RESEARCH SUMMARY

of

New Tech Network Evaluation Report:

Project Years 2013-14, 2014-15, and 2015-16

i3 and Expanded Evaluation Samples

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Introduction

The efficacy of the New Tech Network (NTN) model of project-based learning is currently being tested in several schools in the southeast region of the United States. This report provides the results from two samples: the *i3 Sample* (a comparison of two treatment and two control schools) and the *Expanded Sample* (a comparison of four treatment and four control schools). The data from i3 sample is available for all school years (2013-14, 2014-15, and 2015-16); the data from the expanded sample is available for the last two school years (2014-15 and 2015-16). Two additional years in the grant period include the year of 2011-2012, which was an organization period, and the year of 2012-13, which was a training period for implementing teachers and project staff.

Project Year 2013-14: i3 Sample

Sample. The effect of the NTN design on student achievement was explored using the i3 sample of 9th grade students in the first year of data collection for the project (2013-2014). The sample included 139 students in the four NTN schools and 350 students in the four control schools. The students differed between the control and NTN schools in the poverty level – 82% in the control schools vs. 68% in the NTN schools ($X^2(1, N = 489) = 10.38, p < .001$); however, they did not differ in the proportion of female students – 47% in the control schools vs. 47.5% in the NTN schools ($X^2(1, N = 489) = .006, p = .93$), or in the proportion of minority students – 63.5% in the control schools vs. 70% in the NTN schools ($X^2(1, N = 489) = 2.86, p = .09$).

Student baseline achievement was measured by the PASS exam, which contains assessments in five subject areas: Math, ELA, W, SCI, and SOC. Due to large amounts of missing data, only Math and ELA scores were retained in the analysis. For the purposes of this study, Math and ELA scores were transformed into one baseline achievement index score, which is their arithmetic mean. To explore samples' pre-existing differences in achievement, an independent t test was conducted. The results revealed that students in the NTN schools (M = 622.87, SD = 44.29) did not differ in their baseline achievement scores compared to students in the control schools (M = 631.25, SD = 53.12), $t(409) = 1.53, p = .13$.

Results. Student achievement was measured by EOC Math and EOC ELA scores and analyzed through a series of ANCOVA tests. The results showed that students in the NTN schools had higher EOC Math scores (adjusted M = 71.66, SE = 3.63) than students in the control schools (adjusted M = 53.49, SE = 2.46), controlling for baseline achievement scores,

race, and poverty levels, $F\ (1, 253) = 16.51, p < .00, \eta_p^2 = .06$ (see Figure 1). However, students in the treatment (adjusted M = 69.14, SE = 3.01) and control (adjusted M = 61.92, SE = 2.04) schools did not differ in their scores on EOC ELA, controlling for Baseline achievement scores, race, and poverty levels, $F\ (1, 253) = 3.79, p = .053, \eta_p^2 = .015$.

Additionally, student dropout, dual credit, and retention were statistically analyzed using binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses difficult to interpret. Regarding dropout, the model with the treatment condition, race, poverty, and baseline achievement scores as predictors of dropout was not statistically significant, $\chi 2(4, N = 411) = 4.55, p = .34$. The treatment was not a significant predictor, $Exp(B) = .00, p = .99$.

Regarding retention, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of enrollment in dual enrollment courses was statistically significant, , $\chi^2\ (4, N = 411) = 24.02, p < .001$. Treatment was a significant predictor of retention, as well, $Exp(B) = 6.03, p < .001$, such that treatment students were 6.03 times more likely to be retained compared to control students.

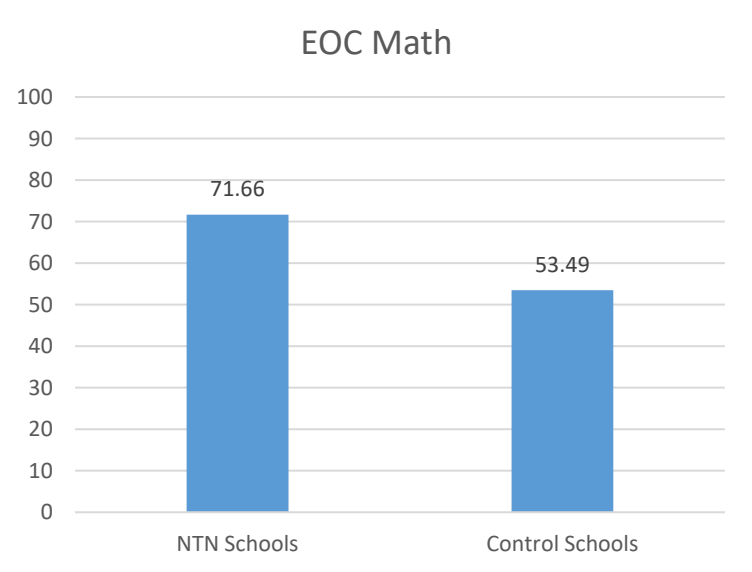

Figure 1. ANCOVA results on EOC Math controlling for race, poverty, and prior achievement

Project Year 2014-15: i3 Sample

Sample. The effect of the NTN design on student achievement was also explored using the i3 sample of 9th and 10th grade students in the second year of data collection for the project (2014-2015). For the 9th grade, the sample included students in the two NTN schools and students in the two control schools. The 9th grade students differed between the control and NTN schools in the poverty level – 87% in the control schools vs. 75% in the NTN schools ($X^2(1, N = 549) = 11.15, p = .001$); however, they did not differ in the proportion of female students – 44% in the control schools vs. 47% in the NTN schools ($X^2(1, N = 406) = 1.47, p = .23$), or in the proportion of minority students – 61% in the control schools vs. 67% in the NTN schools ($X^2(1, N = 545) = 1.60, p = .21$). The 10th grade students did not differ between the control and NTN schools either in the poverty level – 83% in the control schools vs. 78% in the NTN schools ($X^2(1, N = 409) = 1.29, p = .26$), or in the proportion of female students – 49% in both control and NTN schools ($X^2(1, N = 409) = .02, p = .65$), or in the proportion of minority students – 60% in the control schools vs. 67% in the NTN schools ($X^2(1, N = 406) = 1.47, p = .23$).

Student baseline achievement was measured by baseline achievement for five subject areas: Math, ELA, W, SCI, and SOC. Due to large amounts of missing data, only Math and ELA Sate Exam scores were retained in the analysis. For the purposes of this study, Math and ELA scores were transformed into one baseline achievement index score, which is their arithmetic mean. To explore samples' pre-existing differences in achievement, an independent t test was conducted. The results revealed that the 9th grade students in the NTN schools (M = 633.79, SD = 40.64) had higher Baseline achievement scores than 9th grade students in the control schools (M = 612.78, SD = 45.31), $t (472) = 4.41, p = .001$. However, the 10th grade students in the NTN schools (M = 629.31, SD = 41.83) did not differ on their Baseline achievement scores from 10th grade students in the control schools (M = 630.30, SD = 46.51), $t (366) = .19, p = .85$.

9th Grade Results. Achievement of 9th grade students was measured by EOC Math and EOC ELA scores and analyzed through a series of ANCOVA tests. The results showed that 9th grade students in the NTN schools scored higher on their EOC Math scores (adjusted M = 78.73, SE = .80) from 9th grade students in the control schools (adjusted M = 76.98, SE = .44), controlling for baseline achievement scores, race, and poverty levels, $F (1, 278) = 3.78, p = .05, \eta_p^2 = .012$. Students in the NTN schools (adjusted M = 77.34, SE = .86) had higher EOC ELA

scores than students in the control schools (adjusted M = 73.54, SE = .44), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 283) = 15.33$, $p < .001$, $\eta_p^2 = .04$ (see Figure 2).

Additionally, student dropout, dual credit, and retention were statistically analyzed using binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret meaningfully.

Regarding dropout, a model with the treatment condition, race, poverty, and baseline achievement scores as predictors of dropout was not statistically significant, $\chi 2(4, N = 471) = 2.16$, $p = .98$. Treatment was not a significant predictor, $Exp(B) = .00$, $p = .99$.

Regarding retention, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of enrollment in dual enrollment courses was not statistically significant, $\chi^2 (4, N = 471) = 5.19$, $p = .74$. Treatment was not a significant predictor, $Exp(B) = .00$, $p = .99$.

Finally, the model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 471) = 18.41$, $p = .02$. Treatment was not a significant predictor of earning dual credit, $Exp(B) = .00$, $p = .99$.

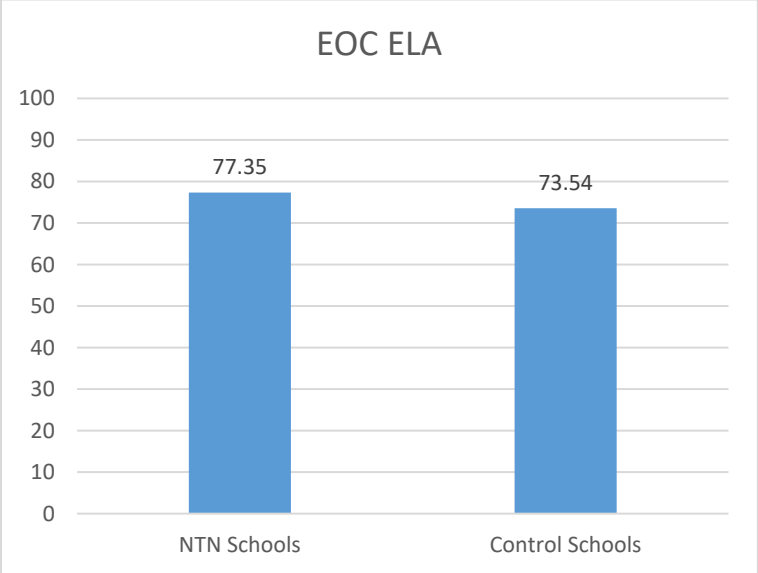

Figure 2. ANCOVA results on EOC Math controlling for race, poverty, and prior achievement for the 9th grade sample

10th Grade Results. For the 10th grade sample, the EOC scores were not available; thus, no ANCOVA analyses were conducted. However, student dropout, dual credit, and retention were statistically analyzed through logistic regression. It needs to be noted that due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Regarding dropout, a model with the treatment condition, race, poverty, and baseline achievement scores as predictors of dropout was not statistically significant, $\chi 2(4, N = 351) = .23, p = 1.00$. Treatment was not a significant predictor, $Exp(B) = .00, p = .99$.

Regarding retention, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of enrollment in dual enrollment courses was not statistically significant, $\chi^2 (4, N = 351) = 1.97, p = .98$. Treatment was a significant predictor of retention, $Exp(B) = 4.03, p = .001$.

Regarding earning dual credit, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was not statistically significant, as well, $\chi^2 (4, N = 351) = 6.40, p = .60$. Treatment was not a significant predictor of earning dual credit, $Exp(B) = .59, p = .09$.

Project Year 2014-15: Expanded Sample

Sample. The effect of the NTN design on student achievement was also explored using the expanded sample. The expanded sample included students in the four NTN schools and students in the four control schools. The 9th grade sample differed between the control and NTN schools in the poverty level – 81% in the control schools vs. 70% in the NTN schools ($X^2(1, N = 1441) = 17.99, p = .001$), in the proportion of female students – 49% in the control schools vs. 40% in the NTN schools ($X^2(1, N = 894) = 5.94, p = .02$), and in the proportion of minority students – 45% in the control schools vs. 56% in the NTN schools ($X^2(1, N = 1433) = 3.27, p = .001$). The 10th grade sample in the control schools had higher percentage of minority students than in the NTN schools – 39% vs. 67% ($X^2(1, N = 894) = 30.36, p = .001$). The schools, however, did not differ in gender with 49% of female students ($X^2(1, N = 897) = .003, p = .96$) or in the poverty level – 75% and 78% in the control and the NTN schools respectively ($X^2(1, N = 897) = .49, p = .48$). To explore samples' pre-existing differences in achievement, a series of

independent t tests were conducted. The results revealed that 9th grade students in the NTN schools (M = 627.74, SD = 41.73) had higher scores on the Baseline achievement than 9th grade students in the control schools (M = 617.52, SD = 47.74), *t (1215) = 3.27, p = .001*. For the 10th grade sample, no differences were found (M = 629.31, SD = 41.83 for the NTN schools; M = 629.96, SD = 45.92 for the control schools), *t (811) = .14, p = .89*.

9th Grade Results. Student achievement was measured by EOC Math and EOC ELA scores and analyzed through a series of ANCOVA tests. For the 9th grade sample, the results showed that students in the NTN schools had higher EOC Math scores (adjusted M = 79.85, SE = .51) than students in the control schools (adjusted M = 75.59, SE = .30), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 686) = 50.98, p < .001, \eta_p^2 = .07$ (see Figure 3). Similar results were found for EOC ELA (adjusted M = 77.44, SE = .52 for NTN students; adjusted M = 73.15, SE = .29 for control students), $F\ (1, 809) = 50.89, p < .001, \eta_p^2 = .06$ (see Figure 4).

Additionally, student dropout, dual credit, and retention were statistically analyzed through logistic regression. It needs to be noted that due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Regarding dropout, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of dropout was not statistically significant, $\chi 2(8, N = 1441) = 9.29, p = .32$. Treatment was not a significant predictor, as well, *Exp(B) = 1.35, p = .72*.

Regarding retention, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was also not statistically significant, $\chi^2\ (8, N = 1441) = 3.07, p = .93$. Treatment was not a significant predictor of retention, *Exp(B) = .70, p = .13*.

Regarding earning dual credit, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of enrollment in dual enrollment courses was not statistically significant, either $\chi^2\ (8, N = 1441) = 8.49, p = .39$. Treatment was not a significant predictor, as well, *Exp(B) = .000, p = .99*.

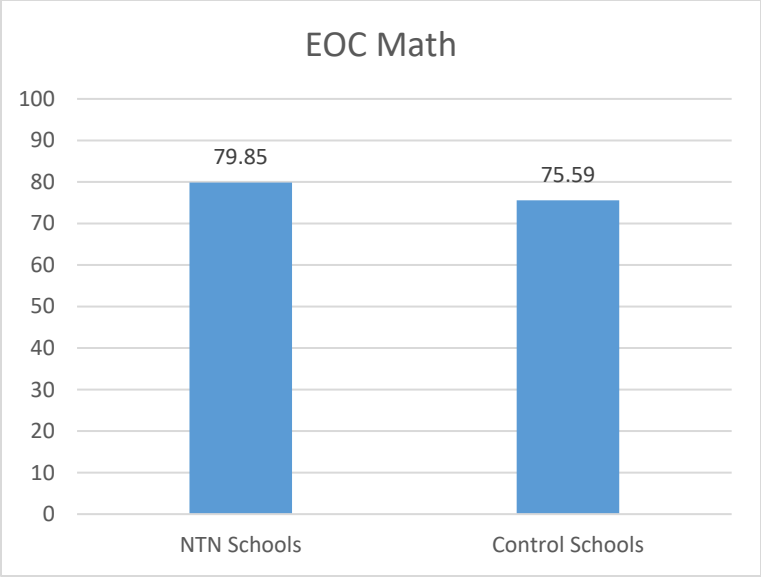

Figure 3. ANCOVA results on EOC Math controlling for race, poverty, and prior achievement for the 9th grade sample

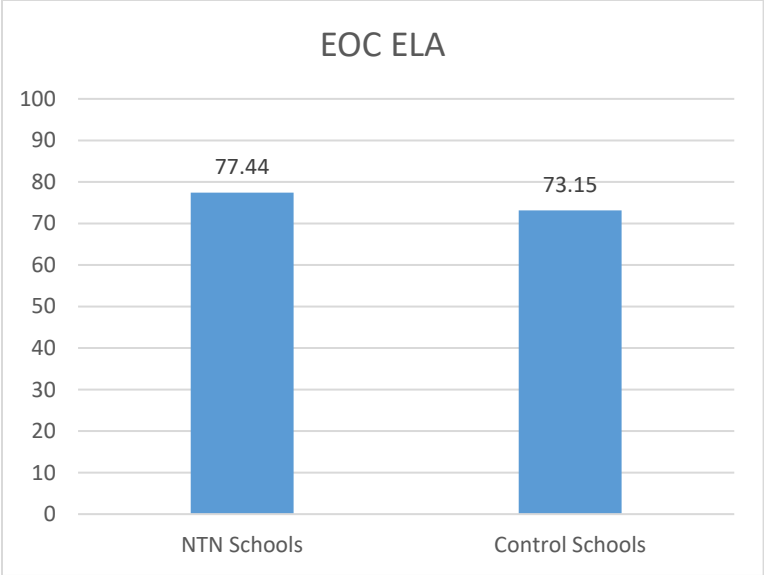

Figure 4. ANCOVA results on EOC ELA controlling for race, poverty, and prior achievement for the 9th grade sample

10th Grade Results. For the 10th grade sample, the EOC scores were not available; thus, the analysis of math and ELA achievement was not performed. However, student dropout, dual credit, and retention were statistically analyzed through logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were

retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Regarding dropout, a model with the treatment condition, race, poverty, and baseline achievement scores as predictors of dropout was statistically significant, $\chi^2 (8, N = 897) = 23.83$, $p = .002$. However, treatment was not a significant predictor, $Exp(B) = .000$, $p = .99$.

Regarding retention, a model with the treatment condition, race, poverty, and baseline achievement scores as predictors of retention was not statistically significant, $\chi^2 (8, N = 897) = 8.06$, $p = .43$. Treatment was a significant predictor of retention in this model, $Exp(B) = 2.98$, $p = .003$.

Regarding earning dual credit, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of enrollment in dual enrollment courses was not statistically significant, $\chi^2(8, N = 897) = 5.65$, $p = .69$. Treatment was not a significant predictor, as well, $Exp(B) = 1.11$, $p = .75$.

Project Year 2015-16: i3 Sample ONLY

Sample. The effect of the NTN design on student achievement was also explored using the i3 sample of 9th, 10th, and 11th grade students in the third year of data collection for the project (2015-2016). For the 9th grade, the sample included students in the two NTN schools and students in the two control schools. In the 9th grade sample, the control and NTN schools did not differ in proportion of students in poverty – 76% in the control schools vs. 68% in the NTN schools, $X^2(1, N =628) = 3.32$, $p = .07$, or in the proportion of female students – 49% in the control schools vs. 44% in the NTN schools, $X^2(1, N = 628) = 1.30$, $p = .25$. The NTN schools did, however, have a higher proportion of minorities than the control schools, 65% in the NTN schools vs. 56% in the control schools, $X^2(1, N = 625) = 4.50$, $p = .03$.

The 10th grade students did differ between the control and NTN schools proportion of students in poverty – 75% in the control schools vs. 63% in the NTN schools, $X^2 (1, N =485) = 6.61$, $p = .01$, but not in the proportion of female students – 48% in the control schools vs. 50% in the NTN schools, $X^2(1, N = 486) = .28$, $p = .59$. Control schools did not differ from NTN schools in proportion of minority students (61% vs. 66%), $X^2(1, N = 485) = .71$, $p = .40$.

The 11th grade students did not differ between the control and NTN schools either in the poverty level – 70% in the control vs. 66% in the NTN schools, $X^2(1, N =400) = .56$, $p = .45$, or

in the proportion of female students – 53% in the control schools vs. 48% in the NTN schools, $X^2(1, N = 400) = .63, p = .43$. However, the proportion of minority students was higher in the NTN compared to control schools – 56% in the control schools vs. 68% in the NTN schools, $X^2(1, N = 400) = 3.83, p = .05$.

For all students, baseline achievement was calculated based on scores on a standardized achievement test during their respective 8th grade year of school. The particular test used changed three times during the grant period. For the 9th grade, student baseline achievement was measured by the South Carolina SC Ready exam in five subject areas: ELA, W, Math, SCI, and SOC. A composite measure of baseline achievement was calculated by combining scores from all five subscales. For the 10th grade students, baseline achievement was measured by the South Carolina ASPIRE exam. This exam has five subscales: Math, ELA, W, SCI, and SOC. Due to large amounts of missing data on some of these subscales, Math and ELA scores were combined to form a composite achievement score for use in the analyses.

For the 11th grade students, baseline achievement was measured by the South Carolina PASS exam, which has four subscales: Math, ELA, W, and SCI. Due to large amounts of missing data on some of these subscales, Math and ELA scores were combined to form a composite achievement score for use in the analyses.

To explore samples' pre-existing differences in achievement, independent-samples t-tests were conducted for each grade level. The results revealed that 9th grade students in the NTN schools (M = 421.82, SD = 5.87) scored slightly higher in baseline achievement scores compared to 9th grade students in the control schools (M = 420.53, SD = 6.08), $t(497) = 2.21, p = .03$. Likewise, 10th grade students in the NTN schools (M = 634.45, SD = 44.25) had higher baseline achievement scores than 10th grade students in the control schools (M = 617.98, SD = 47.26), $t(395) = 3.06, p = .002$. However, 11th grade students in the NTN schools (M = 630.08, SD = 45.34) did not differ in their baseline achievement scores from 11th grade students in the control schools (M = 635.18, SD = 49.73), $t(338) = .84, p = .41$.

9th grade results. Student achievement in the 9th grade was measured by EOC Math and EOC ELA scores, and analyzed through a series of ANCOVA tests. The results showed that students in the NTN schools did not differ on EOC Math scores (adjusted M = 76.40, SE = .81) from students in the control schools (adjusted M = 77.72, SE = .74), controlling for baseline achievement scores, race, and poverty levels, $F(1, 168) = 1.39, p = .24, \eta_p^2 = .008$. On the EOC

ELA exam, students in the NTN schools scored slightly higher (adjusted M = 76.61, SE = .83) than students in the control schools (adjusted M = 75.85, SE = .51), controlling for Baseline achievement scores, race, and poverty levels, but this difference was not significant, $F\ (1, 312) = .60$, $p = .44$, $\eta_p^2 = .002$.

Additionally, student dropout, dual credit, and retention were statistically analyzed through binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 9th grade sample because a very small number of students from either condition dropped out (2% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina. Similarly, analyses are problematic for earning dual credit in the 9th grade sample. A larger proportion of students in the control schools earned dual credit (9%) compared to students in the NTN schools (0%). However, because no students in the NTN schools earned dual credit, this variable cannot be reliably analyzed.

Regarding on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically significant, $\chi^2\ (4, N = 628) = 100.12$, $p < .001$. The proportion of students who were retained in the NTN schools (14%) was approximately the same as the proportion of students retained in the control schools (15%). Consequently, the NTN treatment was not a significant predictor of retention, $Exp(B) = .76$, $p = .38$. Instead, poverty positively predicted, and baseline achievement scores negatively predicted, retention.

10th grade results. For the 10th grade sample, the EOC scores were not available because these students were not scheduled to take the exams in that grade level. Thus, the analysis of math and ELA achievement was not performed. However, student dropout, dual credit, and retention were statistically analyzed through binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 10th grade sample because a very

small number of students from either condition dropped out (.03% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina

With regard to earning dual credits, a larger proportion of students in the NTN schools earned dual credit (.28) compared to students in the control schools (.07). A model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 396) = 131.58, p < .001$. The treatment was a significant predictor of earning dual credit, Exp(B) = 8.39, p < .001. This suggests that students in the NTN schools were 8.38 times more likely to earn dual credit compared to students in the control schools. Race (being a non-minority) and baseline achievement scores also predicted earning dual credit.

With regarding to on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically significant, $\chi^2 (4, N = 396) = 191.14, p = .001$. The proportion of students who were retained in the NTN schools (5%) was approximately the same as the proportion of students retained in the control schools (5%). The treatment was not a significant predictor of retention, $Exp(B) = 1.71, p = .34$. Rather, baseline achievement scores predicted on-time progression to graduation.

11th grade results. Student achievement in the 11th grade was measured by the ACT and Workkeys and analyzed through a series of ANCOVA tests. The results showed that students in the NTN schools had higher ACT Composite scores (adjusted M = 37.45, SE = 1.57) than students in the control schools (adjusted M = 32.36, SE = 1.01), controlling for baseline achievement scores, race, and poverty levels, $F (1, 280) = 7.37, p < .007, \eta_p^2 = .03$ (see Figure 5). On the ACT Math, students in the NTN schools (adjusted M = 35.32, SE = 1.61) did not differ from students in the control schools (adjusted M = 36.19, SE = 1.03), controlling for baseline achievement scores, race, and poverty levels, $F (1, 281) = .21, p = .65, \eta_p^2 = .001$. On the ACT English, students in the NTN schools scored higher (adjusted M = 40.19, SE = 1.83) compared to students in the control schools (adjusted M = 33.17, SE = 1.17), controlling for baseline achievement scores, race, and poverty levels, $F (1, 281) = 10.39, p < .001, \eta_p^2 = .04$. Similar results were observed on the ACT Writing (adjusted M = 43.69, SE = 2.49 for the NTN schools; adjusted M = 35.78, SE = 1.57 for the control schools), $F (1, 281) = 7.17, p = .008. \eta_p^2$

= *.03*, and for the ACT Science (adjusted M = 40.23, SE = 1.83 for the NTN schools; adjusted M = 33.28, SE = 1.18 for the control schools), $F\ (1, 280) = 10.13$, $p = .002$, $\eta_p^2 = .04$.

On the Workkeys Math exam, students in the NTN schools (adjusted M = 77.49, SE = .35) did not differ from students in the control schools (adjusted M = 76.88, SE = .21), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 309) = 2.27$, $p = .13$, $\eta_p^2 = .007$. On the Workkeys Reading exam, students in the NTN schools had higher scores (adjusted M = 79.94, SE = .23) than students in the control schools (adjusted M = 78.87, SE = .14), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 310) = 15.61$, $p < .001$, $\eta_p^2 = .05$. On the Workkeys Information exam, students in the NTN schools also scored higher (adjusted M = 76.78, SE = .25) than students in the control schools (adjusted M = 76.05, SE = .14), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 309) = 6.64$, $p = .01$, $\eta_p^2 = .02$.

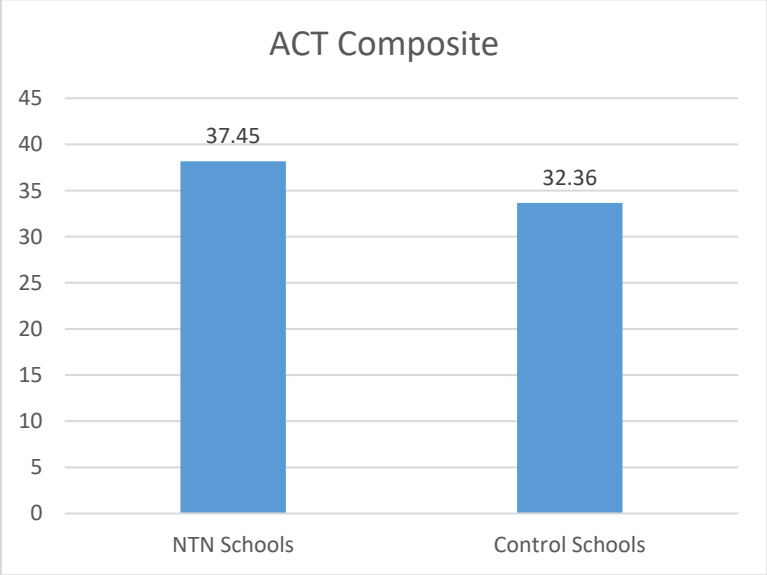

Figure 5. ANCOVA results on ACT Composite controlling for race, poverty, and prior achievement

Additionally, student dropout, dual credit, and retention were statistically analyzed through binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 11th grade sample because a very

small number of students from either condition dropped out (3% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina.

With regard to earning dual credits, a larger proportion of students in the NTN schools earned dual credit (35%) compared to students in the control schools (20%). A model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 340) = 76.09, p < .001$. The treatment was a marginally-significant predictor of earning dual credit, Exp(B) = 3.06, p < .001. This suggests that students in the NTN schools were 3.06 times more likely to earn dual credit compared to students in the control schools. Baseline achievement scores also predicted earning dual credit.

Regarding on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically significant, $\chi^2 (4, N = 340) = 13.74, p = .008$. The proportion of students who were retained in the NTN schools (2%) was approximately the same as the proportion of students retained in the control schools (5%). The treatment was not a significant predictor of retention, *Exp(B) = .49, p = .36.* Rather, race (being a minority student) and baseline achievement scores predicted on-time progression to graduation.

Project Year 2015-16: Expanded Evaluation Sample

Sample. The effect of the NTN design on student achievement was also explored using the Expanded Evaluation sample of 9th, 10th, and 11th grade students in the third year of data collection for the project (2015-2016). For the 9th grade, the sample included students in the four NTN schools and students in the four control schools. The 9th grade students, excluding those with missing baseline achievement scores, did not differ between the control and NTN schools either in the poverty level – 68% in the control schools and 63% in the NTN schools ($X^2(1, N =1223) = 2.54, p = .11$), or in the proportion of female students – 49% in the control schools vs. 44% in the NTN schools ($X^2(1, N = 1223) = 2.62, p = .11$). However, the control schools had lower proportion of minority students (43%) than the NTN schools (60%), $X^2(1, N = 1217) = 26.42, p < .001$).

The 10th grade sample, excluding those with missing baseline achievement scores, did not differ between the control and NTN schools in proportion of students in poverty – 65% in the control schools vs. 60% in the NTN schools ($X^2(1, N =1012) = 2.70, p = .10$). However, the

proportion of female students was higher in the control schools (54%) compared to the NTN schools (44%), $X^2(1, N = 1013) = 7.14, p = .008)$. Also, the control schools had lower proportion of minority students (42%) than the NTN schools (55%), $X^2(1, N = 1011) = 13.95, p < .001$.

The 11th grade sample, excluding those with missing baseline achievement scores, did not differ between the control and NTN schools either in the poverty level – 59% in the control schools vs. 65% in the NTN schools ($X^2(1, N = 759) =1.26, p = .26)$ or in the proportion of female students – 51% in the control and 46% in the NTN schools, $X^2(1, N = 759) = .72, p = .40)$. However, the control schools had lower proportion of minority students (36%) than the NTN schools (67%), $X^2(1, N = 759) = 31.35, p < .001$.

For all students, baseline achievement was calculated based on scores on a standardized achievement test during their respective 8th grade year of school. The particular test used changed three times during the grant period. For the 9th grade, student baseline achievement was measured by the South Carolina SC Ready exam in five subject areas: ELA, W, Math, SCI, and SOC. A composite measure of baseline achievement was calculated by combining scores from all five subscales. For the 10th grade students, baseline achievement was measured by the South Carolina ASPIRE exam. This exam has five subscales: Math, ELA, W, SCI, and SOC. Due to large amounts of missing data on some of these subscales, Math and ELA scores were combined to form a composite achievement score for use in the analyses. For the 11th grade students, baseline achievement was measured by the South Carolina PASS exam, which has four subscales: Math, ELA, W, and SCI. Due to large amounts of missing data on some of these subscales, Math and ELA scores were combined to form a composite achievement score for use in the analyses.

To explore samples' pre-existing differences in achievement, independent-samples t-tests were conducted for each grade level. The results revealed that 9th grade students in the NTN schools (M = 464.97, SD = 50.02) scored significantly lower on their baseline achievement scores compared to 9th grade students in the control schools (M = 475.07, SD = 51.11), $t(1221) = 2.97, p = .003$.

10th grade students in the NTN schools (M = 631.46, SD = 44.04) scored significantly higher on this baseline achievement test compared to 10th grade students in the control schools (M = 623.03, SD = 48.67), $t (1011) = -2.43, p = .02$. Lastly, 11th grade students in the NTN

schools (M = 626.18, SD = 46.83) did not differ in their baseline achievement scores compared to 11th grade students in the control schools (M = 633.33, SD = 48.51), $t(757) = 1.32$, $p = .19$.

9th Grade Results. Student achievement in the 9th grade was measured by EOC Math and EOC ELA scores and analyzed through a series of ANCOVA tests. The results showed that students in the NTN schools had higher EOC Math scores (adjusted M = 79.05, SE = .68) than students in the control schools (adjusted M = 74.46, SE = .44), controlling for baseline achievement scores, race, and poverty levels, $F(1, 553) = 31.97$, $p < .001$, $\eta_p^2 = .055$ (see Figure 6). On the EOC ELA, students in the NTN schools also had higher scores (adjusted M = 78.56, SE = .76) than students in the control schools (adjusted M = 74.08, SE = .43), controlling for baseline achievement scores, race, and poverty levels, $F(1, 798) = 25.88$, $p < .001$, $\eta_p^2 = .03$ (see Figure 7).

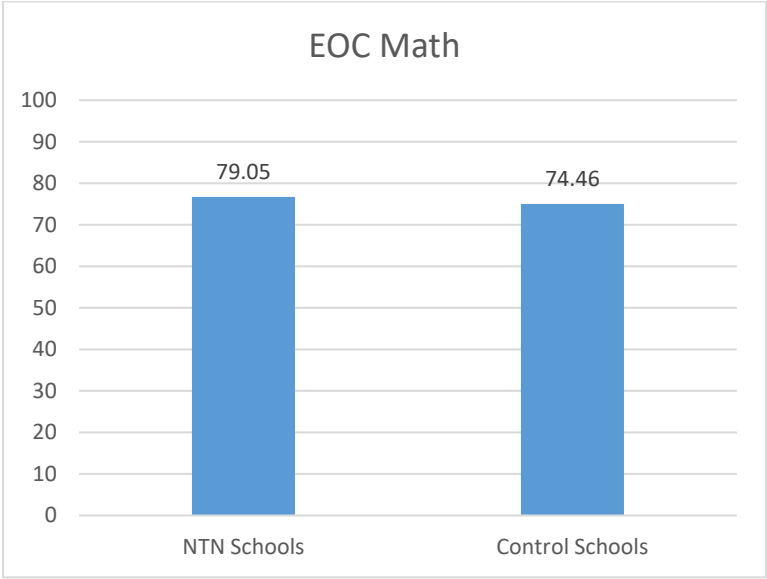

Figure 6. ANCOVA results on EOC Math controlling for race, poverty, and prior achievement

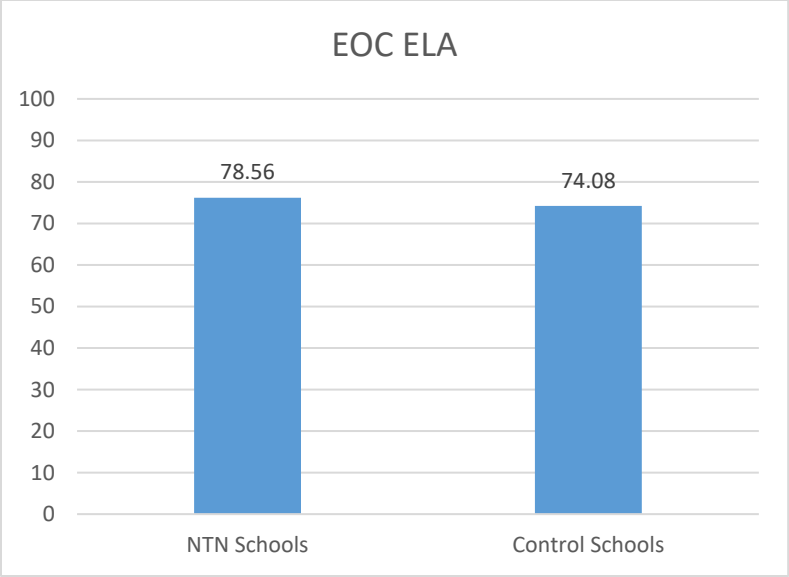

Figure 7. ANCOVA results on EOC ELA controlling for race, poverty, and prior achievement

Additionally, student dropout, dual credit, and retention were statistically analyzed through logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 9th grade sample because a very small number of students from either condition dropped out (.02% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina.

With regard to earning dual credits, no students in the NTN schools earned dual credit (0%) compared to 4% of students in the control schools. A model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 1223) = 42.89, p < .001$. Treatment was not a significant predictor of earning dual credit, Exp(B) = 0.00, p = .94. Instead, poverty and baseline achievement scores predicted earning dual credit.

Regarding on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically significant, $\chi^2 (4, N = 1223) = 81.37, p < .001$. Fewer students were retained in the NTN schools (13%) compared to the control schools (18%). Treatment was a significant predictor of retention,

Exp(B) = 1.73, p = .007. This suggests that students in the control schools were 1.73 times more likely to be retained than students in the New Tech schools. Race (being a minority student) and poverty also predicted retention.

10th Grade Results. For the 10th grade sample, the EOC scores were not available; thus, the analysis of math and ELA achievement was not performed. However, student dropout, dual credit, and retention were statistically analyzed through binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 11th grade sample because a very small number of students from either condition dropped out (.09% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina.

With regard to earning dual credits, a larger proportion of students in the NTN schools earned dual credit (11%) compared to students in the control schools (5%). A model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 1013) = 67.64, p < .001$. Treatment was a significant predictor of earning dual credit, Exp(B) = 2.27, p = .003. This suggests that students in the NTN schools were 2.27 times more likely to earn dual credit compared to students in the control schools. Baseline achievement scores also predicted earning dual credit.

Regarding on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically significant, $\chi^2 (4, N = 1013) = 40.11, p < .001$. The proportion of students who were retained in the NTN schools (3%) was approximately the same as the proportion of students retained in the control schools (5%). Treatment was not a significant predictor of retention, *Exp(B) = .47, p = .73.* Rather, poverty and baseline achievement scores predicted retention.

11th Grade Results. Student achievement in the 11th grade was measured by the ACT and Workkeys and analyzed through a series of ANCOVA tests. The results showed that students in the NTN schools had higher ACT Composite scores (adjusted M = 37.95, SE = 1.55) than students in the control schools (adjusted M = 31.77, SE = .60), controlling for baseline achievement scores, race, and poverty levels, $F (1, 661) = 13.61, p < .001, \eta_p^2 = .02$ (see Figure

8). On the ACT Math, students in the NTN schools (adjusted M = 36.08, SE = 1.76) did not differ from students in the control schools (adjusted M = 34.88, SE = .67), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 662) = .39, p = .58, \eta_p^2 = .001$. On the ACT English, students in the NTN schools (adjusted M = 40.71, SE = 1.78) scored higher than students in the control schools (adjusted M = 32.20, SE = .69), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 662) = 19.38, p < .001, \eta_p^2 = .03$ (see Figure 9). On the ACT Writing, students in the NTN schools (adjusted M = 44.07, SE = 2.46) scored higher than students in the control schools (adjusted M = 36.47, SE = .94), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 655) = 3.48.225, p = .004, \eta_p^2 = .012$. On the ACT Science, students in the NTN schools (adjusted M = 40.71, SE = 1.79) scored higher than students in the control schools (adjusted M = 32.23, SE = .69), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 661) = 19.17, p < .001, \eta_p^2 = .03$ (see Figure 10). On the Workkeys Math, students in the NTN schools (adjusted M = 77.71, SE = .37) scored higher than students in the control schools (adjusted M = 76.77, SE = .14), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 698) = 5.65, p = .02, \eta_p^2 = .008$. On the Workkeys Reading, students in the NTN schools had higher scores (adjusted M = 79.74, SE = .25) than students in the control schools (adjusted M = 78.71, SE = .09), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 700) = 16.69, p < .001, \eta_p^2 = .02$. On the Workkeys Information, students in the NTN schools (adjusted M = 76.97, SE = .24) scored higher than students in the control schools (adjusted M = 76.37, SE = .09), controlling for baseline achievement scores, race, and poverty levels, $F\ (1, 701) = 5.74, p = .02, \eta_p^2 = .008$.

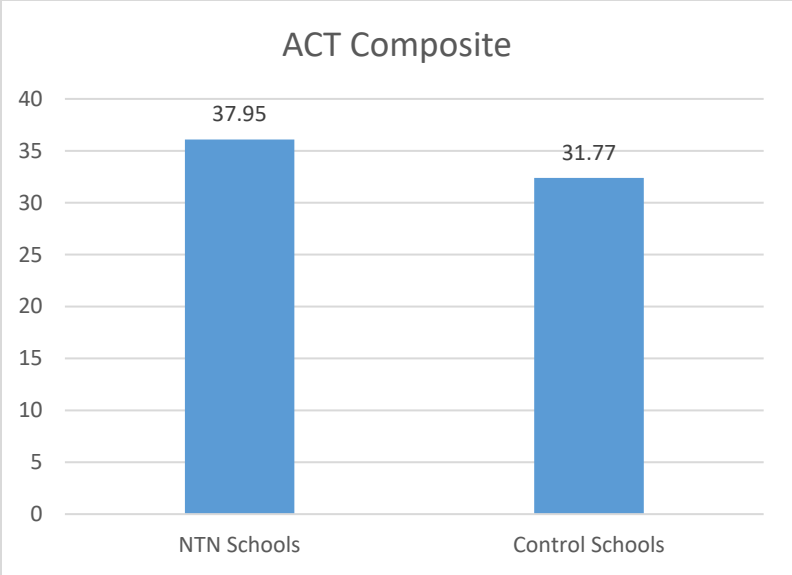

Figure 8. ANCOVA results on ACT Composite controlling for race, poverty, and prior achievement

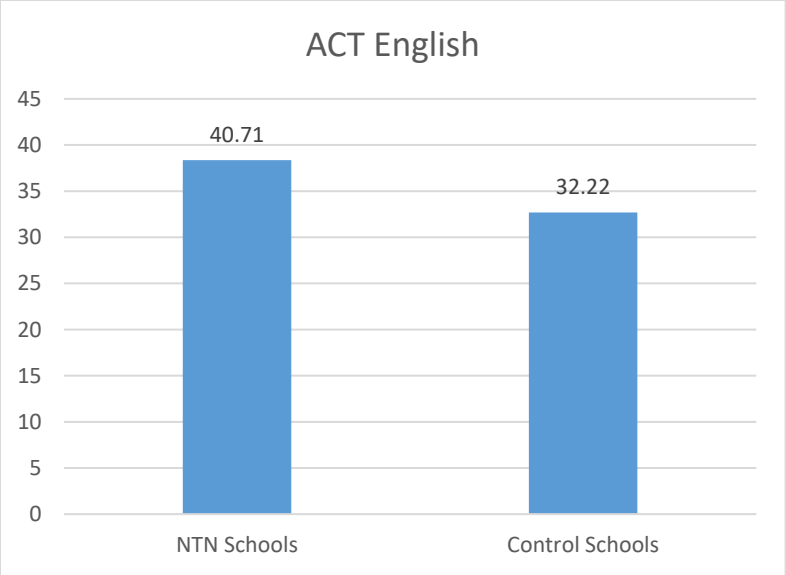

Figure 9. ANCOVA results on ACT English controlling for race, poverty, and prior achievement

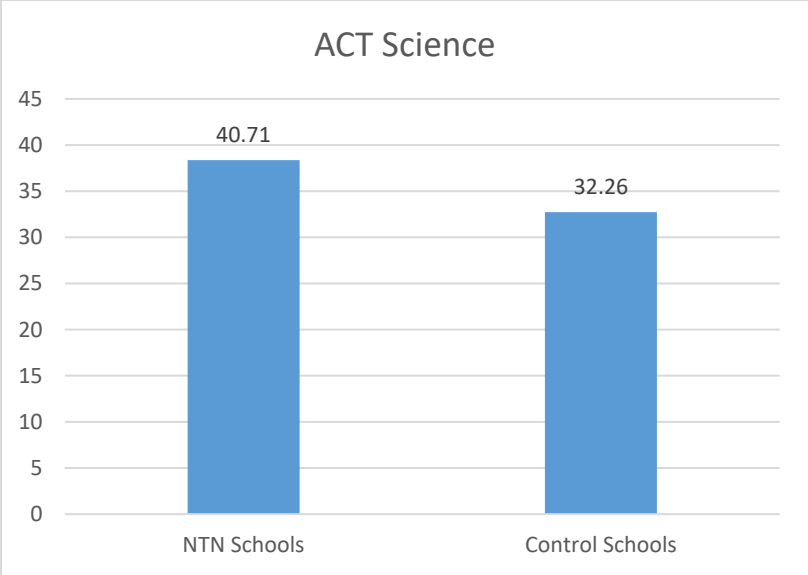

Figure 10. ANCOVA results on ACT Science controlling for race, poverty, and prior achievement

Additionally, student dropout, dual credit, and retention were statistically analyzed through binary logistic regression. Note that, due to the small number of students who dropped out, were enrolled in dual credit courses, or were retained, the results of the logistic regression analyses are difficult to interpret in a meaningful way.

Specifically, dropout cannot be properly analyzed in the 11th grade sample because a very small number of students from either condition dropped out (2% of students in the control schools and 0% of students in the NTN schools). This pattern is not unexpected, because dropping out of school prior to the age of 17 is against the law in the state of South Carolina.

With regard to earning dual credits, a larger proportion of students in the NTN schools earned dual credit (33%) compared to students in the control schools (12%). A model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of earning dual credit was statistically significant, $\chi^2 (4, N = 759) = 103.57, p < .001$. Treatment was a significant predictor of earning dual credit, Exp(B) = 3.75, p < .001. This suggests that students in the NTN schools were 3.75 times more likely to earn dual credit compared to students in the control schools. Race and baseline achievement scores also predicted earning dual credit.

Regarding on-time progression to graduation, a model with the treatment condition, race, poverty, and the baseline achievement scores as predictors of student retention was statistically

significant, $\chi^2 (4, N = 759) = 24.11, p < .001$. The proportion of students who were retained in the NTN schools (5%) was approximately the same as the proportion of students retained in the control schools (5%). Treatment was not a significant predictor of retention, $Exp(B) = 1.14, p = .80$. Rather, baseline achievement scores predicted retention.