that the test is unbiased.

The following graphs can be used to describe reliability and validity. They display the

scores of a group of examinees on multiple occasions. The distribution is bell shaped.

Ideally the average score in the test (yellow line) should correspond to real world

performance (red line) or the ability to utilize all the concepts being tested in the

assessment, which is a measure of real world performance.
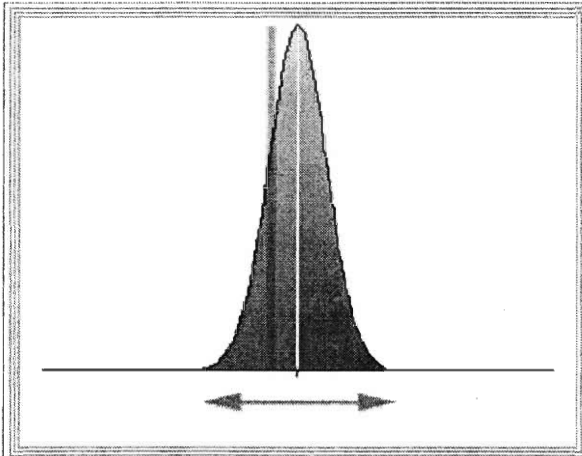
[Reliability and Validity]

The first picture is reliable but not valid because even though the scores show low

variance they are biased (the measured performance doesn't coincide with "actual"

performance)
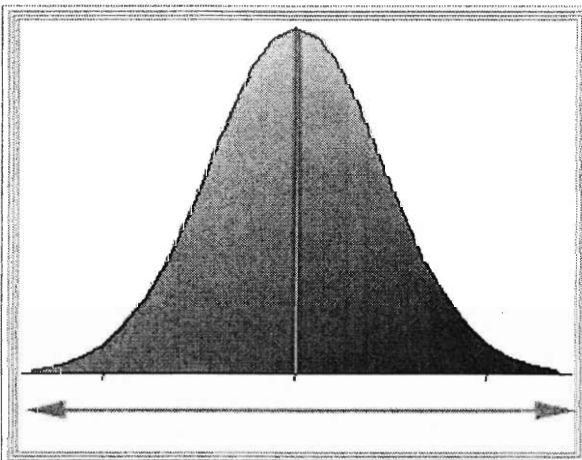
[Reliability and Validity]

 This second picture shows an assessment that is valid but not reliable because of high

variance.

4.4 Statistical analysis

A wide array of methods exists in the field of statistics. A review of the basic statistical methods which are considered relevant to this project along with a review of important statistical terms is presented in this section.

Terminology

The understanding of the following terms is important in using any statistical method.

- Hypothesis Testing: The basic premise of this widely used statistical is to state a null hypothesis which assumes there is no effect, and then see if the data will allow its rejection.

- Confidence Intervals: The confidence interval is the likely range of the true value. There is only one true value, and the confidence interval defines the range where it's most likely to be.

- P values: The p-value of a result is the probability that the observed relationship or a difference in a sample occurred by pure chance, and that in the population from which the sample was drawn, no such relationship or differences exist. [Hopkins, 2001]

Methods for analysis

The following are the methods most suited to analyzing statistical correlations and differences in samples.

- T-Test: This test can be used to compare the means of two samples. Given two samples from a population, this test can be used to determine the difference between the means. More specifically it provides a confidence interval for the difference.

- Pearson's correlation coefficient: This test can be used to determine linear correlations between 2 statistics. The output statistic is a normalized correlation coefficient between -1 and 1, with 1 representing a perfectly linear relationship and -1 indicating an inverse relationship.

5 Methodology

This project involved three major phases. The first was the pre-test which was used to determine the initial knowledge of students and to place them appropriately in the program. The second phase was monitoring student progress. This was accomplished through visual observation and the use of small exercises that students had to do at the end of each section before they could proceed further. In this phase data was also collected on how difficult the students thought the material was. The final phase was the post test, in which students had to complete three sections. The first was used to determine their MBTI, the second was a multiple choice section which was a superset of the pre-test and the final section was a "free response" section where students had to come up with answers rather than selecting them from a list. Finally this data was analyzed.

5.1 Pre-test

The pre-test was adapted from a survey used the previous year (1999) in the Frontiers CS program. The objective of the pre-test was to gather background information and to gauge student knowledge in the following categories. In the interest of keeping the pre-test short and easy to grade the test was entirely multiple-choice. The test had questions that fell into four categories:

1) Background Information: This section was used to collect information on the students' background in programming: for example, how long the students had been programming, how they learned to program (class or self taught etc)

2) Basic Programming Skills: This section tested the knowledge of simple programming statements like assignment, conditionals and loops.

3) Advanced Programming Skills: This section tested whether students knew how functions worked.

4) Java / Object oriented programming Skills: This section was used to determine whether students knew Object oriented programming in general and Java in particular.

5.2 Monitoring Student Progress

After the pretest the students were placed according to their knowledge in the appropriate section of the course. The course material was organized into three programming sections to be completed in the mornings:

1) ROBOTL: Introduction to OO programming through a simple language.

2) JavaBotl: Transition from Robotl to Java. This section allows the student to code in Java and still access ROBOTL objects and routines.

3) Java: OO programming in Java, with exposure to graphics.

In the afternoons the students worked on HTML. In addition to this standard material there was other optional material for students who had advanced through the basics.

All of these sections were subdivided into modules. Two statistics were collected on student progress through the modules. The first was when they finished a particular module and the second was their assessment of the difficulty of the module. This was a number from 1-10, with 1 being easy and 10 being difficult.

The following tables were constructed to be filled in for every student. The cells were filled with the difficulty rating provided by the student.

The first table lists the core material of the course

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Ap
0													
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

The second table lists the optional modules

ays	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML	SGML	XML	JLab1	JLab2	Jlab3
0														
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

5.3 Post test

The post test had three components. The first was the MBTI test. Next was the multiple choice section which was basically an extended version of the pretest. The third and final section was designed to test the ability of students to write actual code rather than pick responses from a predefined list.

The MBTI test at http://www.advisorteam.com/user/ktsintro.asp was used. The results were four letters E/I, S/N, T/F and J/P. The students were told to enter these into the online quiz system.

The multiple choice section of the post-test was a superset of the pre-test multiple choice questions without the background information questions. This was done in order to get a clear before and after picture. Besides the pre-test questions some new questions were added on specific material taught in the Frontiers program.

The final test was designed to get detailed results on the ability of students to code. In contrast to the pre-test and last year's post-test this part of the test used free response/authentic assessment exclusively, to get an idea of the skills students had. Most of the questions were derived from assignments that students had to do during the course. The test had four sections:

1) Basic programming

2) Java

3) HTML

4) C++ (optional)

5) Perl (optional)

A rubric was designed to explicitly specify the concepts that were to be tested and appropriate responses to ensure fair grading. This also helped to get meaningful data on the concepts which students did or did not understand, for example a question in the Java section also tested the knowledge of a basic programming concept like variables and assignment. Here's an example of one of the questions on the final test along with the grading criteria.

2. Write a program to calculate the sum of all natural numbers from 0 to 100 (including hundred) You may use any programming language or pseudo code for this question .Hint: Use a loop
int sum=0;
Initialize sum (1 pt)
for (int i=0~*loop init 1 pt~*; i<101 ~*loop limit 1pt~*;i++ ~*loop increment 1 pt~*)
sum=sum+i; (*calculate sum 1 pt*)
Basics
Variables:
Initialize sum = 1
Loop = 3
Calculate sum = 1

5.4 Procedures for analyzing data

First, all the data collected was tabulated in a spreadsheet. Data was charted to compare the performance of various MBTI groups. A more rigorous statistical follow up was then done to determine the significance of the data. A two sample T-Test was used to determine the significance of the difference in performance among various MBTI groups and the difference between performance of students on the pre-test and the post-test. Correlation analysis was used to find correlations between interesting pairs of numerical fields. Associated p values were calculated to determine the probability of any differences in measurements being caused by pure chance alone.

Two software packages were used to help with these tasks. Bayesware Knowledge Discoverer was used to find correlations between all the fields to determine interesting correlations for further exploration. Statistical computations were done using Minitab.

T-Test

The following steps are involved in a T-test.

1) Calculate the standard error of the differences:

If the variances of the two groups are equal then, Use common pooled variance:

$$SE = \sqrt{sp^2 (\frac{1}{n1} + \frac{1}{n2})}$$

where $sp^2 = \dfrac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$

If the variances are not equal then use:

$$SE = \sqrt{(\frac{s_1^2}{n1} + \frac{s_2^2}{n2})}$$

Where SE is the standard error, s is the standard deviation and n is the size of the sample.

2) Compute the t statistic

$$t = \frac{\text{difference in sample means} - \text{hypothesized difference}}{\text{SE}}$$

3) Compute the confidence interval: The formula is:

C. I = Difference in sample means +/- (t* x standard error)

Where t* depends on the confidence level and can be obtained from the appropriate t distribution.

4) Determine the P-value by standardizing the T statistic and comparing the value of the test statistic to the appropriate sampling distribution.

[PSU]

Pearson correlation coefficient

The following steps are required to calculate the Pearson correlation coefficient:

1. Formulate the null hypothesis. The null hypothesis (H_0) is that "There is no significant association between the observed datapoints and the test criteria". You also need to set the significance level (α) before performing the test (e.g. 0.05).

2. Calculate the correlation coefficient (r) for the test data. The Pearson formula is:

$$r = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{\left[n\Sigma X^2 - (\Sigma X)^2\right]\left[n\Sigma Y^2 - (\Sigma Y)^2\right]}}$$

3. Determine whether the value of r is equal to or greater than the critical value required to accept the null hypothesis. To do this you need to calculate the number of degrees of freedom for the test - this takes into account the number of independent observations used in the calculation of the test statistic and is needed to find the true value in a probability table. For a one-tailed test df = n-1 and for a two-tailed test (most usual) df=n-2. Look up the calculated value of r in a table of critical values of the correlation coefficient.

4. If the calculated value of r is greater than the critical value of r (from the table), reject the null hypothesis - there is a significant association between the variables. If the calculated value of r is less than the critical value of r, accept the null hypothesis - there is no proof of an association between the variables.

[University of Leicester]

6 Results and Analysis

The first part of the results and analysis dealt with the performance of students on a test before and after the program. In this project we also gathered data to compare and contrast the performance of students as it relates to their background and Myers Briggs Type indicators. We had the following groups of MBTI students (in order of the number of students of that type)

ENFP X 4

INTP X 3

INTJ X 2

ENTJ X 2

INFP X 1

ISFP X 1

I: Introvert	(7)	E: Extrovert	(6)
N: Intuitive	(12)	S: Sensor	(1)
T: Thinker	(7)	F: Feeler	(6)
P: Perceiver	(9)	J: Judger	(4)

The total class size was 13.

The analysis will attempt to compare performance between the following groups

I vs E, T vs F, P vs J, TP vs FP vs TJ

An attempt to compare S vs N isn't made since there was only one S student (all the others were N's).

6.1 Experience vs. Performance

Average experience vs MBTI

The chart shows "Years programme" on the vertical axis (0 to 5) and "MBTI" categories on the horizontal axis: TP, FP, TJ, T, F, P, J, E, I. Legend: Average experience.
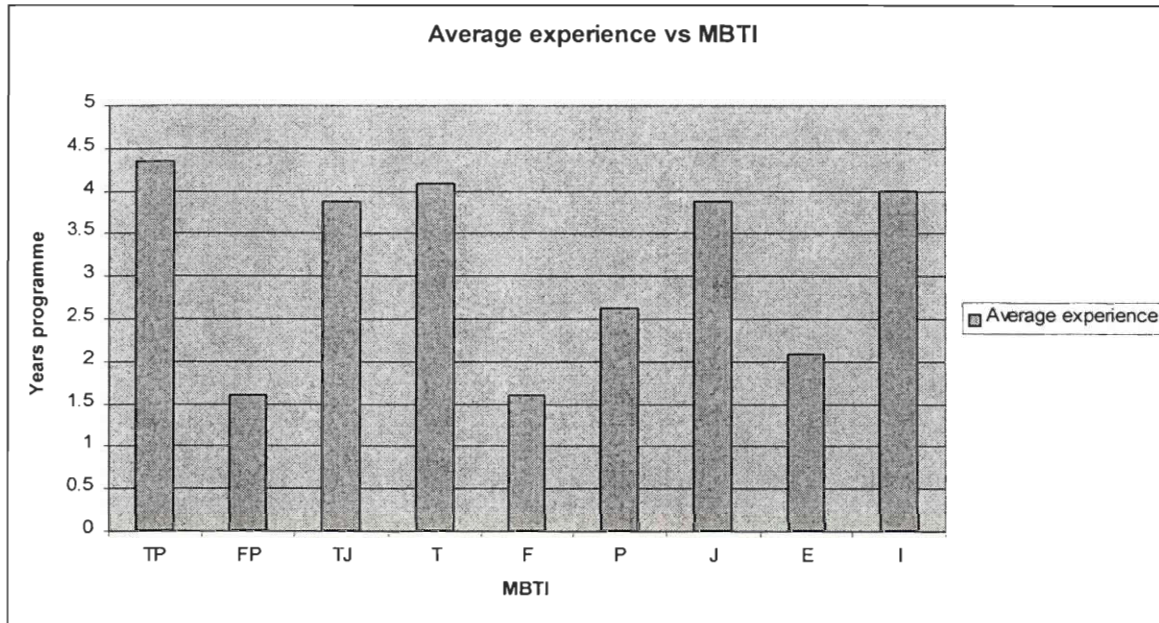
The I's have more experience than the E's. The T's have more experience than the F's. The only exceptions are the *P's who have less experience than the J's (even though their pretest scores are better). Even though the TJ's experience rivals that of the TP's they are well behind in scores.* The P's seem to have acquired more knowledge from their limited experiences.

6.2 MBTI vs. performance

In this section we took a look at connections between MBTI and performance of students.

Pretest Performance and the MBTI connection
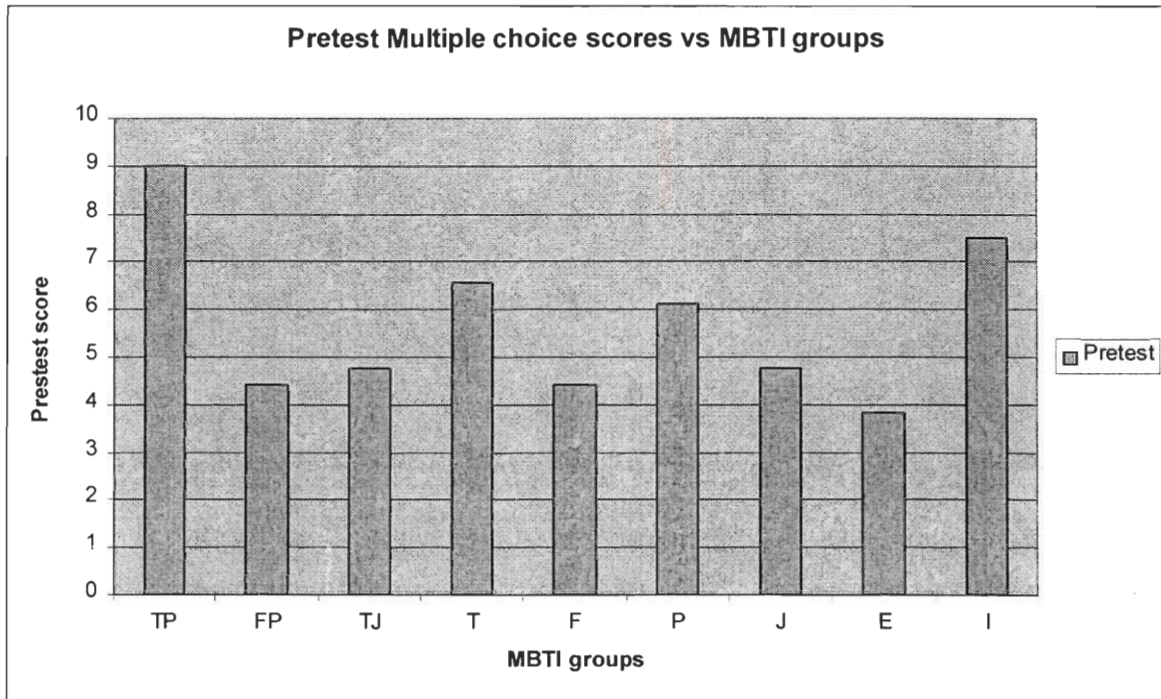
By looking at the graph we can see the following:

The I's did better than the E's. The T's did better than the F's. The P's did better than the J's. The TP's did better than the TJ's who did better than the FP's.

If we compare this with the experience that the various groups had coming into the program we can see a connection between experience and performance on the pretest.

Previous programming languages used vs MBTI groups
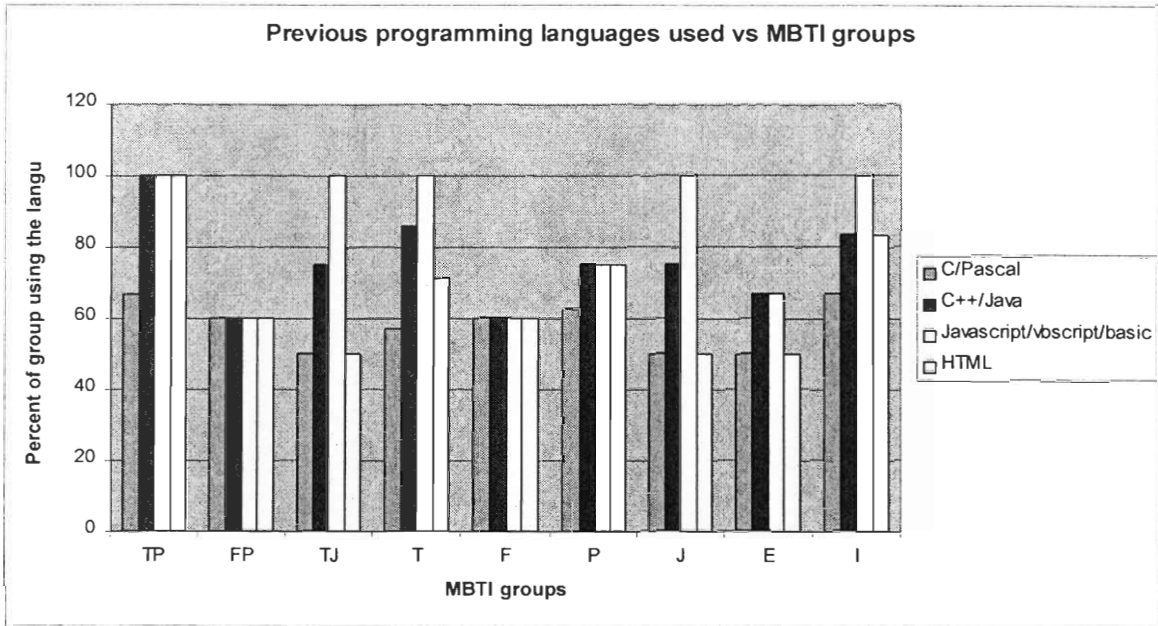
The TP's had the best programming background, with all students in this category having some OO language experience. The TJ's had a significantly less breadth of experience than the TP's which should explain why their pretest scores were significantly lower even though the number of years of experience they had was fairly high. The guess that P's might have acquired more knowledge is confirmed by this chart where the P's appear to have a good breadth of knowledge rivaling that of the J's.

6.3 Posttest performance of different MBTI groups

Posttest MultiplechoiceScore vs MBTI
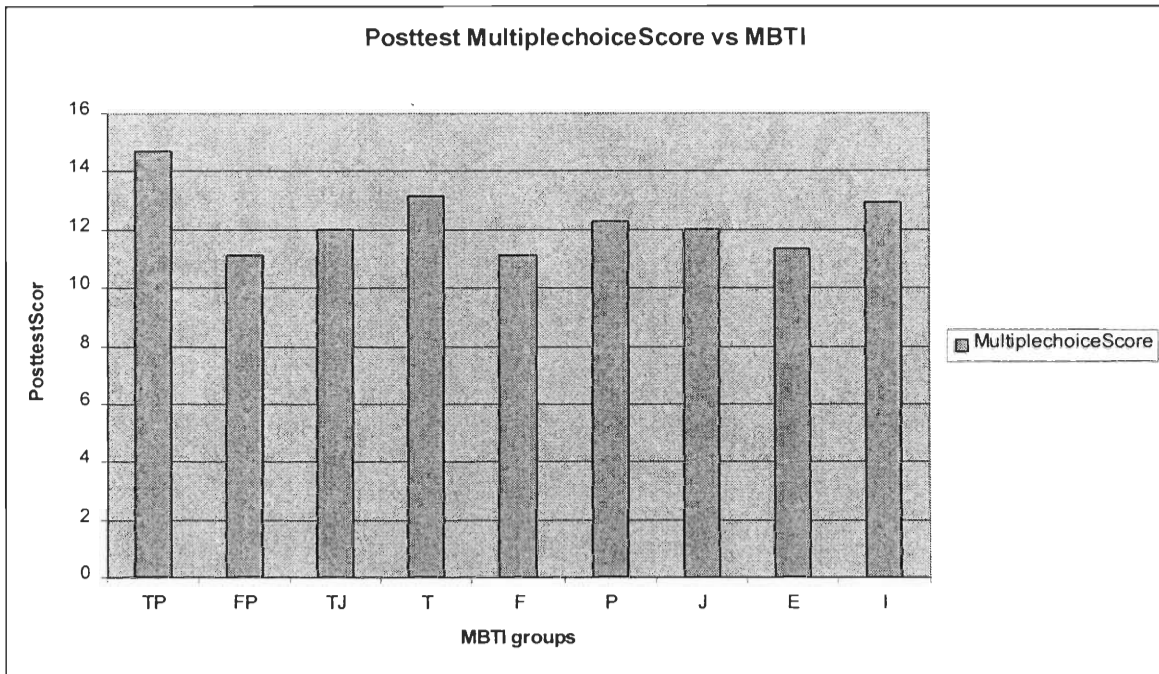
The first thing to notice in this graph is that it represents relative standings which are very similar to the pretest. The MBTI types that were ahead in the pretest were still ahead in the posttest. The playing field did level out a bit and the differences were much smaller. However, the I's were still ahead of the E's , the T's were ahead of the F's, the P's were ahead of the J's and the TP's lead the TJ's who had a slight lead over the FP's

Increase in multiple choice scores (Posttest-Pretest)
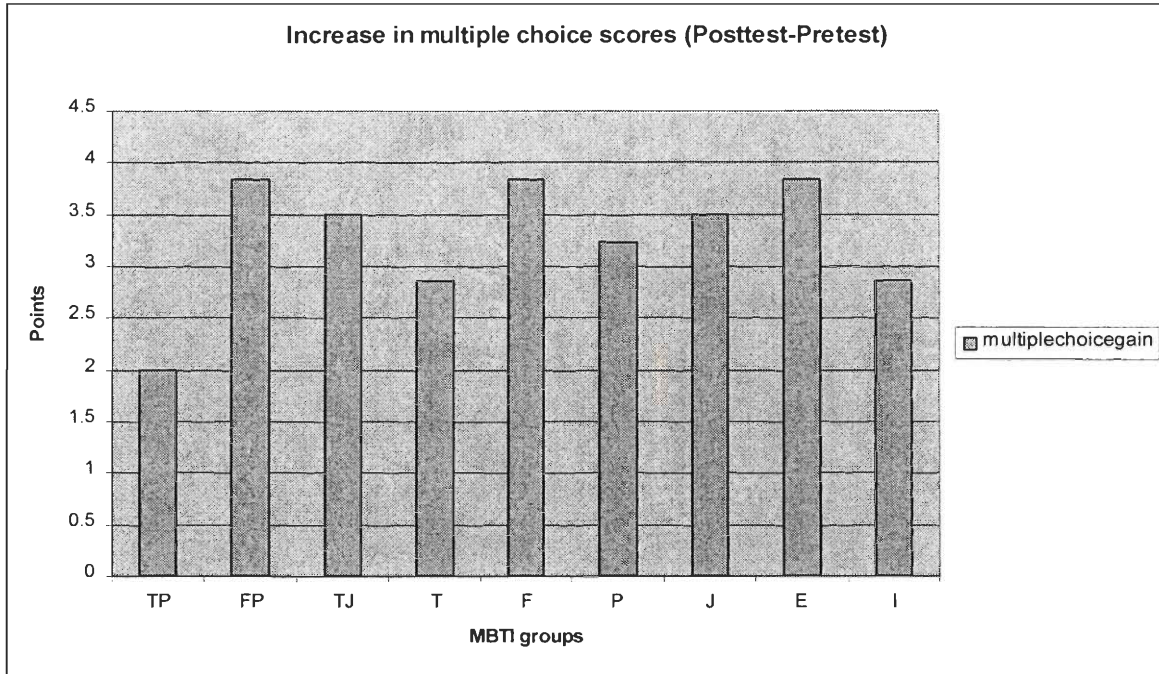
This chart shows the gains made by students in the material that was tested in the multiple choice section of both the pretest and the posttest. The groups that scored higher in the pretest (the I's, T's, P, and the TP's didn't have much room for improvement) showed smaller gains than the groups that started out with lower scores (E's, F's, J's, TF's and TJ's). The patterns in this graph are a little strange because the maximum gain possible is limited by the questions presented on the test. If the test had tested more of the advanced material we might have seen better gains in test scores among the students who started out with good scores in the pretest.

Posttest Freeresponse
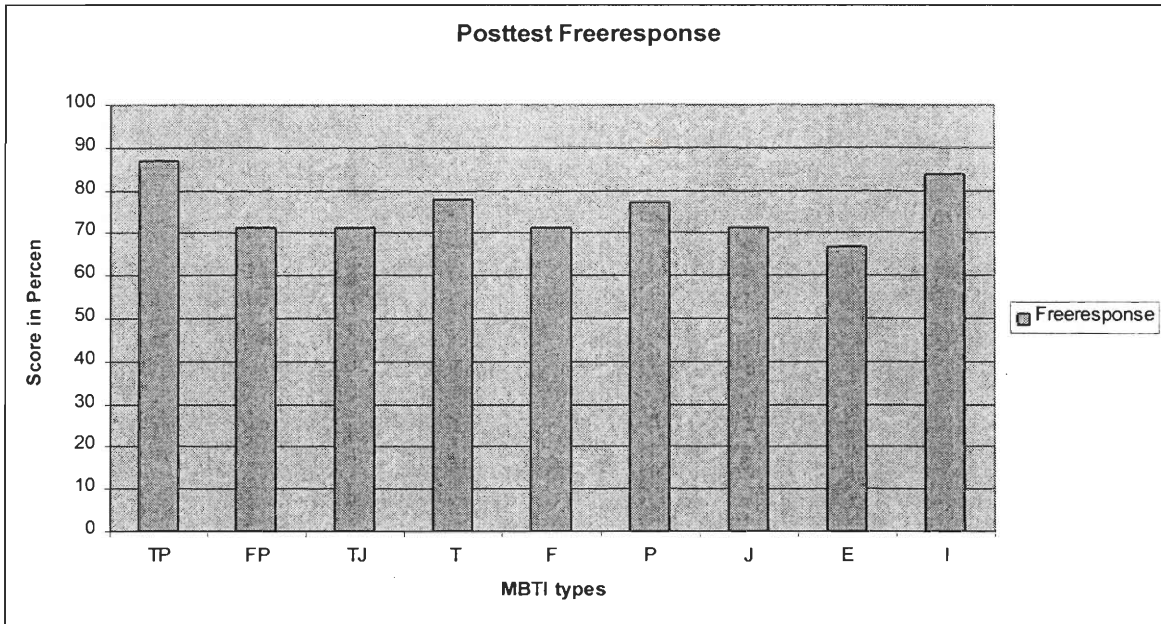
This chart shows the exact same pattern as the Posttest Multiple choice section.

Posttest free response results : Individual sections

The results within the different sections of the post test are worth studying because of a few peculiarities. Half of the individual sections within the posttest showed the same patterns as the overall test with the T's scoring higher than the F's

The P's doing better than the J's

The I's doing better than the E's

The TP's doing better than the FP's and TJ's

The FP's and TJ's swap places in different sections.

While the other half showed some interesting variations.

Basic programming results with respect to MBTI
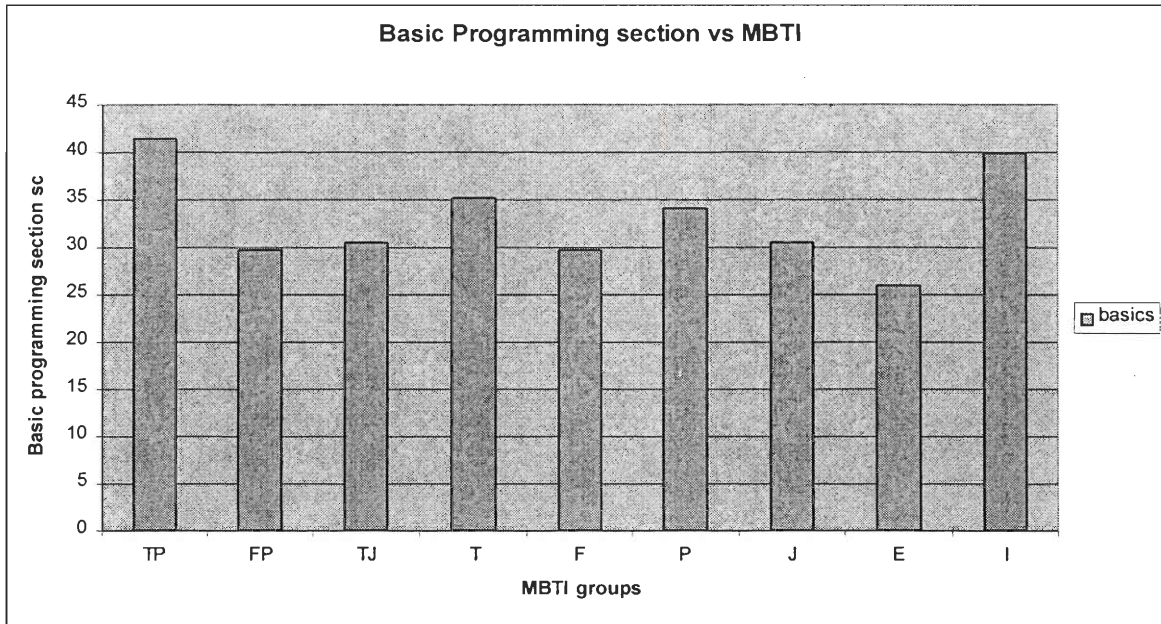
This follows the pattern present in both the pretest and the posttest very closely. The I's are ahead of the E's, the T's are ahead of the F's, the P's are ahead of the J's and the TJ's are slightly ahead of the FP's with the TP's ahead of everyone. This section represented the core of the course material and tested students on their ability to construct simple programs which used variables, arrays, assignments, conditions and functions. It is not surprising that the T's had the advantage over the F's with their ability to think logically. The I's are ahead by a lot because they have most likely spent a lot more time doing this than the E's.

Success in Object oriented programming
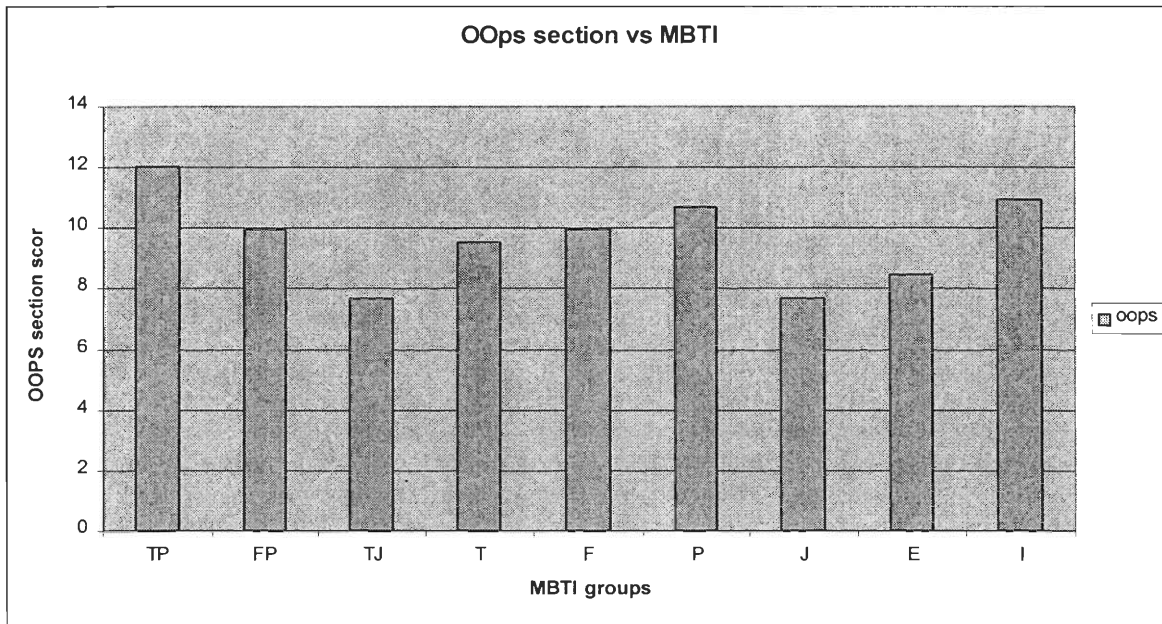
The FP's are ahead of the TJ's in this one. Also the T's fall a bit behind the F's in this section. This section tested the student's abilities to create object oriented programs in pseudo code and java. The strange part was that the T's did not do better than the F's. Our guess is that Object oriented programming is not a very natural extension of functional programming and most people are unable to logically extend the functional paradigm to the object oriented paradigm. A lot of the T's wrote their classes in functional styles without using the power of inheritance in their design. Even the TP's who scored very well at times had a poor understanding of inheritance and its uses. More hands on examples might need to be added to the core material of the course to demonstrate how to use inheritance.

Learning new languages C++/Perl

C++ section scores(Posttest free response) vs MBTI groups
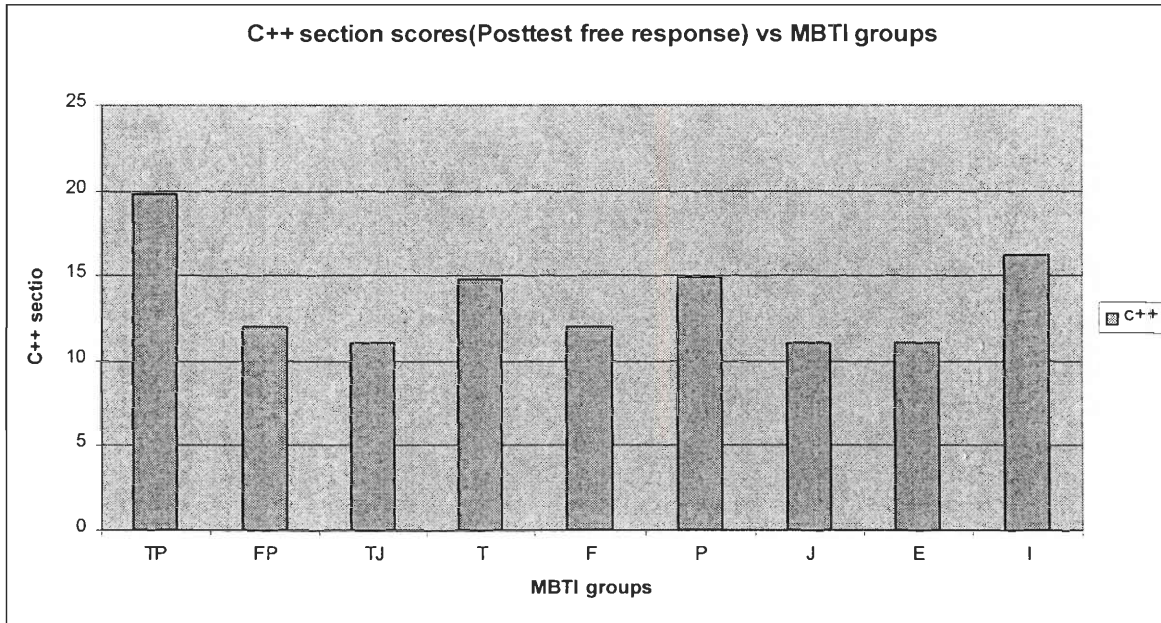
This section tested the ability of students to code using c++ syntax. The programs did not involve any object oriented programming elements. The trend is the usual one but in this case the FP's are slightly ahead of the TJ's.
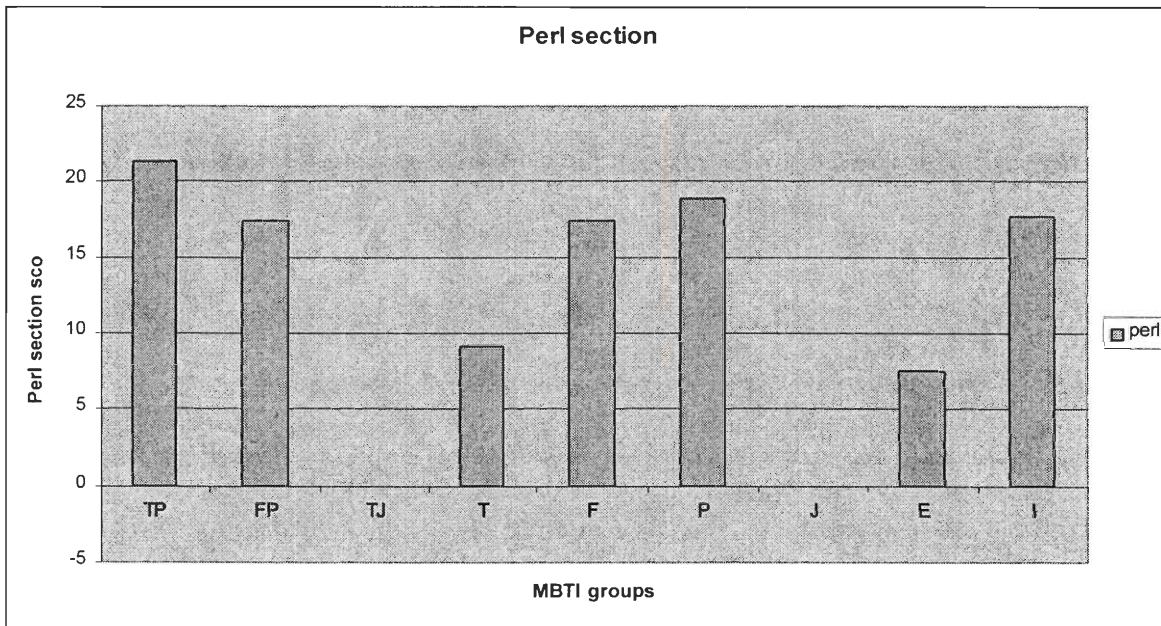
Perl section

The FP's are ahead in this one. None of the TJ's made it to the perl part of the course. This section tested mostly perl syntax and the T's fell behind the F's while the differences between the other groups remained the same.

HTML: designing simple web pages
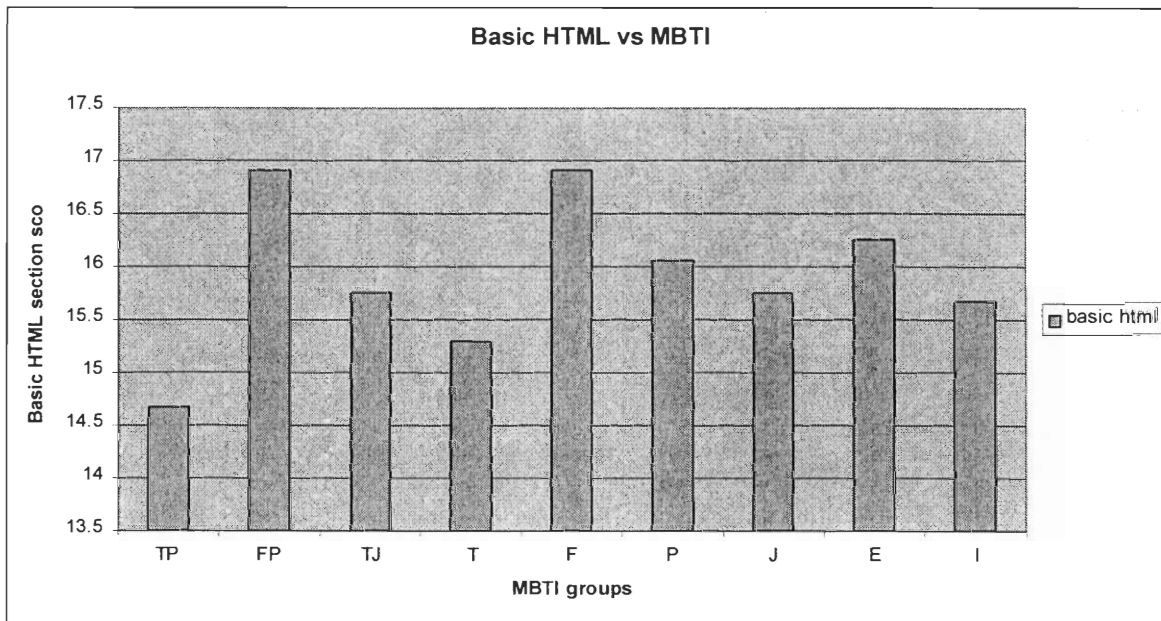
There were a number of reversals in this section.

In this section the E's scored higher than the I's and the T's scored lower than the F's. The FP's scored higher than the TJ's who scored higher than the TP's. So we see people who did not do very well in the programming sections excelling at HTML. One of the most important reasons that this happened is because a number of students spent a lot of time on HTML when they were supposed to be working on other programming assignments. So it is not surprising that these students had an excellent knowledge of HTML.

Advanced HTML (frames) vs MBTI groups
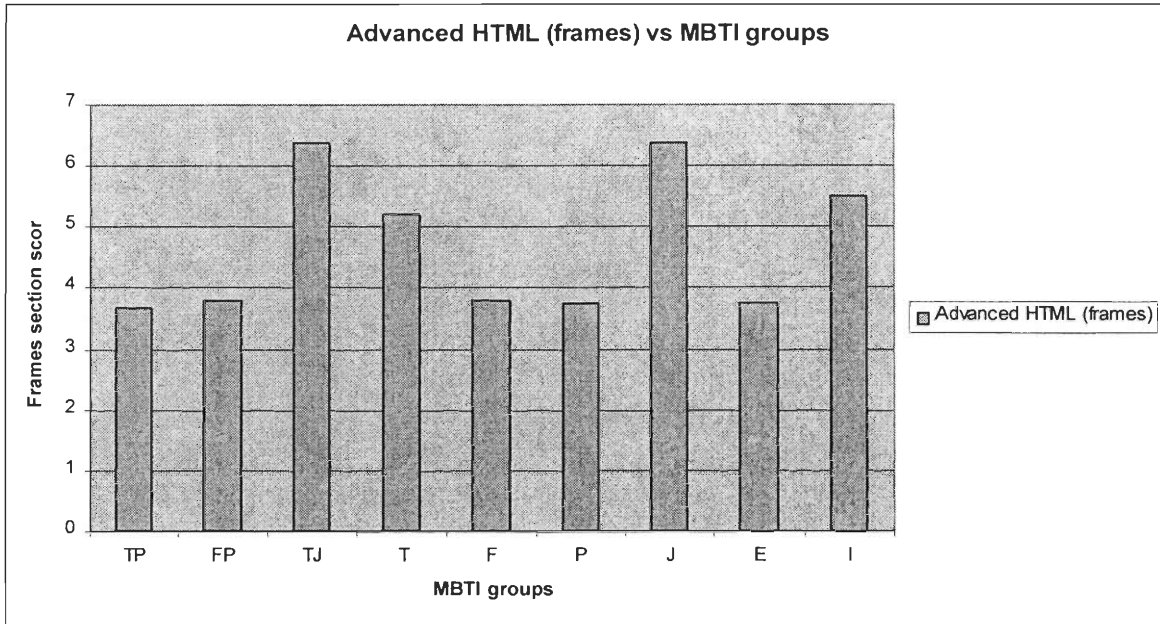
This section continues to show some trends opposing the general trends present in the pretest and posttest. Even though the T's managed to stay ahead of the F's and the I's lead ahead of the E's. The J's were ahead of the P's and subsequently the TJ's were ahead of the FP's who were ahead of the TP's.

6.3 Socializing patterns

In addition to a connection between test scores and MBTI, there were also some connections between socialization patterns and MBTI. The layout of the room was not recorded and is being represented from memory. It looked something like the following (=== represents a row of computers):

```
===========================        ===========================
                    INFP                    ENFP
                    1                       2
===========================        ===========================
            ENFP                                    INTP
            3                                        4
===========================        ===========================
INTP                    ENFP            INTJ            ISFP
5                       6               7               8
===========================        ===========================
        Instructor    Instructor      ENTJ  ENTJ  INTJ  ENFP
                                      9     10    11    12
===========================        ===========================
Instructor    Instructor            INTP
                                    13
```
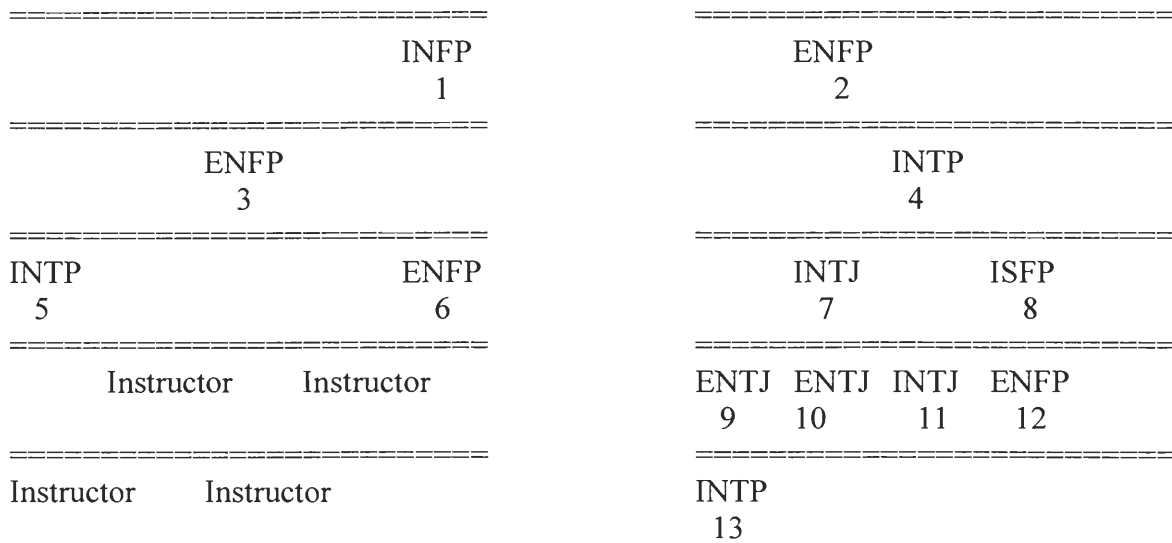
The J's somehow ended up seated next to each other and the group of 4 J's (7,9,10,11) socialized a fair amount and could be seen hanging around together. The INTP's (4,5,13) even though they were far away in terms of their seating positions would move around and talk to each other and the ENFP (6) also socialized with them, These 4 liked to play games and would often engage in games over the network after the afternoon session. The ENFP in the front row (2) would also join them sometimes when they were chatting but did not play any games with them. INFP (1) would usually be by himself looking up stuff on the internet. ENFP (3), also kept mostly to himself, he would listen to music and browse the web in his free time. Students 8 (ISFP) and 12 (ENFP) also hung out together

a bit, student 8 would browse the web in his spare time and sometimes play games alone while student 12 would often finish his work early and play text based games on the internet.

6.4 Minitab Statistical analysis

Minitab was used to carry out statistical analysis to gauge the significance of trends we observed.

After importing the following table from the spreadsheet into Minitab

Myers 1	Myers 2	Myers 3	Myers 4	How Long
I	N	T	J	6
E	N	T	J	6
I	N	T	J	3
E	N	T	J	0.5
I	N	T	P	6
I	N	T	P	6
I	N	T	P	1
E	N	F	P	2
I	S	F	P	2
E	N	F	P	2
E	N	F	P	2
E	N	F	P	0
I	N	F	P	0.5

A 2 sample T-Test was run between the two types of Myers 3 and "How long" (they had been programming in years). The hypotheses being tested were:

H0 : $\mu(T) = \mu(F)$ or $\mu(T)- \mu(F)=0$

(in other words :The average experience of the two Myers 3 types Thinkers and feelers is equal)

Ha: $\mu(T) != \mu(F)$ or $\mu(T)- \mu(F) !=0$

Two-Sample T-Test and CI

```
Two-sample T for C11

C9            N      Mean      StDev    SE Mean
F             6      1.417     0.917     0.37
T             7      4.07      2.52      0.95

Difference = mu (F) - mu (T)
Estimate for difference:  -2.65
95% CI for difference: (-5.08, -0.23)
T-Test of difference = 0 (vs not =): T-Value = -2.59  P-Value = 0.036  DF = 7
```

The program automatically calculates the mean and standard deviation and indicates the statistical significance of the difference in means between the F and T types. In this case the significance p is 0.036 or in other words there is a 3.6% chance that the difference in means is not due to an actual difference between the population means but other random reasons. Therefore at the 0.05 level of significance there is enough evidence to reject the null hypothesis (H0). So we can conclude that the average level of programming experience of Thinkers and Feelers is not equal.

Student performance vs. Student experience

Correlations: Percentage, How Long
```
Pearson correlation of Percentage and How Long = 0.636
P-Value = 0.020
```

This result indicates that there is a significant correlation between the percentage score on the final test and the experience that the students had coming into the program.

Improvement in student performance
To determine whether the students performance had actually improved on the pre-test we compared the means of the pre-test with the post-test.

Two-Sample T-Test and CI: Total Post multiple, Total pretest multiple

```
Two-sample T for Total Post multiple vs Total pretest multiple

              N      Mean     StDev    SE Mean
Total Po    13      12.19     3.79      1.1
Total pr    13       5.23     3.32      0.92

Difference = mu Total Post multiple - mu Total pretest multiple
Estimate for difference:  6.96
95% CI for difference: (4.07, 9.86)
T-Test of difference = 0 (vs not =): T-Value = 4.98   P-Value = 0.000   DF = 23
```

This result indicates that there was a significant improvement in the performance of

students after the program.

7 Conclusion

This section contains a summary of the work done in this project as well as possibilities for future work.

7.1 Summary

The initial goal of this project was to improve the assessment of students in frontiers. Along the way through the research conducted for this project and the additional data collected allowed the project to become much more. The number of students was unfortunately only 13 which made it hard to get many statistically significant results, however it did give us the advantage of getting to know the students better and being able to closely monitor and aid their progress through the program.

Using correlation analysis we were able to see how students who joined the program with more experience generally did better on all the tests than students who joined with less experience. We were also able to see a statistically significant improvement in scores of students after the program using the "t-test". Every single student this year did better than the post-test multiple choice section than on the same test when it was administered at the beginning of the program. This was a relief since a similar survey the previous year had shown no clear improvement in scores. Frontiers is a self paced program and in previous years students had been allowed to skip sections. Based on the suggestion of an IQP conducted in 1999 we decided to closely monitor the progress of students via quizzes and personal observation to ensure that students didn't skip around the material without understanding it.

We found some interesting results in our MBTI vs. performance analysis. There were a number of trends that we were able to identify by charting MBTI vs. performance on different sections, like Introverts scoring higher than the Extroverts, the Thinkers outscoring the Feelers, the Perceivers outscoring the Judgers. We also found some trends in combinations of types like TP's scoring higher than the TJ's who scored higher than the FP's. Similar trends have been observed in studies conducted on aptitude tests. However, we failed to verify the statistical significance of these findings. Most of the differences and correlations were not significant on the $p=0.05$ level which is widely used as a criteria to test significance. This can be attributed to the small sample size of only 13 students. At the same time we did notice a strong correlation between MBTI types who performed well and those who had more experience. So it is possible that the true cause-effect relationship was between experience and scores and not MBTI and scores. Another interesting finding was the reversal of a number of trends in scores in the basic html section. It was observed that a number of students spent a lot more time on HTML than they did on other activities. Even though HTML was only supposed to be done in the afternoon's, some people got so carried away that they could be found working on their web pages during the morning hours which had been designated for programming. Even though no data was collected on the number of hours devoted by students to each section, our hunch is that the extroverts were the ones who devoted a lot of time to their web pages. Number of hours spent on sections could be another useful statistic to collect for future work.

The Extroverts were behind on most tests, yet they did really well on the Basic HTML section and even surpassed the Introverts by a small margin. This is just from memory,

however, it did seem like HTML was a way for the Extroverts to really express themselves and they took a lot of time to do so. A lot of the extroverts had complex layouts, colorful backgrounds and generally more self expression than web pages created by the introverts whose web pages usually met only the basic criteria.

7.2 Future Work

Based on the results of this IQP, more surveys could be carried out to find relationships between MBTI and performance in the various aspects of frontiers. Sample size should be a concern in future work.

In general the students in this year's Frontiers program showed weaknesses in the following areas of the course:

Syntax: Students knew the reasoning behind their programs but just couldn't get them down on paper with the right syntax).

Functions: Most students showed a mediocre understanding of functions, and they were unable to code functions with arguments and return types correctly.

Inheritance: Students were not able to apply the concept of inheritance in the final written test even though most of them were able to get the definition in the multiple choice section.

In order to improve the performance of students in these areas all aspects of the course pertaining to these areas need to be improved.

There are 3 basic ways to improve an instructional course.

1) Improve the material that is taught

2) Improve the way that the material is taught.

3) Improve the way learning is assessed and improve the feedback loop between assessment and learning.

The material being taught in frontiers is already of excellent quality and has evolved to meet the needs of the students. Based on feedback provided by students, the transition from JavaBOTL to Java might be too tough and could use a little more smoothening. More hands on examples might need to be added to the core material of the course in areas like inheritance and encapsulation to improve the students' understanding of the concepts of Object oriented programming.

Improving the way the material is taught would perhaps be a topic for another project. As such we did not delve into this area in any significant detail. However we would like to propose incorporating theories on learning, in particular , the curve of forgetting which suggests that course material should be designed with some review to improve retention. The reason we say this is because a great deal of students who were learning these languages for the first time just didn't remember enough to be able to write a program by themselves. Whether or not the students knew the concepts is also debatable even though most of them were able to answer definition type questions in the multiple choice section of the course.

The assessment that we produced was a step forward, in that it was able to give us a better picture of student learning before and after the program. The section of the assessment that needs immediate improvement is functions. The pre-test/post-test

multiple choice sections only had one question on functions and when the students got to the free response section of the post-test we noticed that almost all students had trouble with functions.

By learning from a previous project we were able to strengthen the feedback loop between learning and assessment by a bit. The results show the improvement in scores of students before and after the program. The next step could be to encourage the students to balance their time evenly among the material to be learned based on what their strengths and weaknesses are and what they would like to learn. Additionally more quests/quizzes need to be added to assess learning in the areas where mediocre learning was demonstrated this year, namely: syntax, functions and inheritance.

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<u>Learning and Teaching Styles in College Science Education</u>

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Description of learning and assessment theories

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Appendix A: Frontiers Pre-Test

#1. (MS) Check your name
a) Christopher Baker
b) Alejandro Castano
c) Bismoy Dasgupta
d) Jeffrey Jin
e) Justin Kneitel
f) Steven McCarter
g) Eoin McGrotty
h) Mark Mosely
i) None of these
#2. (MS) Check your name
a) Theodore Phillips
b) Evan Ray
c) Paul Ruggieri
d) Dan Starr
e) Johnny Vargas
f) Michael Warren.
g) Ashlee Snodgrass
h) Brian O'Donnell
i) None of these
#3. (MS) How long have you been programming?
a) I have never programmed
b) Less than a year
c) One year
D) Two years
e) Three years
f) Since I was little
#4. (MM) Click all the languages you have programmed with:
A) Ada
B) Assembler
C) BASIC
D) C
E) C++
F) HTML
G) Java
H) Javascript/VBScript
I) Lisp
J) Logo
K) Pascal
L) Perl
M) Prolog
N) Scheme
O) Visual Basic
P) XML
Q) RoBOTL
!HI

#5. (MS) How did you learn to program. (Check the best source if you used more than one)
a) Taught myself using the web
b) Taught myself using books
c) Took a course in high-school
D) Took a college programming course
e) Other
#6. (MS) Many programming languages access a data value using a name. This name is called a:
a) Data Name
B) Variable
c) Data Type
d) Method
e) Don't know
#7. (MS) When programming, we often want to store "lists" of the same type data. This can be done with a data type known as a/an:
a) Reference
b) Struct
C) Array
d) Pointer
e) Don't know
#8. (MS) What is the value of x after the program at
penguin.wpi.edu:4546/course/Frontiers/pretest/p1.html executes?
What is the value of x after the program below executes?

```
x = 0
y = 1
if y equals x then
{
  x = x + 1
}
else
{
  x = x - 1
}
```
a) -2
b) -1
c) 0
d) 1
e) 2
f) Don't know

#9. (MS) What is the value of x after the program at
penguin.wpi.edu:4546/course/Frontiers/pretest/p2.html executes?

What is the value of x after the program below executes?

```
x = 0
while x does not equal 10
{
   x = x + 1
}
```

a) 8
b) 9
c)10
d) 11
e) Don't Know

a) 8
b) 9
C) 10
d) 11
e) Don't know
#10. (MS) When you program, do you tend to put all the code into one main function, or separate your program into different functions/subroutines?
a) I put all the code together
B) I use functions
c) What's a function?
#11. (MM) What object-oriented languages have you programmed in?
a) SmallTalk
B) C++
C) Java
d) Other
e) None
#12. (MS) In Object-Oriented languages a class is
A) A general template used to create objects with similar features
b) A specific template used to create a single object
c) A function called many times
d) A function called once
e) Don't know
!C
#13. (MS) Using inheritance
a) You can create entirely different classes
B) You can define classes similar to other classes
c) You can make your functions known to all other functions
d) Don't know
#14. (MS) To create an object of a particular class
a) You declare it
b) You define it
C) You instantiate it

d) Don't know

#15. (MS) Have you programmed in java? (You can skip the rest if you haven't)

A) Yes

b) No

#16. (MS) How did you learn to program in Java? (Check the best source if you used more than one)

a) Taught myself using the web

b) Taught myself using books

c) Took a course in high-school

D) Took a college programming course

e) Other

#17. (MS) How many line (approximately) were there in the largest Java program you have written?

a) Less than 10 lines

b) 10 - 50 lines

c) 60 - 100 lines

d) 100- 200 lines

F) 200 + lines

#18. (MS) Have you ever written a Java Applet?

A) Yes

b) No

#19. (MS) Have you written a Java program that displays graphics?

A) Yes

b) No

#20. (MS) Have you written a Java program that plays sounds?

A) Yes

b) No

#21. (MS) Have you written a Java program that handle mouse events?

A) Yes

b) No

#22. (MS) What does the program at penguin.wpi.edu:4546/course/Frontiers/pretest/p3.html do?

```
// Program to calculate 'n' Mystery numbers

public class Mystery {

    private int n;

    public Mystery(int number){
        n = number;
    }

    public void myst(){
        int first = 0;
        int second = 1;
        int count = n;
```

```java
        int temp ;
        System.out.print("" + first);
        count = count - 1;
        if(count > 0)
            {
                System.out.print("\t" + second);
                count = count - 1;
            }
        for(int i=count ; i>0 ; i--)
            {
                temp = first + second ;
                System.out.print("\t" + temp);
                first = second;
                second = temp;
            }
    }

    public static void main(String args []){
        Mystery mymyst = new Mystery(10);
        mymyst.myst();
    }
}

}
```
a) Computers n factorial
b) Computes the nth Fibonacci number
c) Computes the sum of the first n numbers
d) Don't Know

a) Computes n factorial
B) Computes the nth Fibonacci number
c) Computes the sum of the first n numbers
d) Don't know
#23. (MS) If you wanted to use a standard class that comes with java in a java program you had written, how would you enable your program to
use it?
a) Use the Import statement
B) Use the Include statement
c) Try to find the code for the class and copy it into the program
d) Don't know
#24. (MS) Which of the following best describes the code at
penguin.wpi.edu:4546/course/Frontiers/pretest/p4.html

```java
    public class Enigma
    {
```

```
        int a;
        int b;
    }
```

a) It declares a function with two variables
b) It instantiates a class with 2 integer variables
C) It declares a class with 2 integer variables
d) It instantiates 2 integer variables
e) Don't know
#25. (MS) In C++, the cout stream can be used to output
a) Strings
b) Integer values
c) Floating point values
D) Any of these
e) None of these
f) Don't know

Appendix B: Progress Tables

Standard Modules

Alejandro Castano

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0										
1									2	1		1	
2											1	1	
3											1		
4				3	1	1							
5							3.5						
6								3.5					1
7													
8													
9													
10													

Ashlee Snodgrass

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0		0	0										
1	1								3	2			
2				4							4		
3					5							4	
4						3	4						
5								7					
6													
7													2
8													
9													
10													

Bismoy Dasgupta

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0													
1									4	4			
2	2												
3		2											
4			2								2		
5													
6				2	1								
7						8						3	
8													
9													
10													

Brian O' Donnel

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0				0				
1						3	3						
2								6					
3										1	1	1	1
4													
5													
6													
7													
8													
9													
10													

Chris Baker

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0										
1									8				
2										2			
3											4	4	
4				7	5								
5													
6													
7													
8													
9													
10													

Dan Starr

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0								
1						2	3	4	2				
2										1	1	2	
3													1
4													
5													
6													
7													
8													
9													
10													

Eoin McGrotty

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0										
1									7	4			
2				3									
3					3								
4						2							
5													
6							7						
7													
8													
9													
10													

Evan Ray

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0								
1						2	4	5	5				
2											3		
3												3	
4												2	2
5													
6													
7													
8													
9													
10													

Jeff Jin

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0		0								
1				2					5				
2				2							3		
3												5	
4						3							
5							5					5	
6								7					
7													
8													
9													
10													

Mark Mosley

	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0								
1						6			5	1			
2						6							
3							6						
4								8					
5													
6													
7													
8													
9													
10													

Stephen Mccarter

Days	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0													
1	8								9	7			
2	8												
3		8											
4			7										
5				6									
6					7								
7						8					7		
8													
9													
10													

Paul Ruggierei

	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0								
1									4				
2													
3						4	4			2	4	5	
4													1
5								6					
6													
7													
8													
9													
10													

Ted Phillips

	Rob 1	Rob 2	Rob 3	JB 1	JB 2	Java 1	Java 2	Java 3	Unix	HTML 1	HTML 2	HTML 3	Applets
0	0	0	0	0	0								
1						3	4	4	2	2			2
2											1	2	
3													
4													
5													
6													
7													
8													
9													
10													

Optional Modules

ays	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML	SGML	XML	JLab1	JLab2	Jlab3
0														
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														

Optional Modules (condensed version, up to DHTML, which was the furthest students reached)

Alejandro Castano

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Ashlee Snodgrass

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									

69

Days	9

	9								
	10								

Bismoy
Dasgupta

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Brian O' Donnel

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4						5	5		
5	2	0	0	0					
6									
7									
8									
9									
10									

Chris Baker

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									

8									
9									
10									

Dan Starr

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4	1	2	0	0	2	2	5		
5								0	5
6									
7									
8									
9									
10									

Eoin McGrotty

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Evan Ray

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5	0	0	0	0	3	1	4		
6									
7									
8									

9									
10									

Jeff Jin

Days	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Mark Mosley

	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Paul Ruggierei

	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
0									
1									
2									
3									
4									
5									
6									
7									
8									

	9								
	10								

Ted Phillips

	C++ 1	C++ 2	C++ 3	C++ 4	Perl 1	Perl 2	Perl 3	Jscript1	DHTML
Skipped									
Day 1									
Day 2									
Day 3									
Day 4									
Day 5									
Day 6									
Day 7									
Day 8									
Day 9									
Day 10									

Appendix C: Frontiers Post-Test

Frontiers Post Test

1. My first Myers-Briggs letter is:
a) I
b) E

2. second
a) N
b) S

3. third
a) T
b) F

4. fourth
a) P
b) J

5. Many programming languages access a data value using a name. This name is called a:
a) Data Name
b) Variable
c) Data Type
d) Method
e) Don't Know

6. When programming, we often want to store "lists" of the same type of data. This can be done with a data type known as a/an:
a) Reference
b) Struct
c) Array
d) Pointer
e) Don't know

7. What is the value of x after the program at
penguin.wpi.edu:4546/course/Frontiers/pretest/p1.html
Code:
What is the value of x after the program below executes?

```
x = 0
y = 1
if y equals x then
{
    x = x + 1
}
else
{
    x = x - 1
}
```
a) -2
b) -1
c) 0
d) 1
e) 2
f) Don't know

8. What is the value of x after the program at

penguin.wpi.edu:4546/course/Frontiers/pretest/p2.html
Code:

```
What is the value of x after the program below executes?

What is the value of x after the program below executes?

x = 0
while x does not equal 10
{
    x = x + 1
}
```

a) 8
b) 9
c)10
d) 11
e) Don't Know

9. In Object-Oriented languages a class is
a) A general template used to create objects with similar features
b) A specific template used to create a single object
c) A function called many times
d) A function called once
e) Don't Know

10. Using inheritance
a) You can create entirely different classes
b) You can define classes similar to other classes
c) You can make your functions known to all other classes
d) Don't Know

11. To create an object of a particular class
a) You declare it
b) You define it
c) You instantiate it
d) Don't Know

12. What does the program at
penguin.wpi.edu:4546/course/Frontiers/pretest/p3.html do?

```
What does the following program output?


// Program to calculate 'n' Mystery numbers

public class Mystery {

    private int n;

    public Mystery(int number){
        n = number;
    }

    public void myst(){
        int first = 0;
```

```
            int second = 1;
            int count = n;
            int temp ;
            System.out.print("" + first);
            count = count - 1;
            if(count > 0)
                {
                    System.out.print("\t" + second);
                    count = count - 1;
                }
            for(int i=count ; i>0 ; i--)
                {
                    temp = first + second ;
                    System.out.print("\t" + temp);
                    first = second;
                    second = temp;
                }
        }

    public static void main(String args []){
        Mystery mymyst = new Mystery(10);
        mymyst.myst();
    }
}

}
```
a) Computers n factorial
b) Computes the nth Fibonacci number
c) Computes the sum of the first n numbers
d) Don't Know

13. If you wanted to use a standard class that comes with java in a java program you had written how would you enable your program to use it
a) Use the import statement
b) Use the include statement
c) Try to find the code for the class and copy it into the program
d) Don't Know

14. Which of the following best describes the code at
penguin.wpi.edu:4546/course/Frontiers/pretest/p4.html

```
        public class Enigma
        {
            int a;
            int b;
        }
```

a) It declares a function with two variables
b) It instantiates a class with 2 integer variables
c) IT declares a class with 2 integeter variables
d) It instantiates 2 integer variables
e) Don't Know

15. In C++, the cout stream can be used to output
a) Strings
b) Integer values

c) Floating point values
d) Any of these
e) None of these
f) Don't Know

16. Documents fail to be conforming because:
a) Incorrect HTML
b) no HTML comments
c) extended character set
d) no document type declaration
e) Don't Know

17. The perl code: #!/usr/local/bin/perl
a) is a comment
b) is incorrect
c) addresses the Perl interpreter
d) Generates the first line of a conforming HTML document
e) Don't Know

18. Included in the java language are (check all that apply)
a) Pointers
b) Typedefs)
c) Structs
d) Exceptions
e) Don't Know

19. Javascript programs
a) Are processed by the network
b) Are interpreted by the server
c) Are interpreted by the client
Possible error in test 2 c's??
d) Are compiled by the client
e) Don't Know

20. Perl programs
a) Are processed by the network
b) Are interpreted by the server
c) Are interpreted by the client
d) Are compiled by the client
e) Don't Know

21. The Halting Problem
a) Says that it takes too long to write a program to detect infinite loops
b) Says that it is impossible to write an infinite loop
c) Says that it is impossible to write a program to detect infinite loops
d) Says that a program to detect infinite loops takes too long to execute
e) Don't Know

22. In the Towers of Hanoi Program, to move 64 disks takes approximately
a) .6 centuries
b) 6 centuries
c) 60 centuries
d) 600 centuries
e) 6000 centuries
f) Can't Figure it out

Frontiers post-test, non multiple choice section

Simple Programming Questions: Use any programming language you like. (Java/JavaBOTL, Robotl or C++ preferred)

1. **Write a program to calculate the sum of all natural numbers from 0 to 100 (including hundred)**
   You may use any programming language or pseudo code for this question
   Hint: Use a loop
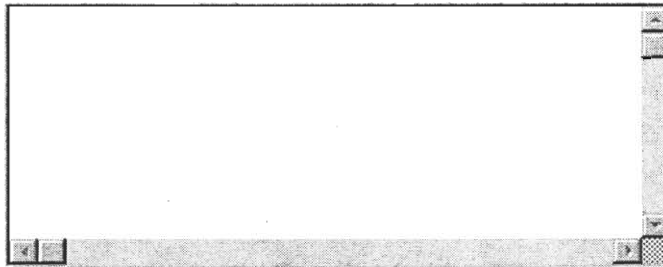
Object Oriented Questions : Use any programming language you like. (Java/JavaBOTL, Robotl or C++ preferred)

2. **Write a smart_bot that extends the class basic_bot**
   Add a function turnright() that makes the smart_bot turn right.
   Assume that the class basic_bot exists and has a function turnleft() defined that makes the bot turn left once.
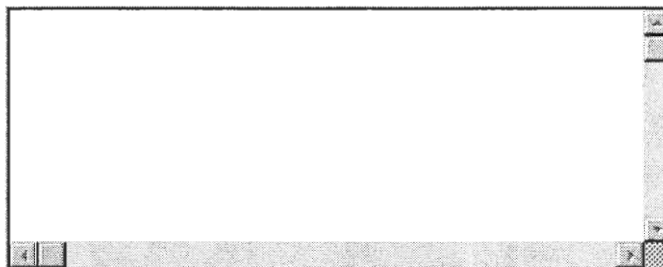
3. **Let's say you have a class with a variable x in it. How could you provide a way for someone who wants to use your class to change the value of x without ever having to deal with x directly? (Hint: *functions*)**

Java Questions (Use java only for this section)

4. **Write a line of code in Java to create/instantiate a 3 by 3 array**

5. **Write a few lines of code in Java to initialize/fill up the 3 by 3 array you created in the previous question with all 0's**

6. **Suppose you have an array of 10 Numbers, write a function that will loop through these numbers, adding 1 to each number that is greater than zero.**

7. **Create a simple class definition with two integer variables (say X and Y) and one class method that returns the sum of the two integers**
    This class can be named anything you want .
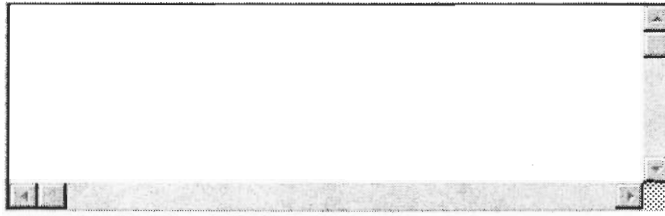
8. Using the simple class you just wrote, create another class that is a sub-class of it,
with two additional integer variables and one method that returns the sum of all four variables
Bonus: Try to create this method without accessing the two integer variables of the super class directly.
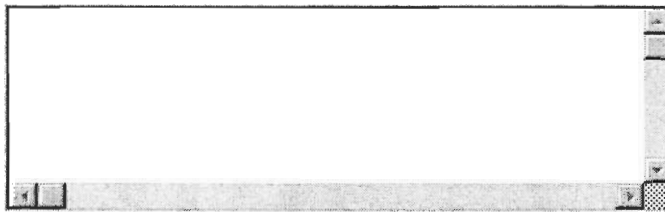
9. Write a statement to create an instance of one of the classes you created in the last 2 questions.
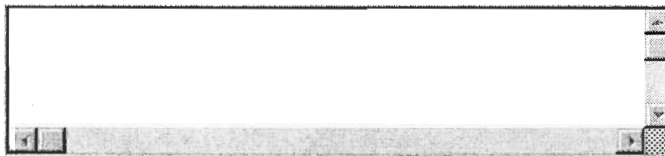
Advanced Java Questions

10. Write a short paint function for an applet to draw a grid for a tic-tac-toe board and display the message "Game Ready!" below the grid. Two vertical lines and two horizontal lines will suffice for the board.
Remember: g.drawLine(x1,y1,x2,y2) draws a line between the points x1,y1 and x2,y2

11. Write a function that checks whether any player has won in row 1 of your Tic-tac-toe
board. Assume that Board has been stored in a globally accessible 3 by the 3 array : Board[row][column] , the array can contain the following values in each of its cells:
0: signifies that the cell is empty
1: signifies that the cell is marked by player 1
2: signifies that the cell is marked by player 2
The function should return 0 if the row has no winner or the player number of the winner. (to win in a row a player must have occupied all three cells in that row)
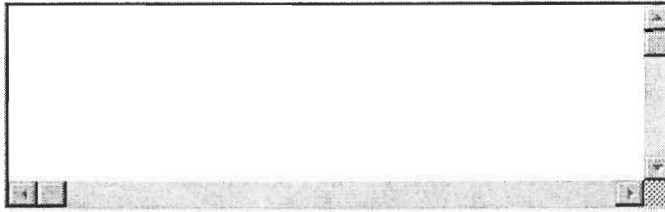
12. Modify the function you just wrote so that it takes the row to be checked as an integer parameter
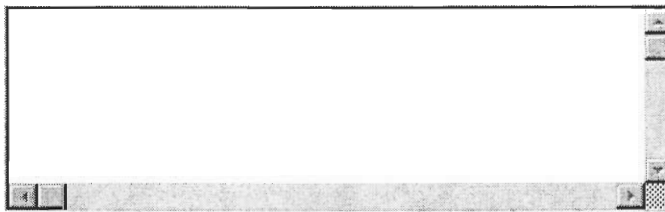
C++ Questions

13. Write a prototype for a C++ function that takes in 2 integer parameters and returns a float.

14. Take a look at the following block of if/else statements:
```
if (a == 1)
    cout<<"Player 1 wins"<<endl;
else if (a == 2)
    cout<<"Player 2 wins"<<endl;
else
    cout<<"Game tied"<<endl;
```
Rewrite the code shown above using switch/case statements
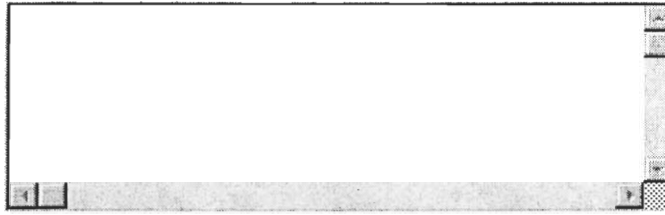
15. **Write a complete program (all the statements you would need for the program to compile properly),**
    which asks a user to input his/her name and responds by saying Hello to that person
    Sample Run:
    What is your name? Joe
    Hello Joe
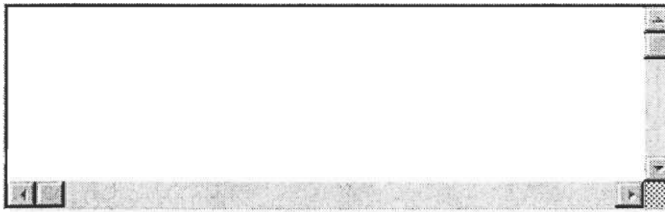
HTML Questions

16. **Write the HTML code for a very simple web page that has your name as its title and a few lines of text.**
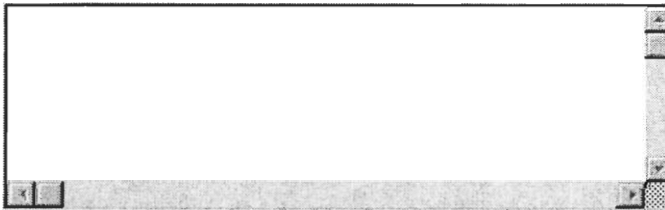
17. **Add a link to a search engine (like www.yahoo.com) on this page, and also add an image called random.jpg to your page, assume this file is present in the same directory as the web page.**

18. Now create another web page that has 2 frames one frame should act as a navigation frame and have 2 links inside it, When you click on these 2 links they should load up in the second frame. For example you could have one link to your home page and another link to the Frontiers page in the left frame and when the user clicks on them they would load up in the right frame.

Perl/cgi Questions

19. Write a short Perl program that asks the user to input 2 numbers and outputs the number that is greater than the other.
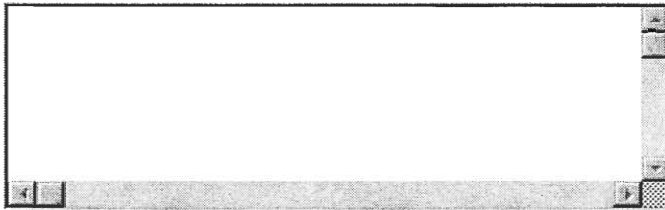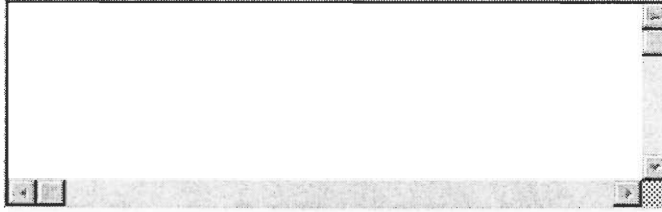
20. Write a program that asks the user how many favourite colors he/she has , then inputs them from the user and finally outputs the users name followed by all of his/her favourite colors. Use arrays for this program
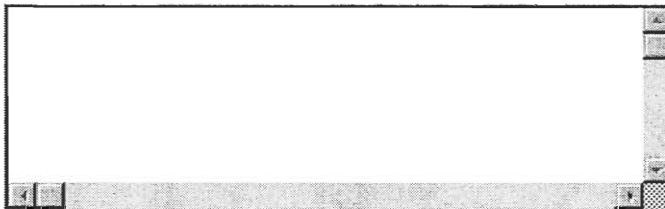
21. Create a form with the 2 text boxes
one box should ask for the users name
and the second one should ask for his email address. Add a submit button that posts the result to a custom cgi script called process.cgi and also have a reset button that allows the user to clear all fields and start over
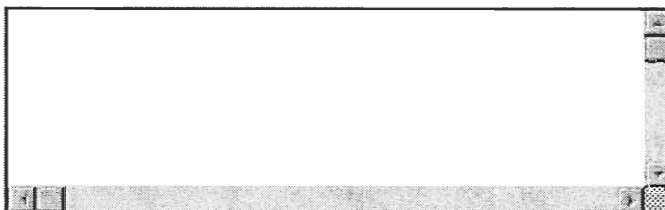
22. **Write a cgi script that processes the form that you wrote in the previous question, the script should send an email to the user saying:**
Hi, <name of user> , Welcome to WPI!.

Appendix D: Assessment Results

Frontiers Pre-Test Output

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From kal9801@cs.wpi.edu Mon Jul 10 11:05:37 2000
Date: Mon, 10 Jul 2000 09:47:11 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: your quiz has been sent

QUIZ: Frontiers Pretest
has been sent to the instructor

From kal9801@cs.wpi.edu Mon Jul 10 11:05:45 2000
Date: Mon, 10 Jul 2000 09:47:11 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from guest

STUDENT: guest
EMAIL:  kal@cs.wpi.edu
QUIZ TITLE:  Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:31:23 to 9:47:10

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (g)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c e . 2 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (e)is incorrect.
The correct answer is (b)

Question 7:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 8:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 9:Answered. The answer (b)is incorrect.
The correct answer is (c)
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Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:e . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (e)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (d) is correct.

From kal9801@cs.wpi.edu Mon Jul 10 11:06:13 2000
Date: Mon, 10 Jul 2000 09:45:00 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from jjin

STUDENT: jjin
EMAIL: jjin@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

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Quiz time: From 9:12:14 to 9:44:59

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (d)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c d e f g h k . 7 of them are
correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b c . 2 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (c)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (a) is correct.

Question 16:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (b)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (a) is correct.

Question 19:Answered. The answer (a) is correct.

Question 20:Answered. The answer (b)is incorrect.
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The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (b) is correct.

Question 23:Answered. The answer (a)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (c) is correct.

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:06:19 2000
Date: Mon, 10 Jul 2000 09:44:56 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from stephenm

STUDENT: stephenm
EMAIL: stephenm@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:37:56 to 9:44:51

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (f)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c . 1 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (e)is incorrect.
The correct answer is (b)

Question 7:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 8:Answered. The answer (f)is incorrect.
The correct answer is (b)

Question 9:Answered. The answer (e)is incorrect.

The correct answer is (c)

Question 10:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 11:Answered. The answers are:e . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (e)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:10:17 2000
Date: Mon, 10 Jul 2000 09:17:51 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from guest

STUDENT: guest
EMAIL: kal@cs.wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:6:2 to 9:17:50

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (b)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (f)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c f g h j . 5 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 8:Answered. The answer (f)is incorrect.
The correct answer is (b)

Question 9:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:d . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (b)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (a) is correct.

Question 16:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (d)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.

The correct answer is (a)

Question 19:Answered. The answer (a) is correct.

Question 20:Answered. The answer (a) is correct.

Question 21:Answered. The answer (a) is correct.

Question 22:Answered. The answer (a)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (a)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:10:38 2000
Date: Mon, 10 Jul 2000 09:11:32 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from jkneitel

STUDENT: jkneitel
EMAIL: jkneitel@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:5:55 to 9:11:27

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (e)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (f)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c e f j k . 5 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b d . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:10:53 2000
Date: Mon, 10 Jul 2000 09:09:25 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: your quiz has been sent

QUIZ: Frontiers Pretest
has been sent to the instructor

From kal9801@cs.wpi.edu Mon Jul 10 11:11:04 2000
Date: Mon, 10 Jul 2000 09:09:24 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from guest

STUDENT: guest
EMAIL: kal@cs.wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:2:56 to 9:9:21

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (h)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (d) is correct.

Question 4:Answered. The answers are:c f k . 3 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:e . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (e)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:11:11 2000
Date: Mon, 10 Jul 2000 09:09:01 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from cb

STUDENT: cb
EMAIL: cb@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 8:58:24 to 9:9:0

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (a)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:e f h . 3 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (a)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (b)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (a)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (a) is correct.

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (b) is correct.

Question 24:Answered. The answer (b)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (a)is incorrect.
The correct answer is (d)

STUDENT: bo
EMAIL: bo@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:2:37 to 9:8:8

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (h)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c d e f . 4 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.

The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (c) is correct.

Question 25:Answered. The answer (d) is correct.

From kal9801@cs.wpi.edu Mon Jul 10 11:11:28 2000
Date: Mon, 10 Jul 2000 09:07:05 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from as

STUDENT: as
EMAIL: as@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 8:59:17 to 9:7:4

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (g)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c e j k . 4 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.

The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

STUDENT: tphillip
EMAIL: tphillip@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 8:53:43 to 9:6:53

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (a)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (f)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c e f . 3 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (a) is correct.

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.

The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (b) is correct.

Question 23:Answered. The answer (b) is correct.

Question 24:Answered. The answer (c) is correct.

Question 25:Answered. The answer (d) is correct.

From kal9801@cs.wpi.edu Mon Jul 10 11:11:48 2000
Date: Mon, 10 Jul 2000 09:06:50 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from mwarren

STUDENT: mwarren
EMAIL: mwarren@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:0:38 to 9:6:47

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (f)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:d f k . 3 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:e . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (e)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (a)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

Subject: quiz received from bd

STUDENT: bd
EMAIL: bd@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 9:2:54 to 9:6:2

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (c)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (a)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c . 1 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (e)is incorrect.
The correct answer is (b)

Question 7:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 8:Answered. The answer (f)is incorrect.
The correct answer is (b)

Question 9:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 10:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 11:Answered. The answers are:e . 0 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (e)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (f)is incorrect.
The correct answer is (d)

From kal9801@cs.wpi.edu Mon Jul 10 11:12:06 2000
Date: Mon, 10 Jul 2000 09:04:50 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from dstarr

STUDENT: dstarr
EMAIL: dstarr@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 8:55:30 to 9:4:47

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (d)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (f)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c d e f g i k . 7 of them are
correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b c . 2 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (c) is correct.

Question 15:Answered. The answer (a) is correct.

Question 16:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (b)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (a) is correct.

Question 19:Answered. The answer (a) is correct.

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect..
The correct answer is (a)

Question 22:Answered. The answer (c)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (a)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (c) is correct.

Question 25:Answered. The answer (d) is correct.

From kal9801@cs.wpi.edu Mon Jul 10 11:12:13 2000
Date: Mon, 10 Jul 2000 09:00:40 -0400 (EDT)

From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from eray

STUDENT: eray
EMAIL: eray@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 8:52:54 to 9:0:36

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (b)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (d) is correct.

Question 4:Answered. The answers are:c e f . 3 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (b)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b d . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (a) is correct.

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (d)is incorrect.
The correct answer is (c)

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 23:Answered. The answer (d)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (e)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (d) is correct.

From kal9801@cs.wpi.edu Mon Jul 10 13:57:00 2000
Date: Mon, 10 Jul 2000 13:55:08 -0400 (EDT)
From: KAL Recourse MQP KAL-9801 <kal9801@cs.wpi.edu>
To: kal@cs.wpi.edu
Subject: quiz received from paulr

STUDENT: paulr
EMAIL: paulr@wpi.edu
QUIZ TITLE: Frontiers Pretest
QUIZ RESULT:

Quiz time: From 13:54:11 to 13:55:4

Summary:There are totally 25 questions.
25 of them were answered

Question 1:Answered. The answer (i)is incorrect.
The correct answer is (`)

Question 2:Answered. The answer (c)is incorrect.
The correct answer is (`)

Question 3:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 4:Answered. The answers are:c e . 2 of them are correct.
The correct answers are:a b c d e f g h i j k l m n o p q .

Question 5:Answered. The answer (c)is incorrect.
The correct answer is (d)

Question 6:Answered. The answer (b) is correct.

Question 7:Answered. The answer (c) is correct.

Question 8:Answered. The answer (b) is correct.

Question 9:Answered. The answer (c) is correct.

Question 10:Answered. The answer (b) is correct.

Question 11:Answered. The answers are:b . 1 of them are correct.
The correct answers are:b c .

Question 12:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 13:Answered. The answer (b) is correct.

Question 14:Answered. The answer (c) is correct.

Question 15:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 16:Answered. The answer (e)is incorrect.
The correct answer is (d)

Question 17:Answered. The answer (a)is incorrect.
The correct answer is (e)

Question 18:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 19:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 20:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 21:Answered. The answer (b)is incorrect.
The correct answer is (a)

Question 22:Answered. The answer (b) is correct.

Question 23:Answered. The answer (a)is incorrect.
The correct answer is (b)

Question 24:Answered. The answer (b)is incorrect.
The correct answer is (c)

Question 25:Answered. The answer (d) is correct.

Frontiers Post-Test Output

Name
1:Alejandro Castano

```
 Simple Programming
2:int count=0;
for(int x=0;x<=100;x++)
{
    count=count+x
}
```

```
 OOps
3:class smart_bot extends basic_bot
   {
          public void turnright()
          {
            for (int i = 0;i < 3;i++) turnleft();
          }
   }
```

4:you call the name of the function were you assign the
value of x.

```
 Java
5:int board= new int[3][3];
```

```
6:int board = new int[3][3];
for(int row=0;row<3;row++)
{
   for(int col=0; col<3;col++)
   {
       board[row][col] = 0;
   }
}
```

```
7:for(int i=0;i<10;i++)
{
  if(Numbers[i]>0)
    {
      Number[i]=Number[i] + 1;
    }
}
```

```
8:import java.awt.*;
import java.applet.*;
```

```
public class sum extends Applet
{
     int x;
     int y;
     int sum;

     public void init()
     {
         resize (200,100);
     }

     public void sum( Graphics g )
     {
         sum = x+y;
         g.drawString("X + Y = " + sum, 25, 25);
     }
}

9:public class sum extends Applet
{
     int x;
     int y;
     int sum;

     public void init()
     {
         resize (200,100);
     }

     public void sum( Graphics g )
     {
         sum = x+y;
         g.drawString("X + Y = " + sum, 25, 25);
     }

     public class xy(Graphic g)
     {
          int a;
          int b;
          int total;
          public void total()
          {
            total=a+ b + sum;
          }
     }
}

10:-------
skipped

11:import java.awt.*;
import java.applet.*;
```

```java
public class TTT extends Applet
{
    int board [][];
    int curPlayer;
    boolean over;

    public void init ()
    {
     resize(300,400);
        board = new int[3][3];
     curPlayer = 1;
     over=false;
        for (int row=0; row<3; row++)
          {
           for(int column=0; column<3; column++)
                {
                 board[column][row] = 0;
                }
          }
    }

    public void paint( Graphics g )
    {
     g.drawLine(0,50,150,50);
     g.drawLine(0,100,150,100);
     g.drawLine(50,0,50,150);
     g.drawLine(100,0,100,150);

     if(board[0][0]==0 && board[1][0]==0&&
        board[2][0]==0 && board[0][1]==0&&
        board[0][2]==0 && board[1][1]==0&&
        board[1][2]==0 && board[2][1]==0&&
        board[2][2]==0)
          {
           g.drawString("Game ready",40,170);
          }
        }
}

12:public void paint( Graphics g )
    {
       if(board[0][0]==0 && board[1][0]==0&&
          board[2][0]==0 && board[0][1]==0&&
          board[0][2]==0 && board[1][1]==0&&
          board[1][2]==0 && board[2][1]==0&&
          board[2][2]==0)
            {
             g.drawString("Game ready",40,170);
            }
       else
            {

            if((board[0][0]==board[1][0])&&
               (board[1][0]==board[2][0])&&
```

```
                  (board[2][0]!=0))
                  {
                    g.drawLine(0,15,150,15);
                    if(board[2][0]==1)
                        {
                          g.drawString("Player X has won", 20,
170);
                          over=true;
                        }
                    else
                        {
                          over=true;
                          g.drawString("Player O has won", 20,
170);
                        }
                  }
            else if((board[0][0]==board[0][1])&&
                  (board[0][1]==board[0][2])&&
                  (board[0][1]!=0))
                  {
                    g.drawLine(25,0,25,150);
                              if(board[0][1]==1)
                                  {
                          over=true;
                                  g.drawString("Player X has
won", 20, 170);
                                  }
                        else
                                  {
                          over=true;
                                  g.drawString("Player O has
won", 20, 170);
                                  }
                  }
                  }
      }
13:public void paint( Graphics g )
   {
       for(int row=0; row<3; row++)
          {
            for(int column=0; column<3; column++)
                {
                  if(board[column][row]==1)
                      {
                        g.drawString("X", column*50+20, row*50
+20);
                      }
                  else if(board[column][row]==2)
                      {
                        g.drawString("O",
column*50+20,row*50+20);
                      }
```

```
                    }
                }
        if(board[0][0]==0 && board[1][0]==0&&
            board[2][0]==0 && board[0][1]==0&&
            board[0][2]==0 && board[1][1]==0&&
            board[1][2]==0 && board[2][1]==0&&
            board[2][2]==0)
            {
              g.drawString("Game ready",40,170);
            }
        else
            {
            if((board[0][0]==board[1][0])&&
                (board[1][0]==board[2][0])&&
                (board[2][0]!=0))
                {
                  g.drawLine(0,15,150,15);
                  if(board[2][0]==1)
                    {
                      g.drawString("Player X has won", 20,
170);
                      over=true;
                    }
                else
                    {
                      over=true;
                      g.drawString("Player O has won", 20,
170);
                    }
                }
            else if((board[0][0]==board[0][1])&&
                (board[0][1]==board[0][2])&&
                (board[0][1]!=0))
                {
                  g.drawLine(25,0,25,150);
                        if(board[0][1]==1)
                            {
                      over=true;
                              g.drawString("Player X has
won", 20, 170);
                            }
                        else
                            {
                      over=true;
                              g.drawString("Player O has
won", 20, 170);
                            }
                }
        }

    C++
14:main()
```

```cpp
{
    int ix;
    int iy;
    float TZ;
    TZ=ix+iy;
    return 0;
}
```

```cpp
15:switch (a)
{
    case 1: cout<<"Player 1 wins";
    break;
    case 2: cout<<"Player 2 wins";
    break;
    default: cout<<"Game tied";
    break;
}
```

```cpp
16:#include <iostream.h>  // for input and output

        int main(void)
        {

            cout << "What is your name? ";

            char name;
            cin >> name;

            cout << "Helo " << name << "." << endl;
        }
```

HTML
```html
17:<html>

<body>

<title>ACastano's Place</title>

<p align="center">
<strong>
Hello everybody. This is my place. blah blah blah...
I have to write a few lines of text so...
blah blah blah blah blah blah blah blah blah blah blah
blah blah blah blah blah blah blah blah blah blah blah
blah blah blah blah blah blah blah blah blah blah blah...
That's it... Wait for me WPI!!!!
<strong>
</p>
</body>
</html>
```

```html
18:<html>
```

```
<body>

<title>ACastano's Place</title>

<p align="center">
<strong>
Hello everybody. This is my place. blah blah blah...
I have to write a few lines of text so...
blah blah blah blah blah blah blah blah blah blah blah
blah blah blah blah blah blah blah blah blah blah blah
blah blah blah blah blah blah blah blah blah blah blah...
That's it... Wait for me WPI!!!!
<strong>
</p>
<p align="center">
<a href="http://www.yahoo.com">
Click here to go to Yahoo!.
</a>
<img src="random.jpg">
</p>
</body>
</html>

19:<html>
<body>
        <title>Alex Castano @ WPI </title>
        <head><title>Frames Example</title></head>
        <frameset rows="50%,50%" border=1>
            <frameset cols="100%,*">
                    <frame scrolling="yes" name="frame1">
                    <p align="center">
                    <a href="http://www.wpi.edu"
target="frame2">
                    Click to WPI
                    </a>
                    </p>
                    <p align="center">
                    <a href="http://www.wpi.edu/~acastano"
target="frame2">
                    Click to my page (Although it's not
there anymore! ha ha ha)
                    </a>
                    </p>
            </frameset>
            <frameset cols="100%,*">
                    <frame scrolling="yes" name="frame2">
            </frameset>
        </frameset>
</body>
</html>

 Perl
20:--- din't do perl ---
```

```
21:--- didn't do perl ---
22:--- didn't do perl ---
23:--- didn't do perl ---
```

Name
1:Ashlee Snodgrass

 Simple Programming
2:include java.awl.*

```
int sum;
int change;

public class mathadd extends Rob(int change, int sum);
sum=0;
change=0;
while(int change>101);
  {
   change+1=change;
   sum+change=sum;
}
```

 OOps
3:public class smart_bot extends basic_bot;
```
{
turnleft();
}
public void turnright();
{
turnleft();
turnleft();
turnleft();
}
```

4:

 Java
5:board[3][3]= new board[][];
6:if(column; column>0; column++);
```
{
if(row; row>0; row++)
{
board[row][column]=0
}
}
```
7:
8:int total
public class addup()
```
{
int x;
int y;
```

 addup=x+y

```
}

9:
public class addup()
{
int x;
int y;


 addup=x+y
}
public class inadd() extends addup
{
int c;
int d;
c+d=inadd;
}
inadd+addup=total


10:addup+1;
11:include java.awl
include java.applet


public void graphics(g.graphics)
{
g.drawLine(0, 50, 150, 50);
g.drawLine(0, 100, 150, 100);
g.drawLine(50, 0, 50, 150);
g.drawLine(100, 0, 100, 150);
g.drawString("Game Ready!!!!", 50, 200)
12:public int winner()
{
if((((board[0][0]==board[1][0])&&(board[1][0]==board[2][0]))&&
board[0][0]!=0))
{win=board[0][0];
if(win==1)
{
g.drawString("Player 1 wins!!!!", 50, 200);
winner=1;
init;
}

if(win=2)
{
g.drawString("Player 2 wins!!!!", 50, 200);
winner=2;
init;
}
if(win=0)
{
winner=0;
}
}
13:
```

```cpp
 C++
14:float x=int x + int y
15:switch as()
{
case 1(a==1)
cout<<"Player 1 wins"<< endl;
case 2(a==2)
cout<<"Player 2 wins"<<endl;
case 3(a!=1, a!=2)
cout<<"Game Tied"<<endl;
}
16:
```

```html
 HTML
17:<html>
<head>
<title>Ashlee Snodgrass</title></head>
<body>
This is my psudowebpage.
</body>
</html>
18:<html>
<head>
<title>Ashlee Snodgrass</title></head>
<body>
This is my psudowebpage.
<a href="www.google.com",google.com</a>
<img src="random.jpg">
</body>
19:<html>
<head>
<title>Ashlee</title>
</head>
```

```perl
 Perl
20:
21:
22:
23:
```

From kal9801@cs.WPI.EDU Wed Jul 19 09:27:21 2000
Date: Wed, 19 Jul 2000 09:26:44 -0400 (EDT)
From: kal9801@cs.WPI.EDU
To: undisclosed-recipients: ;

Name
1:Bismoy Dasgupta

 Simple Programming
2:public class calculate extends Rob

 OOps
3:define
{
 WolrdEntity Home;
 smart_bot adam at 5,5;
}
execute
{
 smart_bot extends basic_bot;
 tell adam:
  {
   turnright;
  }
 turnright
  {
   turnleft;
   turnleft;
   turnleft;
  }
}
4:

 Java
5:i don't remember the java commands because i did all of it yesterday
afternoon
6:if (row=0; row<3; row++)
{
 if (column=0; column<3; column++)
}
7:
8:
9:don't know
10:don't know
11:g.drawLine(0, 50, 150, 50);
g.drawLine(0, 100, 150, 100);
g.drawLine(50, 0, 50, 150);
g.drawLine(100, 0, 100, 150);
g.drawString("Game Ready!", 50, 200);
12:if ((Board[0][0] == 1) &&
    (Board[1][0] == 1) &&
    (Board[2][0] == 1))
  { g.drawString("Winner", 10, 30)}
if ((Board[0][0] == 2) &&
    (Board[1][0] == 2) &&
    (Board[2][0] == 2))

```
  { g.drawString("Winner", 10, 30)}

13:don't know

 C++
14:didn't learn C++
15:didn't learn
16:didn't learn

 HTML
17:<html>
<head>
<title> Bismoy's Page</title>
</head>
<body>
<h3> Right now I am taking the Frontiers Strive Computer science class
final test.</h3>
</body>
</html>
18:<body>
<h3>...</h3>
<a href="http://www.yahoo.com">Search engine</a>
<IMG src="random.jpg">
19:<html>
<head><title></title></head>
<frameset 50%>
 <frame1="title1.html">
 <frame2="title2.html">
</frameset>
</html>
<html>//title1
<head><title></title></head>
<body>
<a href="index.html">My Home Page</a>
<a href="http://www.webrecourse.org">Frontiers Page</a>
</body>
</html>

 Perl
20:didn't learn perl
21:didn't learn
22:didn't learn

23:didn't learn
```

Name
1:Brian O'Donnell

 Simple Programming
2:#include <iostream.h>

```
void main()
{
    int sum = 0;
    for(int x=0; x <=100; x++)
       sum += x
    cout << sum << endl;
}
```

 OOps
```
3:public class smart_bot extends basic_bot
{
    botloc[10][10];
    botdir; // uses 8 = n, 6 = e, 2 = s, 4 = w

    turnright()
    {
       if(botdir == 8)
          botdir = 6;
       else if(botdir == 6)
          botdir = 2;
       else if(botdir == 2)
          botdir = 4;
       else if(botdir == 4)
          botdir = 8;
    }
}
```
4:make a public function

 Java
```
5:int array[3][3];
6:for(int x=0; x < 3; x++)
   for(int y=0; y<3; y++)
      array[x][y] = 0;
7:for(int x=0; x < 10; x++)
{
   if(array[x] > 0)
      array[x] += 1;
}

8:class myclass {
   private:
       int x, y;
   public:
       int sum myfunc(int x, int y)
};
9:class myclass2 extends myclass {
```

```
   private:
      int a, b;
   public:
      int sum_all myfunc2(int a, int b, int x, int y)
};
10:myinstance myclass2;
11:public void paint(Graphics g)
{
   g.drawLine(50, 0, 50, 150);
   g.drawLine(100, 0, 100, 150);
   g.drawLine(0, 50, 150, 50);
   g.drawLine(0, 100, 150, 100);
   g.drawString("Game Ready", 25, 175);
}
}
12:int winner checkwin(int Board)
{
if ((Board[0][0] == 1) &&
    (Board[1][0] == 1) &&
    (Board[2][0] == 1))
    {
        drawstring("Player 1 Wins");
        return 1;
    }

else if ((Board[0][0] == 2) &&
    (Board[1][0] == 2) &&
    (Board[2][0] == 2))
    {
        drawstring("Player 2 Wins");
        return 2;
    }

else
   return 0;
}
13:int winner boardwin (int Board, int row)

 C++
14:float num1  myfunc(int x, int y);
15:switch (a)
   case 1:
      cout<<"Player 1 wins"<<endl;
      break;
   case 2:
      cout<<"Player 2 wins"<<endl;
      break
   default:
       cout<<"Game tied"<<endl;

16:#include <iostream.h>

void main()
{
   char stringin[20];

   cout << "What is your name?";
```

```
   cin >> stringin;
   cout << "Hello" << stringin;
}
```

 HTML
```
17:<HTML>
<TITLE>
Brian
</TITLE>
<BODY>
code on the page
</BODY>
</HTML>
18:<A HREF = "www.yahoo.com", Yahoo </A>
19:I dont remember the syntax for doing frames
```

 Perl
```
20:n/a
21:n/a
22:n/a
23:n/a
```

```
From kal9801@cs.WPI.EDU Wed Jul 19 10:20:42 2000
Date: Wed, 19 Jul 2000 09:46:04 -0400 (EDT)
From: kal9801@cs.WPI.EDU
To: undisclosed-recipients:  ;

Name
1:Chris Baker

 Simple Programming
2:import java.awt.*
import java.applet.*

public class sum extends applet
{
  int x
Public void init()
{ x = 0;
  resize(150,50);
}

 public int sum()
      {
      for (x<101)
        { x= (x + x + 1);}

      return x;
      }
public void paint( Graphics g)
      {g.drawString(X,25,25)}
}

 OOps
3:smart_bot extends basic_bot

    smart_bot Smarty= new smart_bot

      public void turnright()
      {turnleft;
       turnleft;
       turnleft;}

4:public class dolphin extends applet
   {int x;
     public void init()
     {x = 0;
    public int changex()
     {x= x/453.7689689767689767897679
      return x;}

 Java
5:int Board[3][3];
6: int test;
public void init()
{resize(150,150)
 test = 0;

{public void filler()
```

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```
      int row;
      int column;
    for (row = 0; row<3; row++)
        {
               for (column = 0; column<3; column++)
             {Board[row][column]=0;}
            if (Board[row][column] == 0)
             {test = 1}
      public void paint (Graphics G)
            if ( test == 1)
          g.drawString("O",column*50+25,row*50=25)
}}}
7:int Array[x];
 if (x>0)
  x=(x+1)
 else
  x=x
8:public class SUMer extends applet
{int x;
int y;
int z;
public void init()
{x=4574578;
y=1.37847487437387433;
z=0;}
public int SUM()
{z=(x+y)
return z;}


9:public class SUMer2 extends SUMer
 {int a;
  int b;
  int c;
  int ans;
  public void init()
   {a = 343.5535;
    b = 69;
    c = 0;
    ans = 0;}
  public void SUM2()
    {c = (a + b)
     sum(x,y);
     ans = (z + c);
     }
}
10:a=45784587457854
b=5784578478487

11:public void paint(Graphics g)
g.drawLine(50,0,50,150)
g.drawLine(100,0,100,150)
g.drawLine(0,50,150,50)
g.drawLine(0,100,150,100)
g.drawString("Game Ready!", 175, 43)

12:if (Board[0][0] == 1 || Board[0][1] ==1 || Board[0][2] == 1)
```

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```
   //X wins
if (Board[0][0] == 2 || Board[0][1] ==2 || Board[0][2] == 2)
   //O wins
if (Board[0][0] == 0 || Board[0][1] ==0 || Board[0][2] == 0)
   {if (CurPlayer == 1)
    CurPlayer = 2;
    else
    CurPlayer = 1;}


13:if (Board[0][0] == 1 || Board[0][1] ==1 || Board[0][2] == 1)
    //X wins
    win = 1;
if (Board[0][0] == 2 || Board[0][1] ==2 || Board[0][2] == 2)
   //O wins
   win = 2;
if (Board[0][0] == 0 || Board[0][1] ==0 || Board[0][2] == 0)
   win = 0;
   {if (CurPlayer == 1)
    CurPlayer = 2;
    else
    CurPlayer = 1;}



 C++
14:int x;
int y;
float z;
cin >>x>>
cin>>y>>
return z;

15:switch(2)
case(0)
 cout<<"Game tied"<<endl;
case(1)
 cout<<"Player 1 wins"<<endl;
case(2)
 cout<<"Player 2 wins"<<endl;
16:#include iostream.h

int main()
{int x;
Cin>>"What is your name?">>x>>
cout<<"Hello"<<x<<
}


 HTML
17:<HTML>
<HEAD><TITLE>Chris Baker</title></head>
<Body bgcolor="Blue" text="green">
<P>
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
```

```
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
</Body>
</html>
18:<HTML>
<HEAD><TITLE>Chris Baker</title></head>
<Body bgcolor="Blue" text="green">
<P>
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
 I'm Blue Da Boo Dee Da Boo Dy Doo Da Boo Dee Da Boo Dy Doo
Da Boo Dee Da Boo Dy!!
<a href="www.yahoo.com"><img src="random.jpg" alt="man this
 is random"><BR>come Visit Yahoo</a>
</Body>
</html>

19:<frameset 30%,*>
  <frame name="left">
  <frame name="right">
</frameset>


 Perl
20:
21:
22:
23:
```

Name
1:Dan Starr

 Simple Programming
2:#include <iostream.h>

```
main() {
int sum=0;
for (int i=0;i<=100;i++) {
sum += i;
}
cout << sum;
return 0;
}
```

 OOps
3:class smart_bot extends basic_bot {

```
void turnright() {
turnleft();
turnleft();
turnleft();

}
}
```
4:create a function that accesses and changes x, for example:

```
void myClass::changeX(int c) {
x=c;
}
```

 Java
5:int array[3][3];
```
6:for (int i=0;i<3;i++) {
   for (int j=0;j<3;j++) {
      array[i][j] = 0;
   }
}
7:for (int i=0;i<10;i++) {
    if (array[i] > 0) array[i] += 1;
}

8:class blah {
   int x=1,y=5;

   int function() {
      return x+y;
   }
}
9:class blah2 {
```

```
    blah obj = new blah();
    int a=2,b=6;
    int function2() {
      return (obj.function() + a + b)
    }
}
10:blah obj = new blah();
11:void paint(Graphics g) {
  g.drawLine(50,0,50,150);
  g.drawLine(100,0,100,150);
  g.drawLine(0,50,150,50);
  g.drawLine(0,100,150,100);
  g.drawString("Game Ready!",75,175);

12:
int won() {
if ((Board[0][0] == 1) && (Board[1][0] == 1) && (Board[2][0] == 1))
return 1;
else if ((Board[0][0] == 2) && (Board[1][0] == 2) && (Board[2][0] ==
1)) return 2;
else return 0;
}

13:int won(int row) {
if ((Board[0][row] == 1) && (Board[1][row] == 1) && (Board[2][row] ==
1)) return 1;
else if ((Board[0][row] == 2) && (Board[1][row] == 2) && (Board[2][row]
== 1)) return 2;
else return 0;
}


 C++
14:float function(int x, int y);
15:switch(a) {
case 1:
cout << "Player 1 wins" << endl;
break;
case 2:
cout << "Player 2 wins" << endl;
break;
otherwise:
cout << "Game tied" << endl;
}

16:#include <iostream.h>

main() {
cout << "What is your name? ";
int a;
cin >> a;
cout << "Hello " << a << "\n";
}


 HTML
17:<html>
```

```
<head><title>Dan Starr</title></head>
<body>
Hello..how are you doing?
</body>
</html>
18:<a href="http://www.yahoo.com">www.yahoo.com</a>
<img src="random.jpg">

19:<html>
<head><title>Hello</title></head>
<body>
<frameset cols="30%,*">
<frame src="nav_page.html">
<frame src="main_page.html" name=main>
</frameset>
</body>
</html>


*************NEW PAGE CALLED nav_page.html***********
<html>
<head><title>nav page</title></head>
<body>
<a href="http://www.wpi.edu" target="main">www.wpi.edu</a>
<a href="http://www.frontiers.com" target="main">www.frontiers.com</a>
</body>
</html>


 Perl
20:print "Input first number\n";
$num1 = <STDIN>;
print "\ninput second number";
$num2 = <STDIN>;
if ($num1>$num2) {
print $num1;
}
else { print $num2; }

21:print "how many favorite colors do you have?";
$colors = <STDIN>
foreach $rep ($colors) {
@array[rep] = <STDIN>;
}
print "Dan Starr";
foreach $key (@array) {
print @array[$key];
}

22:<form action="process.cgi" method="POST">
   Your name: <input type="text" name="name">
<br>   Your email address: <input type="text" name="email">
<br><input type="submit" value="Send">
<br><input type="reset" value="Reset">
</form>

23:#!/usr/local/bin/perl
read(STDIN, $buffer, $ENV(CONTENT_LENGTH));
```

```
$mailprog = '/usr/sbin/sendmail';
OPEN($mailprog);
print MAIL "recipient: $FORM($email);
print MAIL "Hi, $FORM($name), Welcome to WPI!;
```

```
From kal9801@cs.WPI.EDU Wed Jul 19 10:29:46 2000
Date: Wed, 19 Jul 2000 10:25:51 -0400 (EDT)
From: kal9801@cs.WPI.EDU
To: undisclosed-recipients:  ;

Name
1:Eoin Mc Grotty

 Simple Programming
2:for x > 0,x<=100,x++;
let x=x+1;

 OOps
3:public class smart_bot extends basic_bot
turnright()
4:x=y+p

 Java
5:board[][][]
6:
7:for x>0,x<=10,x++;
x=x+1;
8:public class Help extends Eoin
int =x;
int +y;

public class paint(g graphics)


9:
10:
11:public class paint(g graphics)
g.drawLine(0,50,150,50);
g.drawLine(0,100,150,100);
g.drawLine(50,0,50,150);
g.drawLine(100,0,100,150);
g.drawLine(0,100,150,100);
g.drawString("Game Ready",40,175);
12:CurPlayer()
CurPlayer=1;
13:

 C++
14:
15:
16:cout("Eoin")

 HTML
17:<html>
<title>Eoin Mc Grotty></title>
<body>
<p><u>Hi my name is Eoin</u></p>
</body>
</html>
18:<a href ="www.yahoo.com">
<img src ="random.jpg">
19:<html>
```

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```
<title>Eoin Mc Grotty2</title>
<frameset cols50% "x.html">
<a href ="www.search.com">
<a href ="www.yahoo.com">
<frameset row20%"y.html">
<bla bla>
</frameset>
</frameset>

 Perl
20:
21:
22:
23:
```

Name
1:Evan Ray

 Simple Programming
```
2:int count = 0;
for(int i = 0; i <= 100; i++)
{
   count += i;
}
```

 OOps
```
3:public class smart_bot : basic_bot()
{
   void turnright()
   {
      turnleft();
      turnleft();
      turnleft();
   }
}
```
4:We can create a modifier function in this class which can be
called taking in the new value for x as a parameter, and
then sets x to equal this parameter.

 Java
```
5:int thistestisbad[][] = new thistestisbad[3][3];
6:for(int i = 0; i < 3; i++)
{
   for(int p = 0; p < 3; p++)
   {
      thistestisbad[i][p] = 0;
   }
}
7:for(int i = 0; i < 10; i++)
{
   if(array[i] > 0)
   {
      array[1] += 1;
   }
}
8:class BOO (int num1, int num2)
{
   int X = num1, Y = num2;
   int sum()
   {
      return X + Y;
   }
}
9:class more extends BOO (int num1, int num2)
{
   int A = num1, Z = num2;
   int blah()
```

```
    {
       return sum() + A + Z;
    }
}
10:BOO ouch(1,234);
11:paint(Graphics g)
{
    g.resize(200, 200);
    g.drawLine(0, 50, 150, 50);
    g.drawLine(0, 100, 150, 100);
    g.drawLine(50, 0, 50, 150);
    g.drawLine(100, 0, 100, 150);
    g.drawString("Game Ready!", 20, 175);
}
12:int funct()
{
    if((Board[0][0] == Board[0][1]) && (Board[0][0] == Board[0][2]) &&
Board[0][0] != 0)
    {
       return Board[0][0];
    }
    else
    {
       return 0;
    }
}
13:int funct(int r)
{
    if((Board[r][0] == Board[r][1]) && (Board[r][0] == Board[r][2]) &&
Board[r][0] != 0)
    {
       return Board[r][0];
    }
    else
    {
       return 0;
    }
}

 C++
14:float function (int num1, int num2);
15:switch(a)
{
    case 1:   cout << "Player 1 wins" << endl;
              break;
    case 2:   cout << "Player 2 wins" << endl;
              break;
    default:  cout << "Game tied" << endl;
}
16:#include <iomanip.h>

int main()
{
    string name;
    cout << "What is your name?   ";
    cin >> name;
    cout << "\n\nHello, " << name;
```

```
   return 0;
}

 HTML
17:<HTML>
<HEAD><TITLE>Welcome to my homepage</TITLE></HEAD>
<BODY>
Hi.  My name is Evan Ray.  This is a terrible web site, but oh well.
</BODY>
</HTML>
18:You can use a <a href = "http://www.yahoo.com">search engine</a> to
find stuff.
<p>
<img src = "random.jpg">
19:

 Perl
20:print "Please input number 1:  ";
$num1 = <STDIN>;
print "\nPlease input number 2:  ";
$num2 = <STDIN>;
print "\n\n";
if($num1 > $num2)
{
   print $num1;
}
else if($num1 < $num2)
{
   print $num2;
}
21:print "What is your name?  ";
$name = <STDIN>;
print "\n\nHow many favorite colors have you got?  ";
$numcolors = <STDIN>;
@colors;
print "\n\n";
for($i;$i < $numcolors; $i += 1)
{
   print "Enter a favorite color:  ";
   $colors[$i] = <STDIN>;
}
print
"\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n";
#yeah I could use a for loop for that but hey I'm lazy=P
print "Your name is $name.";
for($i = 0; $i < $colors; $i += 1)
{
   print "\n$colors[$i]";
}
22:<FORM method = "post" action = "process.cgi">
<INPUT TYPE = "text" name = "Name">
<input type = "text" name = "Email">
<input type = "submit" ...there's other stuff that goes here dont
remember what tho...>
<input type = "reset" ....see comment above...>
</form>
23:$name = param("Name");
```

```
$email = param("Email");
...
blah blah blah
...
print "Hi, $name, Welcome to WPI!"
```

Name
1:Jeffrey Jin

 Simple Programming
```
2:int num=0;

while (num<=100)
(
num +=1;
}
```

 OOps
```
3:public class smart_bot extends basic_bot
{
   public void run ()
}
   turnleft ()
4:public class x extends Applet
{
   int Open[];
   public void init ()
   {
   for (int = x)
   }
```


 Java
```
5:Board = new int [3][3;
6:public void init ()
{
Board= new int[3][3];
for (int=0; i<3; row++)
{
for (int=0; i<3; column++)
{
Board[i][i] = O;
}

7:for (int i=0, i<10, i++)
   {
if (Array[i]>=0)
   {
(i+1)
8:public class New extends Applet
{
   int X;
   int Y;
   int Z;

public void init()
  {
```

```
  for (int X)&& for (int Y)
  {
    (Z= int X + int Y)
9:
10:
11:public void paint (Graphics g)
{
   g.drawLine (0, 50, 150, 50)
   g.drawLine (0, 100, 150, 100)
   g.drawLine (50, 0, 50, 150)
   g.drawLine (100, 0, 100, 150)
   g.drawString ("Game Ready!", 90, 200);



12:Board= new int [3][3];
   for (int row=0; row<3, row ++)
   {
   if
((Board[0][0]==Board[0][1]&&(Board[0][1]==Board[0][2]&&(Board[0][2]==Bo
ard[0][0]))
   {
   player = Board [row][1];
   }
   if (player == 1)
   {
   g.drawString ("Player 1 wins!", 120, 240);
   over=true;
   }
   if (player == 1)
   {
   g.drawString ("Player 2 wins!", 120, 240;
   over=true;
   }
13:Board= new int [3][3];
   for (int row=0; row<3, row ++)
   {
   if
((Board[0][0]==Board[0][1]&&(Board[0][1]==Board[0][2]&&(Board[0][2]==Bo
ard[0][0]))
   {
   player = Board [row][1];
   }
   if (player == 1)
   {
   g.drawString ("Player 1 wins!", 120, 240);
   over=true;
   }
   if (player == 1)
   {
   g.drawString ("Player 2 wins!", 120, 240;
   over=true;
   }

 C++
14:
15:
```

```
16:

 HTML
17:<html>
<header>
<title>Jeff</title>
</header>
<body>
<p>
Welcome to my page!
<br>
Feel free to look around.
<br>
Read on!
</body>
</html>




18:<a href="www.yahoo.com">yahoo>
<img src="random.jpg">
19:<html>
<head><title>Frame 1</title></head>
<frameset column="30%,">
<a href="google.com" target="framemain">
<a href="wpi.edu" target="framemain">
</frameset>
</html>

 Perl
20:
21:
22:
23:
```

Name
1:Mark Moseley

 Simple Programming
```
2:sum=0;
for (x=0; x<100;X++)
{
sum=sum+x;
}
```

 OOps
```
3:class smart_bot extends basic_bot
smartbot=new smart_bot

function turnright();
{
turnleft();
turnleft();
turnleft();
}
4:function (int x);
variable();
```

 Java
```
5:ary3by3[3][3];
6:for (rows=0, rows<3; row++);
  {
  for (cols=0, cols<0; cols++);
    {
    ary3by39[rows][cols]=0;
    }
  }
7:for (x=0, x<10; x++);
{
  if (numarray[x]>0);
  {
    numarray[x]=numarray[x]+`;
  }
}

8:class sum (int x, int y);
{
function sumnum (int a, int b);
  {
    sumnum=a+b;
  }
sumnum(x,y);
}
9:class subclass extends sumnum (int w, int z, int c, int d);
{
int sum;
sum=0;
```

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```
sum=sumnum(w,z)+sumnum(c,d);
}
10:subclass(var 1, var2, var3, var4);
11:function paint();
{
public();
window(0,150,0,200);
g.drawString("Game Ready", 75,200);
g.drawLine(0, 50, 150, 50);
g.drawLine(0, 100, 150, 100);
g.drawLine(50, 0, 50, 200);
g.drawLine(100, 0, 100, 200);
}
12:function checkwin();
{
win=0;
if (Board[0][0]==Board[0][1]);
{
   if (Board[0][1]==Board[0][2]);
   {
     win=Board[0][0];
   }
}
}
13:function checkwin(int row);
{
win=0;
if (Board[row][0]==Board[row][1]);
{
   if (Board[row][1]==Board[row][2]);
   {
     win=Board[row][0];
   }
}
}

 C++
14:
15:switch (a);
case 1;
{
cout<<"Player 1 wins"<<endl;
break;
}
case 2;
{
cout<<"Player 2 wins"<<endl;
break;
}
case 3;
{
cout<<"Game tied"<<endl;
break;
}
}
16:*I have no clue what goes at the beginning. I know its something.*
```

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```
string name;

cout<<"What is your name?"<<endl;
cin<<string<<endl;
cout<<"Hello"<<name<<endl;

 HTML
17:<html>
<head>
<title>Mark Moseley</title>
</head>
<body>
<center><b>I'm not going to pass this test.</b></center>
</body>
</html>


18:<a href="http://www.yahoo.com">Yahoo</a><BR>
<img src="random.jpg">;
19:<frame>
<frameset rows=20%>
< *something* name=sidelinks value="sidelinks.html">
< *something* name=main value="index.html">
</frameset>
</frame>

 Perl
20:#!user/bin/perl
use(*don't know*);


print "input number";
<STDIN>=$jkl;
print "another one!";
<STDIN>=$asdf;
$sum=$jkl+$asdf;
print "$sum";


21:#!user/bin/perl
use(*don't know*);

print"name";
<STDIN>=$user;
print"how many favorite colors";
<STDIN>=$many
@$user[$many];
foreach ($x=0, $x<$many; $x++);
{
print"input color";
$user[$x]=<STDIN>;
}
print "$user";
foreach ($x=0, $x<$many; $x++);
{
print "$user[$x}";
}
```

```
22:<Form method = "post" action="process.cgi">
<input type="text" name="username">
<input type="text" name="email">
<input type="submit" name="submit" value="submit">
<input type="reset" name="reset" value="reset">
</form?
23:#!/user/bin/perl

param($email)=email;
param($name)=name;

print "<acion='mailto:$email'>";
print "Hi, $name, welcome to WPI!";
```

```
From kal9801@cs.WPI.EDU Wed Jul 19 09:27:15 2000
Date: Wed, 19 Jul 2000 09:22:04 -0400 (EDT)
From: kal9801@cs.WPI.EDU
To: undisclosed-recipients:  ;

Name
1:Paul Ruggieri

 Simple Programming
2://  using c++
int counter = 0;

for(int x=0; x<=100; x++)
    counter += x;

 OOps
3:public class smart_bot extends basic_bot
{
    public turnleft()
    {
        for(int x=0; x<3; x++)
            turnright();
    }
}
4:public void assignX(int x)
{}

 Java
5:int example[][] = new int[3][3];
6:int board[][] = new int[3][3];
for(int r=0; r<3; r++)
    for(int c=0; c<3; c++) example[r][c] = 0;
7:public void add1(int num[])
{
    for(int x=0; x<10; x++)
        if(num[x] > 0) num[x]++;
}
8:public class test()
{
    int x, y;
    public int Sum()
    {
        return(x+y);
    }
}

9:public class test2 extends test()
{
    int a, b;
    public int SumAll()
    {
        return(sum()+a+b);
    }
}

10:test temp = new test();
11:public void paint extends graphics(Graphics g)
```

```
{
    resize(300,200);
    g.drawLine(50,0,50,200);
    g.drawLine(100,0,100,200);
    g.drawLine(0,50,200,50);
    g.drawLine(0,100,200,100);
    g.drawString("Game Ready!",250,75);
}
12:public int Winner()
{
    if(board[0][0] == board[0][1] &&
        board[0][0] == board[0][2]) return board[0][0];
    return 0;
}
13:public int Winner(int row)
{
    if(board[row-1][0] == board[row-1][1] &&
        board[row-1][0] == board[row-1][2]) return board[row-1][0];
    return 0;
}
```

 C++
```
14:float FunctionName(int, int);
15:switch(a)
{
    case 1:
        cout << "Player 1 Wins" << endl;
        break;
    case 2:
        cout << "Player 2 Wins" << endl;
        break;
    case default:
        cout << "Game Tied" << endl;
        break;
}
16:#include<iostream.h>

int main()
{
    char name[15];
    cout << "Please input your name " << endl;
    cin >> name;
    cout << "Hello " << name;
    return 0;
}
```

 HTML
```
17:<html>
<head>
<title>Paul Ruggieri</title>
</head>
<body>
This is random text that is aligned on the left side of the screen!!!
</body>
</html>
18:<html>
<head>
```

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```
<title>Paul Ruggieri</title>
</head>
<body>
This is random text that is aligned on the left side of the
screen!!!<br>
<a href="http://www.yahoo.com">A Search Engine</a><br>
<img src="random.jpg>
</body>
</html>
19:<!-- Frames page --!>
<html>
<head>
<title>Frames page</title>
</head>
<frameset cols="20%,80%">
<frame src="navbar.html">
<frame src="main.html" name=main>
</frameset>
</html>

<!-- main page --!>
<html>
<head>
<title>Paul Ruggieri</title>
</head>
<body>
This is random text that is aligned on the left side of the
screen!!!<br>
<a href="http://www.yahoo.com">A Search Engine</a><br>
<img src="random.jpg>
</body>
</html>

<!-- navbar.html --!>
<html>
<head>
<title>random title</title>
</head>
<body>
<center>
<a href="randomlink1.html" target=main>Link 1</a><br>
<a href="randomlink2.html" target=main>Link 2</a>
</center>
</body>
</html>

 Perl
20:i didn't do any perl
21:i didn't do any perl
22:i didn't do any perl
23:i didn't do any perl
```

Name
1:Ted Phillips

 Simple Programming
```
2:int sum=0;
for(int x=0;x<=100;x++)
{sum=sum+x;}
```

 OOps
```
3:#include<basic_bot.h>
public class smart_bot
{
void turnright();
}

public void turnright()
{
turnleft();
turnleft();
turnleft();
}
```
4:create a function that would allow the client (someone) to send a
value to it and have that function make the needed changes.

 Java
```
5:int jeep[][];
jeep=new int[3][3];
6:for(int y=0;y<3;y++)
{for(int x=0;x<3;x++)
 {
 jeep[y][x]=0;
 }
}
7:for(int i=0;i<10;i++)
{
if(array[i]>0)
 {array[i]++;}
}
8:public class dog
{
int x;
int y;
int sum();
}
public int sum()
{return x+y;}
9:public class dog2g
{
dog tg;
dog th;

int fsum();
```

```
}
public int fsum()
{
return tg.sum+th.sum;
}
10:dog2g variable;
11:public paint(Graphics g)
{
g.drawLine(0,50,150,50);
g.drawLine(0,100,150,100);
g.drawLine(0,150,150,150);

g.drawLine(50,0,50,150);
g.drawLine(100,0,100,150);
g.drawLine(150,0,150,150);

g.drawString("Game Ready!",75,175);

}
12:public int checkwin()
{int winner=0;
if((Board[0][0]>0)&&((Board[0][0]==Board[0][1])&&(Board[0][1]==Board[0]
[2])))
    {
winner = Board[0][0];
    }
return winner;
}
13:public int checkwin(int row)
{int winner=0;
if((Board[row][0]>0)&&((Board[row][0]==Board[row][1])&&(Board[row][1]==
Board[row][2])))
    {
winner = Board[row][0];
    }
return winner;
}

  C++
14:float function(int x,int y)

15:
16:#include<iostream.h>
#include<string.h>

int main()
{
String name;
cout<<" what is your name? ";
cin>>name;
cout<<"hello "<<name;

return 0;}

  HTML
17:<html>
<title>ted's page</title>
```

```
<body>
hi ya...<br>
wassup??<br>
dog pie.<br>
</body>
</html>
18:<html>
<title>ted's page</title>
<body>
hi ya...<br>
wassup??<br>
dog pie.<br>
<a hreft="www.yahoo.com">click for yahoo!</a><br>
<img src="dog.jpg"><br>

</body>
</html>
19:

 Perl
20:print "input two numbers\n";
$num1=<stdin>;
$num2=<stdin>;
if($num1>$num2)
   {print "$num1\n";}
else
   {print "$num2\n";}
21:print "how many favorite colors do you have?\n";
$numc=<stdin>;
@dog[$numc];
while($numc>=0)
{$numc=$numc-1;
@dot[$numc]=<stdin>;}
22:
23:
```

```
INCOMPLETE SUBMISSION
From kal9801@cs.WPI.EDU Wed Jul 19 10:32:47 2000
Date: Wed, 19 Jul 2000 09:00:39 -0400 (EDT)
From: kal9801@cs.WPI.EDU
To: undisclosed-recipients:  ;

Name
1:Stephen C. McCarter

 Simple Programming
2:define
Beeper at 0,1;
Beeper at 0,2;
Beeper at 0,3;
```

Appendix E: Minitab Statistical analysis output

```
Welcome to Minitab, press F1 for help.
Retrieving project from file: D:\Program Files\MTBDEMO\Data\iqp.MPJ
```

Two-Sample T-Test and CI: Totals, Myers 3

```
Two-sample T for Totals

Myers 3     N     Mean     StDev     SE Mean
F           6     78.5     56.8         23
T           7     94.1     39.8         15

Difference = mu (F) - mu (T)
Estimate for difference:  -15.7
95% CI for difference: (-79.4, 48.0)
T-Test of difference = 0 (vs not =): T-Value = -0.57   P-Value = 0.586   DF = 8
```

Two-Sample T-Test and CI: Totals, Myers 4

```
Two-sample T for Totals

Myers 4     N     Mean     StDev     SE Mean
J           4     76.3     37.3         19
P           9     91.6     51.9         17

Difference = mu (J) - mu (P)
Estimate for difference:  -15.3
95% CI for difference: (-74.0, 43.4)
T-Test of difference = 0 (vs not =): T-Value = -0.60   P-Value = 0.564   DF = 8
```

Two-Sample T-Test and CI: Totals, Myers 1

```
Two-sample T for Totals

Myers 1     N     Mean     StDev     SE Mean
E           6     77.4     42.1         17
I           7     95.0     52.5         20

Difference = mu (E) - mu (I)
Estimate for difference:  -17.7
95% CI for difference: (-76.1, 40.8)
T-Test of difference = 0 (vs not =): T-Value = -0.67   P-Value = 0.516   DF = 10
```

Two-Sample T-Test and CI: Totals, Myers 1

```
Two-sample T for Totals
```

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```
Myers 1       N       Mean      StDev   SE Mean
E             6       77.4      42.1         17
I             7       95.0      52.5         20

Difference = mu (E) - mu (I)
Estimate for difference:  -17.7
95% CI for difference: (-76.1, 40.8)
T-Test of difference = 0 (vs not =): T-Value = -0.67  P-Value = 0.516  DF = 10
```

Two-Sample T-Test and CI: Totals, Myers 4

```
Two-sample T for Totals

Myers 4       N       Mean      StDev   SE Mean
J             4       76.3      37.3         19
P             9       91.6      51.9         17

Difference = mu (J) - mu (P)
Estimate for difference:  -15.3
95% CI for difference: (-74.0, 43.4)
T-Test of difference = 0 (vs not =): T-Value = -0.60  P-Value = 0.564  DF = 8
```

Two-Sample T-Test and CI: Totals, C/Pascal

```
Two-sample T for Totals

C/Pascal      N       Mean      StDev   SE Mean
0             6       80.9      54.6         22
1             7       92.0      43.0         16

Difference = mu (0) - mu (1)
Estimate for difference:  -11.1
95% CI for difference: (-73.5, 51.3)
T-Test of difference = 0 (vs not =): T-Value = -0.40  P-Value = 0.697  DF = 9
```

Two-Sample T-Test and CI: Totals, C++/Java

```
Two-sample T for Totals

C++/Java      N       Mean      StDev   SE Mean
0             4       52.7      59.5         30
1             9      102.1      33.6         11

Difference = mu (0) - mu (1)
Estimate for difference:  -49.4
95% CI for difference: (-150.5, 51.7)
T-Test of difference = 0 (vs not =): T-Value = -1.55  P-Value = 0.218  DF = 3
```

Two-Sample T-Test and CI: HTML, Myers 1

```
Two-sample T for HTML
```

```
Myers 1      N      Mean      StDev    SE Mean
E            6      0.500     0.548      0.22
I            7      0.714     0.488      0.18

Difference = mu (E) - mu (I)
Estimate for difference:  -0.214
95% CI for difference: (-0.860, 0.432)
T-Test of difference = 0 (vs not =): T-Value = -0.74   P-Value = 0.477   DF = 10
```

Two-Sample T-Test and CI: basic html, Myers 1

```
Two-sample T for basic html

Myers 1      N      Mean      StDev    SE Mean
E            6     16.250     0.987      0.40
I            7     13.43      6.19       2.3

Difference = mu (E) - mu (I)
Estimate for difference:  2.82
95% CI for difference: (-2.99, 8.63)
T-Test of difference = 0 (vs not =): T-Value = 1.19   P-Value = 0.279   DF = 6
```

Two-Sample T-Test and CI: basics, Myers 1

```
Two-sample T for basics

Myers 1      N      Mean      StDev    SE Mean
E            6     26.0       15.7       6.4
I            7     34.2       15.8       6.0

Difference = mu (E) - mu (I)
Estimate for difference:  -8.22
95% CI for difference: (-27.80, 11.35)
T-Test of difference = 0 (vs not =): T-Value = -0.94   P-Value = 0.371   DF = 10
```

Two-Sample T-Test and CI: c++, Myers 4

```
Two-sample T for c++

Myers 4      N      Mean      StDev    SE Mean
J            4     11.0       12.8       6.4
P            9     13.27      9.57       3.2

Difference = mu (J) - mu (P)
Estimate for difference:  -2.28
95% CI for difference: (-22.15, 17.59)
T-Test of difference = 0 (vs not =): T-Value = -0.32   P-Value = 0.766   DF = 4
```

Two-Sample T-Test and CI: Percentage, Myers 4

```
Two-sample T for Percentage
```

```
Myers 4      N     Mean     StDev   SE Mean
J            4     71.3     23.5        12
P            9     68.4     30.5        10


Difference = mu (J) - mu (P)
Estimate for difference:  2.8
95% CI for difference: (-33.9, 39.5)
T-Test of difference = 0 (vs not =): T-Value = 0.18  P-Value = 0.862  DF = 7
```

Two-Sample T-Test and CI: Percentage, Myers 3

```
Two-sample T for Percentage

Myers 3      N     Mean     StDev   SE Mean
F            6     59.3     34.2        14
T            7     77.9     19.0       7.2


Difference = mu (F) - mu (T)
Estimate for difference:  -18.5
95% CI for difference: (-55.7, 18.6)
T-Test of difference = 0 (vs not =): T-Value = -1.18  P-Value = 0.277  DF = 7
```

Two-Sample T-Test and CI: Percentage, Myers 1

```
Two-sample T for Percentage

Myers 1      N     Mean     StDev   SE Mean
E            6     66.5     19.7       8.0
I            7     71.7     34.4        13


Difference = mu (E) - mu (I)
Estimate for difference:  -5.2
95% CI for difference: (-39.8, 29.4)
T-Test of difference = 0 (vs not =): T-Value = -0.34  P-Value = 0.741  DF = 9
```

Two-Sample T-Test and CI: basics, Myers 3

```
Two-sample T for basics

Myers 3      N     Mean     StDev   SE Mean
F            6     24.8     18.0       7.3
T            7     35.2     12.9       4.9


Difference = mu (F) - mu (T)
Estimate for difference:  -10.39
95% CI for difference: (-30.71, 9.92)
T-Test of difference = 0 (vs not =): T-Value = -1.18  P-Value = 0.272  DF = 8
```

Correlations: Percentage, Total pretest multiple

```
Pearson correlation of Percentage and Total pretest multiple = 0.757
P-Value = 0.003
```

Correlations: basic html, How Long

```
Pearson correlation of basic html and How Long = 0.318
P-Value = 0.289
```

Correlations: basics, How Long

```
Pearson correlation of basics and How Long = 0.705
P-Value = 0.007
```

Two-Sample T-Test and CI: basics, Myers 3

```
Two-sample T for basics

Myers 3      N      Mean      StDev    SE Mean
F            6      24.8      18.0        7.3
T            7      35.2      12.9        4.9

Difference = mu (F) - mu (T)
Estimate for difference:  -10.39
95% CI for difference: (-30.71, 9.92)
T-Test of difference = 0 (vs not =): T-Value = -1.18  P-Value = 0.272  DF = 8
```

Two-Sample T-Test and CI: basics, Myers 4

```
Two-sample T for basics

Myers 4      N      Mean      StDev    SE Mean
J            4      30.5      16.1        8.1
P            9      30.3      16.5        5.5

Difference = mu (J) - mu (P)
Estimate for difference:  0.17
95% CI for difference: (-24.93, 25.27)
T-Test of difference = 0 (vs not =): T-Value = 0.02  P-Value = 0.987  DF = 5
```