



A Tale of Two Paradigms

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Structure of Course

- Two tracks available for CS1 & CS2
 - Majors and Non-Majors
- Both taught in Java
- Spring 2000 saw shift to an Objects-First, Objects-Emphasized curriculum in the Majors track
- Non-majors track did not implement change.

Fall 2002 – Spring 2003

- (Fall) One instructor kept status quo in Non-Majors CS1, while the other decided that after introducing objects that the course should stay focused on objects and not just slip back into imperative programming in Java
- (Spring) Material moves onto to discussion of Object-Oriented Programming: encapsulation, inheritance, polymorphism

Experimentation

- Hypotheses:
 - Students in CS1OE would have a lower resign rate than those in CS1OD
 - Students in CS1OE and CS1OD would perform equally well on tests of non-object based material
 - Students in CS1OE would perform better than CS1OD on midterm testing advanced OO skills.

Results: Testing general CS1 knowledge

Test 1 Grades	Mean	Standard Deviation
<i>CS10E</i>	70.656	4.2478
<i>CS10D</i>	70.946	2.7910

- Analysis with a t-test gave a p value of > 0.05
- No significant difference
- Hypothesis 1 proven

Results: Midterm Exam 1

Midterm 1 Grades	Mean	Standard Deviation
<i>CS10E</i>	64.367	18.248
<i>CS10D</i>	50.250	23.761

- Analysis using a t-test produced:
 - $t(85) = 2.83, p < 0.05$
- There is a significant difference
- Hypothesis 2 proven

Results: Resignation Rates

Section	Resigned	Not Resigned	Total Students
CS10E	2	30	32
CS10D	15	41	56

- Analysis using Chi-square goodness of fit test
 - $\chi^2 = 4.27$ and a p value < 0.05
- There is a difference in the two groups
- Hypothesis 3 proven

Further Results: Midterm Exam 2

Midterm 2 Grades	Mean	Standard Deviation
<i>CS10E</i>	63.000	18.137
<i>CS10D</i>	54.902	26.073

- Analysis with a t-test gave a p value of > 0.05
- No significant difference

Further Results: Final Exam

Final Exam Grades	Mean	Standard Deviation
<i>CS10E</i>	67.826	25.839
<i>CS10D</i>	54.710	28.773

- Analysis using a t-test produced:
 - $t(66) = 1.91, p < 0.05$
- Significant difference in scores

Further Results: Lab Averages

Lab Averages	Mean	Standard Deviation
<i>CS10E</i>	71.112	30.291
<i>CS10D</i>	70.284	27.944

- Analysis with a t-test gave a p value of > 0.05
- No significant difference
- Lab groups – 9 out of 26 were mixed

Further Results: Course Average

Course Averages	Mean	Standard Deviation
<i>CS10E</i>	72.013	22.265
<i>CS10D</i>	63.120	28.661

- Analysis with a t-test gave a p value of > 0.05
- No significant difference

Conclusions

- Object-Emphasized does improve students ability to understand the more advanced concepts of OO Programming.
- Objects-Emphasized does not effect the students abilities to understand other imperative concepts.