Worthiness of Developmental Math Courses:
A study into the developmental math courses Math 091, Math 093, and Math 152 offered at Morehead State University

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Introduction

The change from high school to college can be quite a change in both scenery and expectation for students. Developmental math courses are offered by both 2 year and 4 year colleges/universities to help bridge this gap and to help the students be prepared for college level work for which they may not be quite ready. There has been little research into the efficacy of developmental courses, with studies being divided between these courses being helpful and not helping at all. There has been even less such studies for the courses that are offered at Morehead State University.
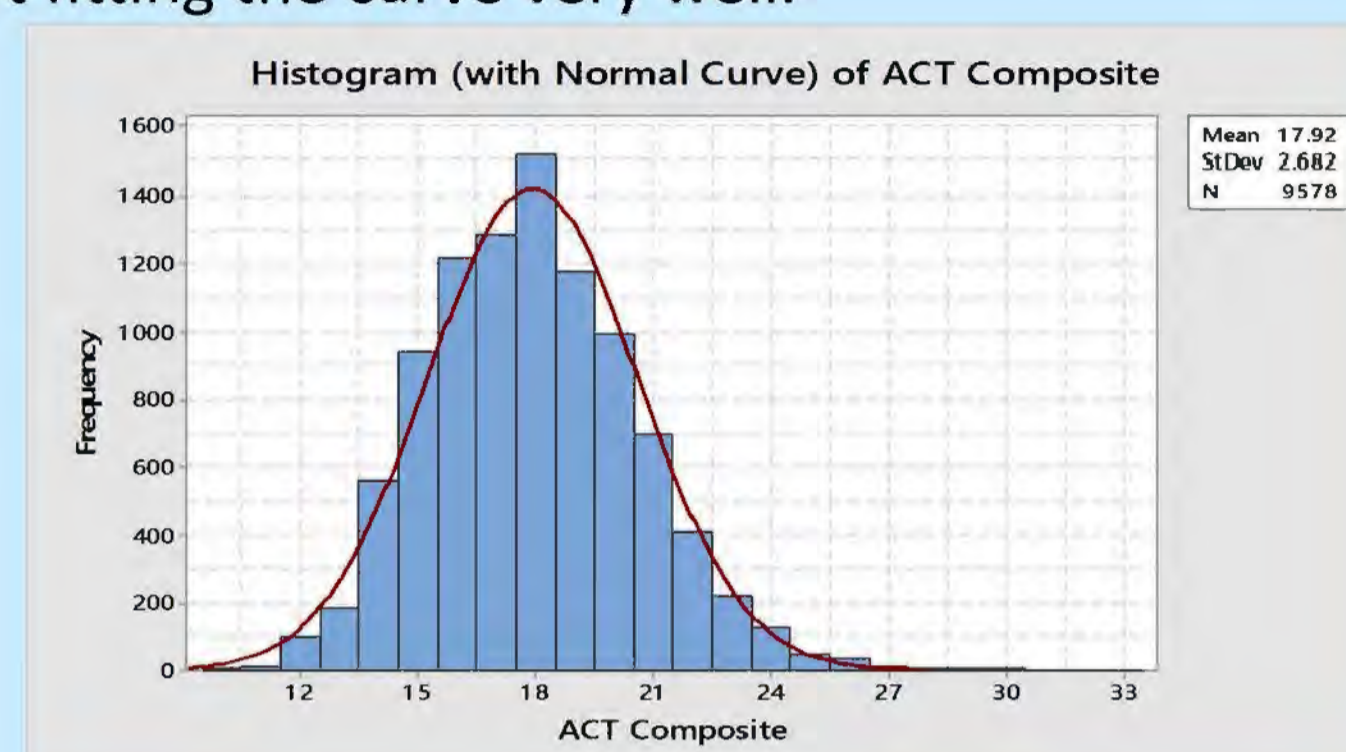
Much of the research done into developmental courses show that the populations of these students are predominantly minority, non-traditional females, of whom are considered high risk for dropping out from the start.

Hypotheses

❖ ACT Composite score, ACT English score, ACT Math score, ACT Reading score, COMPASS Math score, High School GPA, Academic Index Score, and/or age will have an effect on graduation rates/successful grade rates on students taking Math 091, Math 093, or Math 152.

❖ The student's residency status, gender, traditional or nontraditional status, will have an influence on success in Math 091, Math 093, or Math 152.

❖ The student's residency status, gender, traditional or nontraditional status, will have an influence on graduation rate.

❖ Different types of instructional methods will not affect the chances of success for a student in Math 091, Math 093, or Math 152 or for graduating.

Methodology and Analysis- All Population

The first population that needed to be looked into was all of the students that were used in the study. Bar graphs were used at this point to help determine the different ways that the whole population could be categorized. The different ways that this could be done with the information that was given was by residency status (In-State or Out-of-State), high school at time of course (high school or college), traditional or non-traditional, transfer or non-transfer, gender (male or female), and by course taken (Math 091, Math 093, or Math 152).
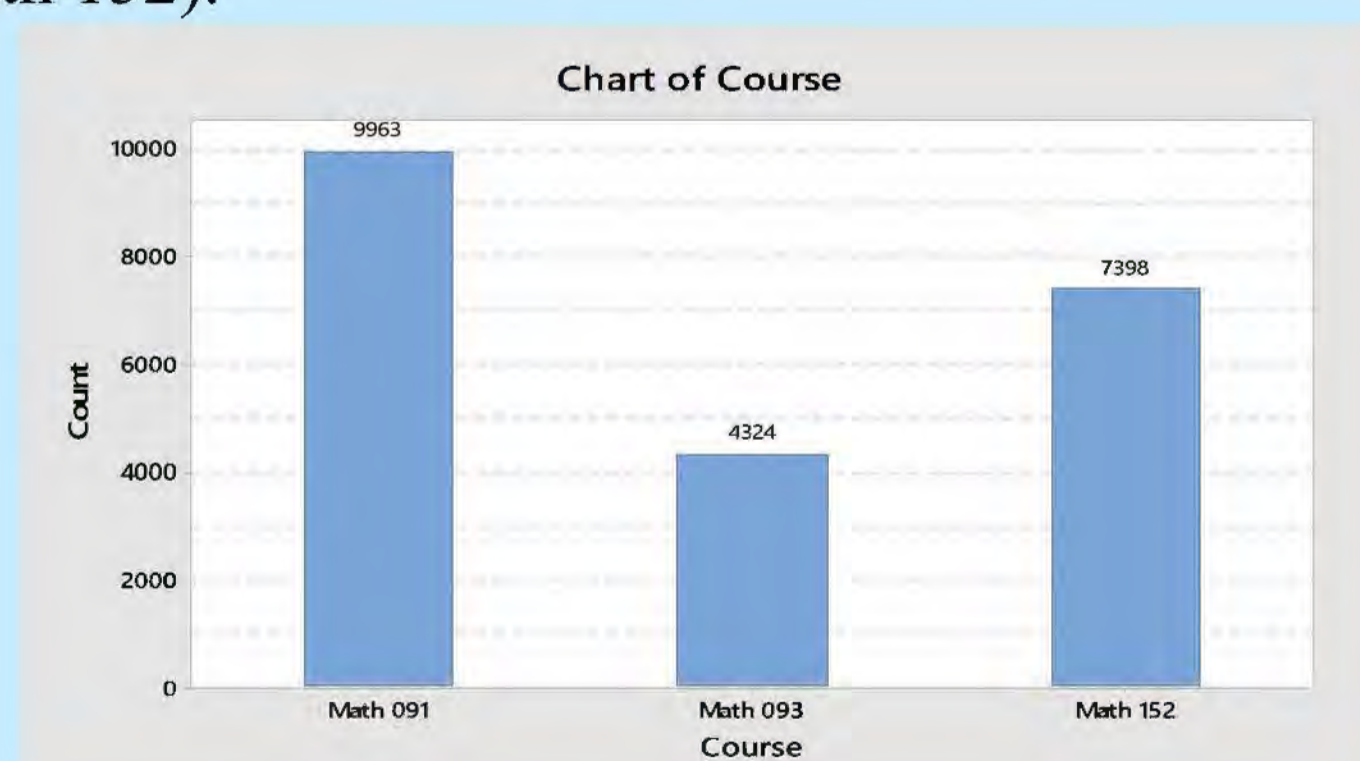
Above is a chart of the courses that the students could have taken.

Using bar graphs gave a picture representation of what the numbers were saying, and made it much easier to be able to see what was going on in the population. Most of the students in the study were In-State, college level, traditional, non-transfer, and female. The course with the most students taking Math 091, followed by Math 152 and Math 093.

Each one of these smaller populations could be compared to one another, but the pathway that was decided upon was through the courses. Through the courses the answers to the research questions could be found, and proof or disproof of the hypotheses.

Methodology and Analysis - Math 091

After being split based on the course the student took, the data was graphed once more. Histograms of ACT Composite scores, ACT Reading scores, ACT Math scores, ACT English scores, COMPASS Math scores, High school GPA, Academic Index scores, and ages were created. All of these graphs mostly followed a bell curve, with a few scores not fitting the curve very well.

The above figure is the histogram that was created for ACT Composites scores for Math 091.

The ones that least fit the bell curve were COMPASS Math scores, ACT Math score, and age. A GPA that really didn't fit the bell curve, though the rest did, was the HS GPA of 2.5.

Similar to how all of the data could have been split, the separate courses can also be split into smaller categories. These categories were residency status (In-State or Out-of-State), traditional or non-traditional, gender (male or female), and class type (Internet, Main Campus, or Extended Campus) the student chose to take the course.

Since separated, the individual populations were analyzed using Binary Logistic Regressions. The FITS were found for each continuous predictor of ACT Composite score, ACT English score, ACT Math score, ACT Reading score, high school GPA, Academic Index score, and age with the outcome being a successful grade (C or better) and then graduating.
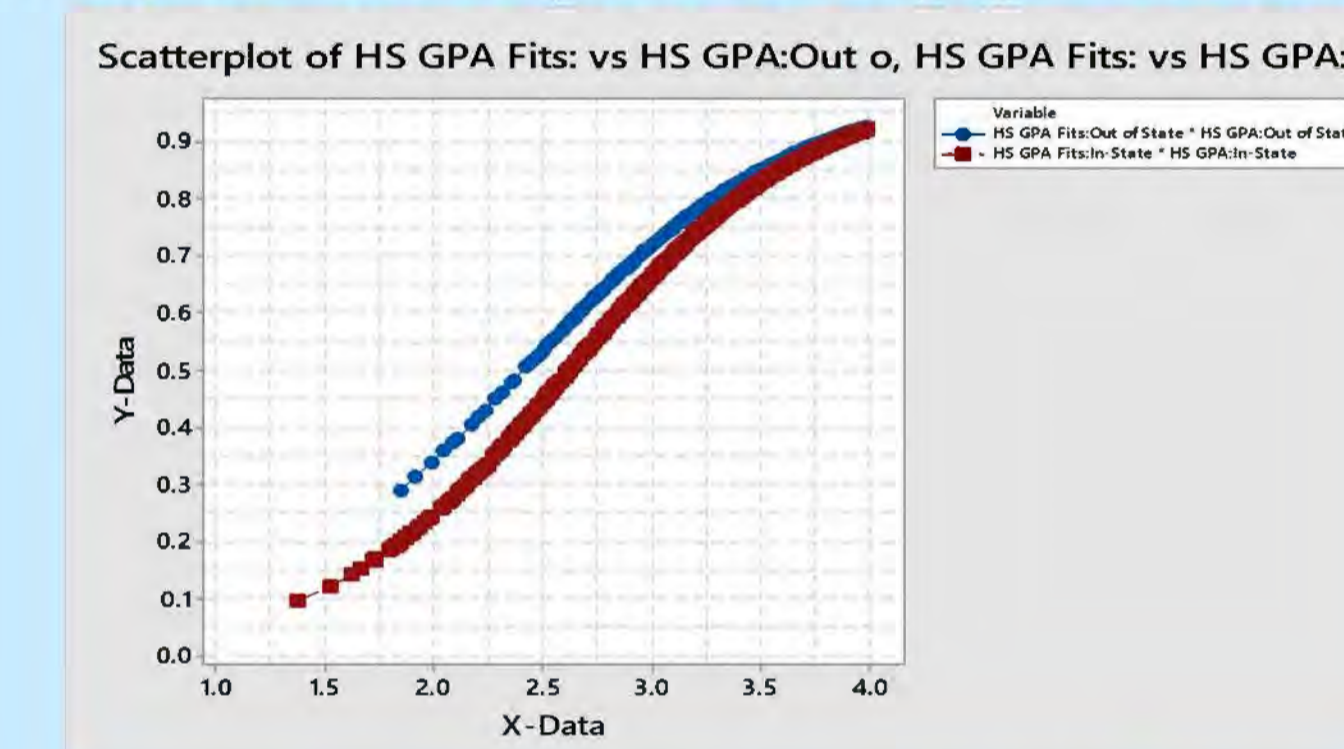
These FITS were graphed and analyzed to determine how well the continuous predictors were predicting the different outcomes.

Methodology and Analysis - Math 093

Similar to what was done for Math 091, ACT Composite scores, ACT Reading scores, ACT Math scores, ACT English scores, COMPASS Math scores, high school GPA, Academic Index scores, and ages were graphed in a histogram. These scores also mostly followed the expected bell curve, with age, COMPASS Math scores, and ACT Math scores least following the curve.

The Math 093 population was also further separated by residency status (In-State or Out-of-State), traditional or non-traditional, gender (male or female), and by class type (Main Campus, Internet, or Extended Campus). These populations were also put into bar graphs for a picture representation of how different sized the populations were compared to another (example Male and Females).
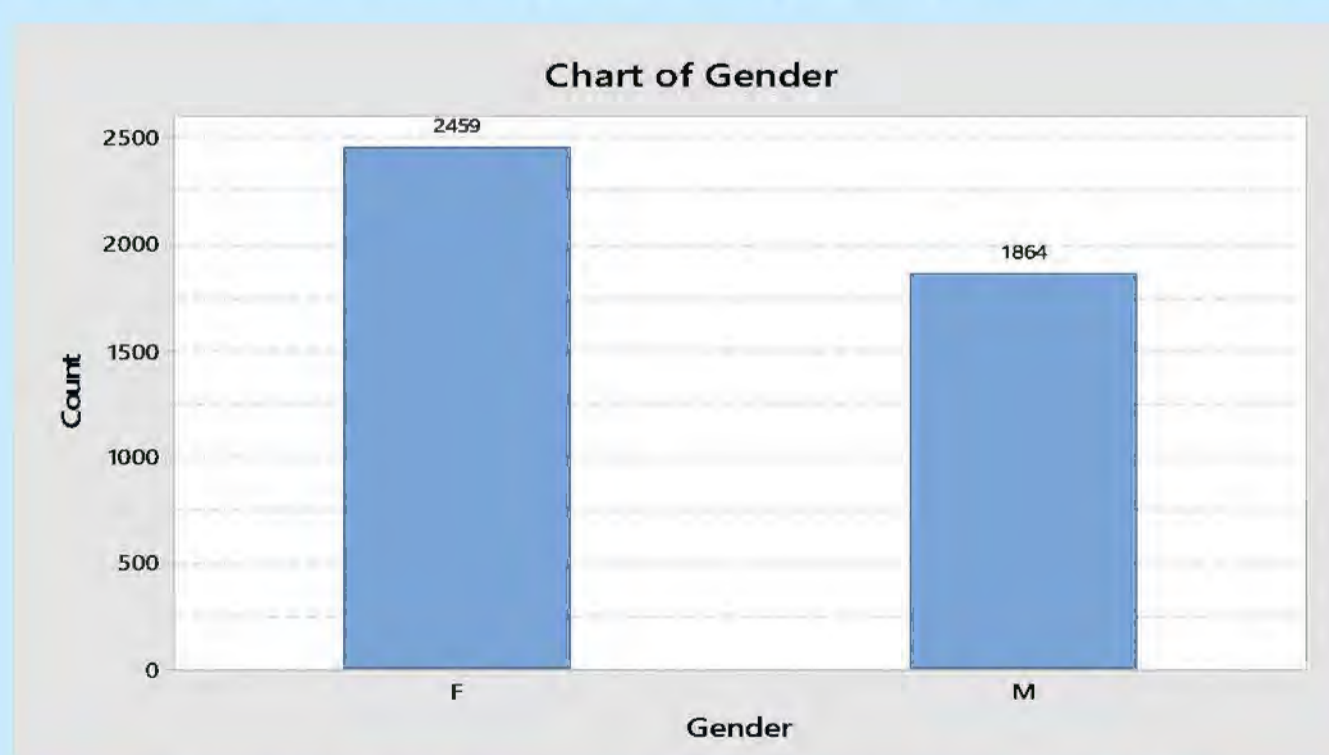
Above is the bar graph of the genders of Math 093.

These populations were similar to the larger population as well. The majority of the population was female, In-State, non-transfer, traditional, and at college.

After this, FITS, similar to those created for Math 091, were created for Math 093 and graphed. These FITS showed how well a certain predictor was predicting a certain outcome. At the same time, these graphs compared parts of the populations (Males vs. Females, Traditional vs. Non-Traditional, etc.).

Methodology and Analysis - Math 152

Math 152 also had histograms created for ACT Composite scores, ACT Reading scores, ACT Math scores, ACT English scores, COMPASS Math scores, high school GPA, Academic Index scores. The ones that least followed the expected bell curve were age, HS GPA, and COMPASS Math scores. The good thing with histograms is that they also give the mean, standard deviation, and N for each.

The students taking Math 152 were also further split into smaller populations of residency status (In-State or Out-of-State), traditional or non-traditional, gender (male or female), and class type (Internet, Main Campus, or Extended Campus) the student chose to take the course. These were graphed in bar graphs.

After being split based on these smaller populations, Binary Logistic Regression analysis was ran. The FITS were found for each continuous predictor of ACT Composite score, ACT English score, ACT Math score, ACT Reading score, high school GPA, Academic Index score, and age with the outcome being a successful grade (C or better) and then graduating. Then these were graphed to see how well the predictors predicted, and which segment of the population did compared to the other.


Above is a graph of the FITS with continuous predictor of HS GPA with result of successful grade. The two populations compared were In-State and Out-of-State students.

The example graph shows a continuous predictor that as the HS GPA gets larger, the more likely the student is of getting a certain outcome (successful grade in this case). The blue represents the Out-of-State students while the red represents the In-State students. At about 3.75, the chance of getting a successful grade was the same for both populations.

Conclusion

The research concluded that:

- ACT Composite score, ACT Math score, HS GPA, and Academic Index score were positive predictors for success in Math 091, Math 093, and Math 152.
- ACT English score, ACT Reading score, COMPASS Math score, and age were negative predictors for at least 1 population.
- HS GPA, and Academic Index score were positive with respect to graduating.
- ACT Composite score, ACT English score, ACT Math score, ACT Reading score, COMPASS Math score, and age were negative for at least 1 population with response being graduating.
- For Math 091 and Math 093 with result being successful grade or graduating; females did better than males, Out-of-State did better than In-State, traditional over non-traditional. For Math 152 with successful grade, all was the same except that non-traditional were more likely than traditional.
- For Math 152 with result being graduating; males over females, In-State more than Out-of-State, college more than HS, non-traditional more than traditional.
- For class types from most likely to least likely

Result	Math 091	Math 093	Math 152
Successful	Main Campus-Extended Campus-Internet	Extended Campus-Internet-Main Campus	Main Campus-Internet-Extended Campus
Graduate	Internet-Main Campus-Extended Campus	Main Campus-Internet-Extended Campus	Internet-Main Campus-Extended Campus

Acknowledgements