



ATTRITION RATES IN GENERAL CHEMISTRY AT EKU



EFFECTIVENESS OF VARIOUS TESTS AS PLACEMENT TOOLS AND CORRELATION WITH STUDENT GRADES

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PROJECT GOALS

- Determine the attrition rate in general chemistry (CHE 111)
- Identify correlations of student success rate to standardized test scores (ACT)
- Identify correlations of student success rate to MAT 107
- Identify correlations of student success rate to CHE 111 Aptitude Exam
- Propose a set of recommendations to improve attrition rate in CHE 111

CHE 111 PERFORMANCE STATISTICS

Attrition rate for CHE 111

1028/2294 x 100 = **44.8%**

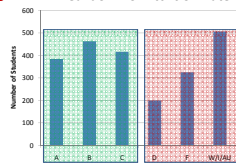
Breakdown

D = 200

F = 325

W = 502

Breakdown of Attrition Rate



- Of the above, **818** students took CHE 111 only one time, did not pass, and **never attempted** to take CHE 111 again.

Number of Repeats for CHE 111

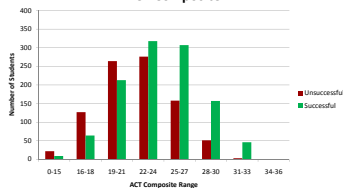
Number of Times CHE 111 Was Taken	Number of Students
2	311
3	62
4	19
5	7

DATA SET

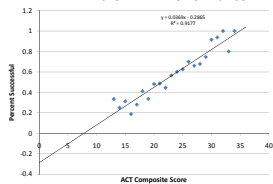
- **Source of data set:** Microsoft Access 2007 database provided by EKU Institutional Research Department
- **Content:** ACT scores, SAT scores, grades in CHE 1XX and math courses taken by students
- **Size**
 - Total number of course records: 8287
 - Total number of Test Score records: 2506
 - Total number of 1st time CHE 111 records: 2294

ACT SCORES

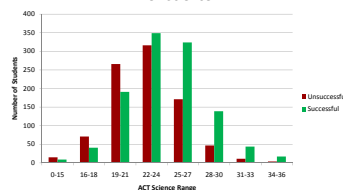
CHE 111 Unsuccessful vs. Successful ACT Composite



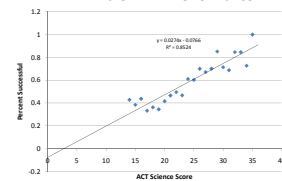
Correlation Between ACT Composite And CHE 111 Performance



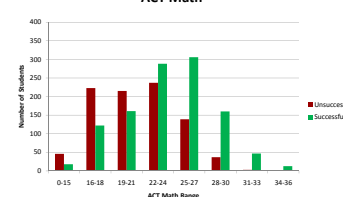
CHE 111 Unsuccessful vs. Successful ACT Science



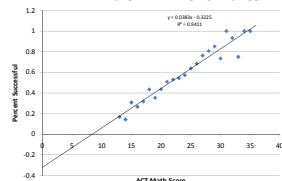
Correlation Between ACT Science And CHE 111 Performance



CHE 111 Unsuccessful vs. Successful ACT Math



Correlation Between ACT Math And CHE 111 Performance



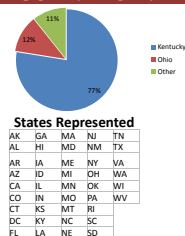
METHODS

- SQL queries to extract necessary data from the database
- Java programming as needed for complex queries

DEFINITIONS

- **Unsuccessful students:** Students who obtained less than a "C" in CHE 111 on the first attempt (D,F,W,I)
- **Successful students:** Students who passed CHE 111 on the first attempt (A,B,C)
- **Attrition Rate:** (# of unsuccessful students/# total students) x 100

WHERE DO OUR STUDENTS COME FROM?



States Represented

AK	GA	MA	NI	TN
AL	HI	MD	NM	TX
AR	IA	ME	NY	VA
AZ	ID	MI	OH	WA
CA	IL	MN	OK	WI
CO	IN	MO	PA	WV
CT	KS	MT	RI	
DC	KY	NC	SC	
FL	LA	NE	SD	

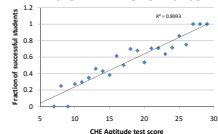
APTITUDE TEST SCORES

- An in-house aptitude test has been given to students entering General Chemistry for the past three semesters in a total of ten sections of CHE 111.

- The aptitude test has a total of 30 questions and the questions are divided into three subsections that test specific skills presumed to be needed for success in chemistry.
 - 8 questions test Chemistry Knowledge
 - 12 questions test Chemistry Skill
 - 10 questions test Math Skill

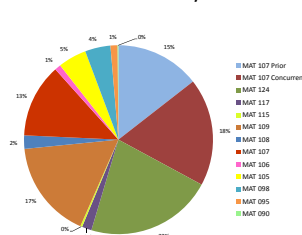
- To determine the optimum cutoff score, we plotted the fraction of students that would be correctly placed versus each score in order to obtain a maximum

Correlation Between Aptitude Test Scores And CHE 111 Performance

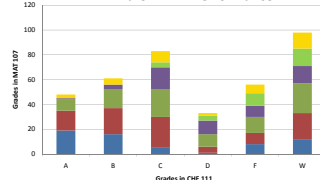


MAT 107 GRADES

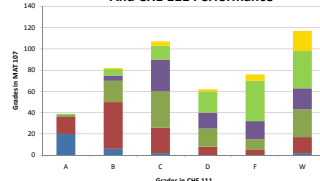
Math Classes Taken by Students



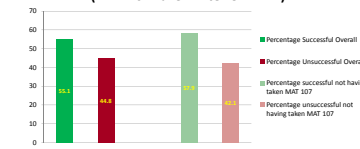
Correlation Between Grades in MAT 107 (MAT 107 Previously Taken) And CHE 111 Performance



Correlation Between Grades in MAT 107 (MAT 107 Taken Concurrently) And CHE 111 Performance

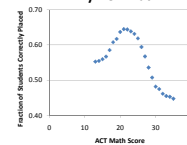


Grades in MAT 107 vs. Grades in CHE 111 (MAT 107 Taken After CHE 111)



EFFICIENCY OF PLACEMENT TOOLS

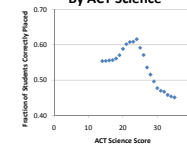
Fraction of Students Correctly Placed By ACT Math



Peak: (22, .64)

An efficiency of 64% was achieved at a score of 22 on the ACT Math.

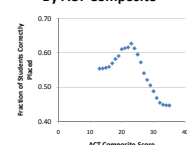
Fraction of Students Correctly Placed By ACT Science



Peak: (24, .62)

An efficiency of 62% was achieved at a score of 24 on the ACT Science.

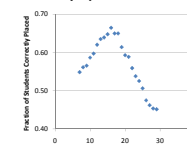
Fraction of Students Correctly Placed By ACT Composite



Peak: (23, .63)

An efficiency of 63% was achieved at a score of 23 on the ACT Composite.

Fraction of Students Correctly Placed By Aptitude Test



Peak: (16, .66)

An efficiency of 66% was achieved at a score of 16 on the aptitude test.

DEFINITIONS

- **Students correctly placed** – student s who scored below the cutoff and failed OR students who scored at or above the threshold and passed.

- **Fraction of students correctly placed** – the number of students correctly placed divided by the total number of students.

- To determine the optimum cutoff score, we plotted the fraction of students that would be correctly placed versus each score in order to obtain a maximum.

CONCLUSIONS

- Little correlation between success in CHE 111 and grades in MAT 107 was found. There was not a significant difference in the success or failure rate between those students who had MAT 107 and those who did not.

- The composite ACT score as well as the ACT Math and ACT Science scores achieved an efficiency lower than that of the efficiency of the aptitude test (63% with a score of 23, 64% with a score of 22, and 62% with a score of 24, respectively).

- The maximum efficiency was achieved with the in house aptitude test. This test correctly placed **66%** of the students when the cutoff was a score of **16**.

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