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Is GPA or ACT Composite more related to student on-time graduation in the North Dakota **University System?**

Brief Summary of Results

Utilizing three classes of North Dakota high school graduates enrolling in North Dakota University Systems, it appears that both high school GPA and ACT Composite score are useful in predicting future on-time degree completion in NDUS. However, if trying to determine which is more useful *in isolation*, it appears that an individual student's GPA may be more predictive of on-time degree completion than a student's ACT Composite score.

Description of Data and Methodology

The data set used to examine this question was made up of students who graduated from a North Dakota high school in either 2009, 2010, or 2011, and were enrolled in any NDUS institution immediately following graduation. For the purposes of this study, on-time completion was considered to be a student:

- Completing his or her Associate degree within 3 years of initial enrollment in an NDUS Community College.
- Completing his or her Bachelor degree within 6 years of initial enrollment in an NDUS Regional or Research University.

Students included in this study must also have had a valid ACT score, with sublevels, and a final cumulative high school GPA present in the SLDS. The total number of students under consideration for this study was 3,444. Throughout this report, the ACT Composite score represents the maximum composite score for each individual student (if they had multiple ACT attempts).



NDUS On–Time Degree Completion Rates

Figure 1: On-Time NDUS Graduation Rates by ACT Composite Score and High School GPA

Figure 1 above shows that both ACT Composite score and cumulative high school GPA are correlated with higher NDUS degree completion rates. Both graphs are only shown for groups where more than 100 students had the given GPA or ACT Composite score.



Figure 2: Average ACT Composite Score by High School GPA

However, as Figure 2 shows above, the major difficulty in stating that GPA or ACT Composite scores is *more* related to on-time graduation is the fact that they are highly correlated to **each other**. Students with higher GPAs in high school very often tend to have higher ACT Composite scores as well. To begin to isolate the two, students will be divided into one of four groups, depending on their high school GPA and maximum ACT Composite score.



Figure 3: Comparison of On-Time Degree Completion Rates by Quadrant

The median high school GPA for these students was 3.54, with a median ACT Composite score of 23. Comparing students with a higher GPA and lower ACT score to those with a lower GPA and higher ACT score, students with a higher GPA and lower ACT score tended to complete NDUS degrees on-time more often than those students with lower GPAs and higher ACT scores. This tends to indicate that higher GPAs may be more indicative of completing a degree. *However*, students possessing **both** a higher GPA along with a higher ACT still have the highest NDUS on-time degree completion rate, indicating that both values have merit in predicting future student degree completion.

To further attempt to measure their relative usefulness in assessing the likelihood of an incoming freshman completing a degree on-time in the North Dakota University System, logistic regression models were developed using an indicator variable for on-time degree completion with ACT Composite score and High School GPA as the independent variables. Prior to the development of th emodels, the student sample was split into two random halves, one to develop the model, and one to test it. After determining the two logistic regression models, receiver operating characteristic (ROC) curves were created for each model using the test sample to determine the relative value of each.

ROC curves measure the tradeoff between the sensitivity (true positive rate) and specificity (true negative rate) of a given model. Models with a higher level of accuracy will have an ROC curve closer to the upper left hand corner of the graph, indicating the model is accurately identifying both students who complete their degree on-time and students who do not complete their degree on-time at equally high rates. To help determine the relative usefulness of models plotted on an ROC curve, the area under the curve, or AUC is calculated. To interpret the AUC, suppose that the two groups of students were already pre-split, with a group of on-time graduates, and a group of students who did not graduate on-time. The AUC represents the probability that, when presented with a randomly selected pair of students, one from each group, the model will correctly assign a higher probability of success to the on-time graduate. Very poor models will have an AUC of close to 0.50, with excellent models having an AUC close to 1.



Figure 4: GPA vs. ACT Composite ROC Curves

Figure 4 shows that the logistic regression model utilizing GPA only was slightly better at identifying on-time degree completers than the ACT Composite only model, with an AUC of 0.636 versus the 0.579 of the ACT Composite model (p - value < 0.0001).

This reinforces the view from Figure 3 illustrating that GPA may be more indicative of future NDUS on-time degree completion. It is worth noting that ACT Composite score is also valuable in predicting on-time degree completion. If the goal is to state which is *more* useful *in isolation* in predicting NDUS on-time degree completion, however, it appears that cumulative high school GPA may be a stronger indicator of NDUS on-time degree completion than ACT Composite score.