# Comparison of STAAR Test Performance Between General Education and Special Education Students in Killeen ISD, 2016-2017

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## Abstract

The purpose of the current analysis was to quantify the overall and by-grade level change in STAAR test Reading and Writing pass rates between general education and special education students for the 2016 and 2017 school years. Holding individual campuses and grade levels constant, the overall gap between general education and special education student STAAR Reading pass rates decreased 11.38% (see Table 1.). Conversely, the overall gap between general education and special education student STAAR Writing pass rates increased 9.26% (see Table 3. below). STAAR Reading and Writing improvement results between general education and special education students were mixed, with grade 4 showing the greatest improvement in reading at -37.94% and grade 4 showing the greatest improvement in writing at -4.39%. The following report contains a fuller treatment of the results, including a description of the analysis approach.


## Analysis Description

By-campus differences and percentage change calculations were omitted for the purposes of this report. Compared to the number of general education students across most campuses who took the STAAR test in both 2016 and 2017, the number of special education students who took the test is considerably smaller. For example, over the 2016 and 2017 period, 16 of 19 special education classrooms in the schools analyzed contained fewer than 30 students. This disparity in the class sizes among the population of general education and special education students prohibits making appropriate and tenable comparisons. However, when individual campuses are held constant and the number of general education and special education students in each grade are combined, the tenability of comparisons is slightly more appropriate. As a result, all analyses were conducted by year and grade level across all campuses.

In order to calculate the percentage change in pass rates between general education and special education students over the 2016-2017 period, we first calculated the difference in percentage points in each grade for each year (see Eq. 1). For example, in 2016, 78.44% of 3rd grade general education students passed the reading portion of the STAAR test ($n$ = 393), compared with 53.49% of 3rd grade special education students ($n$ = 23), resulting in a difference of 24.95 percentage points. Using this approach, we treated special education pass rates as the reference class. Thus, a negative percentage point difference indicated the degree to which special education pass rates were below those of general education students.

$$pdiff_{Y_iG_j} = (special\ education_{Y_iG_j} - general\ education_{Y_iG_j}), \quad (1)$$

where $pdiff_{Y_iG_j}$ is the percentage point difference in $Year_i$ at $Grade_j$ between special education and general education student pass rates. We then use the percentage point difference in each year between general education and special education student pass rates at each grade level to calculate the percentage change occurring in 2017, compared to 2016 (see Eq. 2).

$$pchange_{Y_iG_j} = \frac{(pdiff_{Y_{2017}G_j} - pdiff_{2016G_j})}{pdiff_{2016G_j}}, \quad (2)$$

where $pchange_{Y_iG_j}$ is percent change observed at each grade level in 2017, with reference to 2016. All analyses were conducted using the R statistical programming language (R Core Team, 2017). See Appendix A. for all supporting code.

## STAAR Reading, 2016-2017

### Overall Change

Compared to 2016, holding individual campuses and grade levels constant, the overall gap between general education and special education student STAAR Reading pass rates decreased 11.28% in 2017 (see Table 1.).

Table. 1. *Overall percentage change in reading performance gap between general education and special education students across all grades and all campuses, 2016-2017.*

| | General Education | | | Special Education | | | Difference | |
|---|---|---|---|---|---|---|---|---|
| Year | Total | Passed | Pass Rate | Total | Passed | Pass Rate | (Pct. Points) | Pct. Change |
| 2016 | 2,191 | 1,797 | 82.02% | 228 | 95 | 41.67% | 40.35 | -11.28% |
| 2017 | 1,968 | 1,570 | 79.78% | 191 | 84 | 43.98% | 35.80 | |

### Change by Grade Level

STAAR Reading improvement results were mixed across grades 3-8. Among the six grade levels, four (grades 4, 5, 6, and 8) showed a noticeable improvement in 2017, compared to 2016. Table 2. below displays pass rates, percentage point differences, and corresponding percentage change between general education and special education students in each grade by year. Similarly, Fig. 1 displays the percentage change values between general education students and special education students by grade level.

Table. 2. *Percentage change in reading performance gap between general education and special education students by grade level, 2016-2017.*

| | | General Education | | | Special Education | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Grade | Total | Passed | Pass Rate | Total | Passed | Pass Rate | (Pct. Points) | Pct. Change |
| 2016 | 3 | 501 | 393 | 78.44% | 43 | 23 | 53.49% | 24.95 | 32.38% |
| 2017 | 3 | 448 | 356 | 79.46% | 28 | 13 | 46.43% | 33.04 | |
| 2016 | 4 | 424 | 333 | 78.54% | 47 | 20 | 42.55% | 35.98 | -37.94% |
| 2017 | 4 | 403 | 285 | 70.72% | 31 | 15 | 48.39% | 22.33 | |
| 2016 | 5 | 346 | 308 | 89.02% | 32 | 12 | 37.50% | 51.52 | -21.97% |
| 2017 | 5 | 345 | 297 | 86.09% | 37 | 17 | 45.95% | 40.14 | |
| 2016 | 6 | 345 | 276 | 80.00% | 42 | 10 | 23.81% | 56.19 | -36.63% |
| 2017 | 6 | 272 | 207 | 76.10% | 31 | 10 | 32.26% | 43.84 | |
| 2016 | 7 | 280 | 213 | 76.07% | 34 | 11 | 32.35% | 43.72 | 26.81% |
| 2017 | 7 | 250 | 191 | 76.40% | 30 | 5 | 16.67% | 59.73 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2016 | 8 | 295 | 274 | 92.88% | 30 | 19 | 63.33% | 29.55 | -22.12% |
| 2017 | 8 | 250 | 234 | 93.60% | 34 | 24 | 70.59% | 23.01 | |

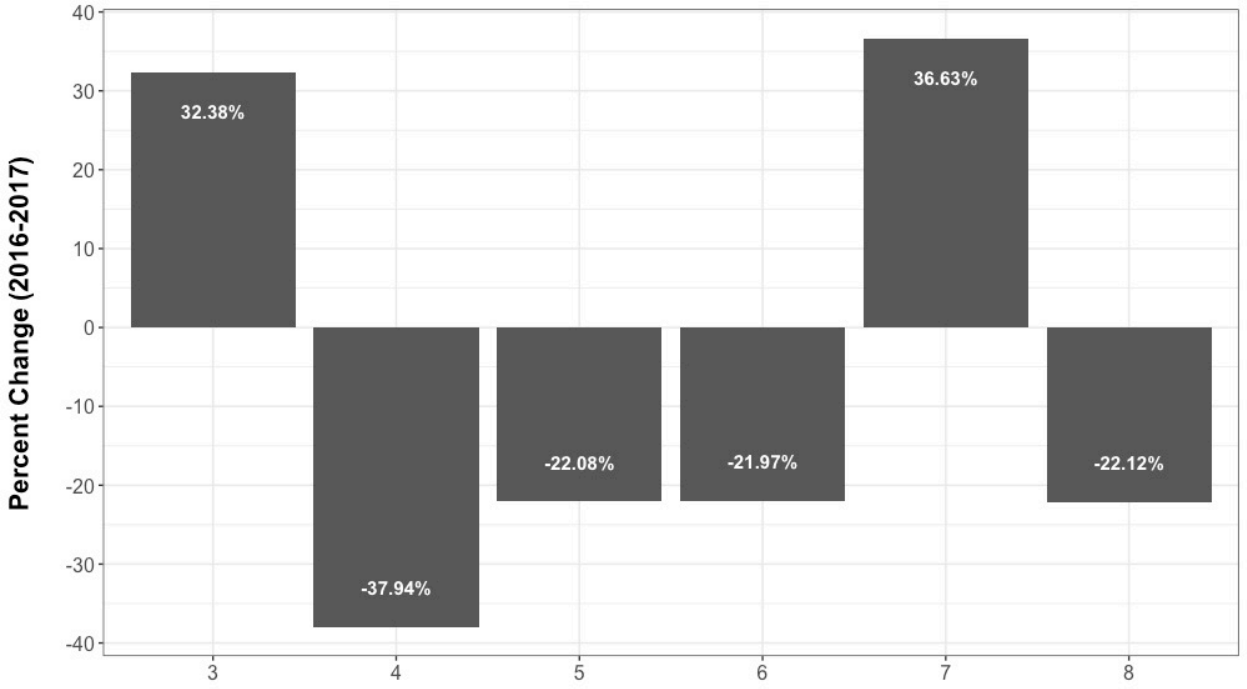


Fig. 1. Percentage Change in Reading Performance Gap Between General Education and Special Education Students by Grade Level, 2016-2017.

## STAAR Writing, 2016-2017

### Overall Change

Compared to 2016, holding individual campuses and grade levels constant, the overall gap between general education and special education student STAAR Writing pass rates increased 9.26% in 2017 (see Table 3.).

Table 3. *Overall percentage change in writing performance gap between general education and special education students across all grades and all campuses, 2016-2017.*

| | General Education | | | Special Education | | | Difference | |
|---|---|---|---|---|---|---|---|---|
| Year | Total | Passed | Pass Rate | Total | Passed | Pass Rate | (Pct. Points) | Pct. Change |
| 2016 | 705 | 506 | 71.77% | 84 | 26 | 30.95% | 40.82 | 9.26% |
| 2017 | 658 | 447 | 67.93% | 60 | 14 | 23.33% | 44.60 | |

### Change by Grade Level

STAAR Writing improvement results were also mixed across among 4 and 7. Only grade 4 shoed improvement in the performance gap between general education and special education students in 2017, compared to 2016. Table 4. below displays pass rates, percentage point

differences, and corresponding percentage change between general education and special education students in each grade by year. Similarly, Fig. 2 displays the percentage change values between general education students and special education students by grade level.

Table 4. *Percentage change in writing performance gap between general education and special education students by grade level, 2016-2017.*

| | | General Education | | | Special Education | | | Difference | |
|---|---|---|---|---|---|---|---|---|---|
| Year | Grade | Total | Passed | Pass Rate | Total | Passed | Pass Rate | (Pct. Points) | Pct. Change |
| 2016 | 4 | 426 | 294 | 69.01 | 50 | 15 | 30.00 | 39.01 | -4.39% |
| 2017 | 4 | 401 | 266 | 66.33 | 31 | 9 | 29.03 | 37.30 | |
| 2016 | 7 | 279 | 212 | 75.99 | 34 | 11 | 32.35 | 43.63 | 21.90% |
| 2017 | 7 | 257 | 181 | 70.43 | 29 | 5 | 17.24 | 53.19 | |

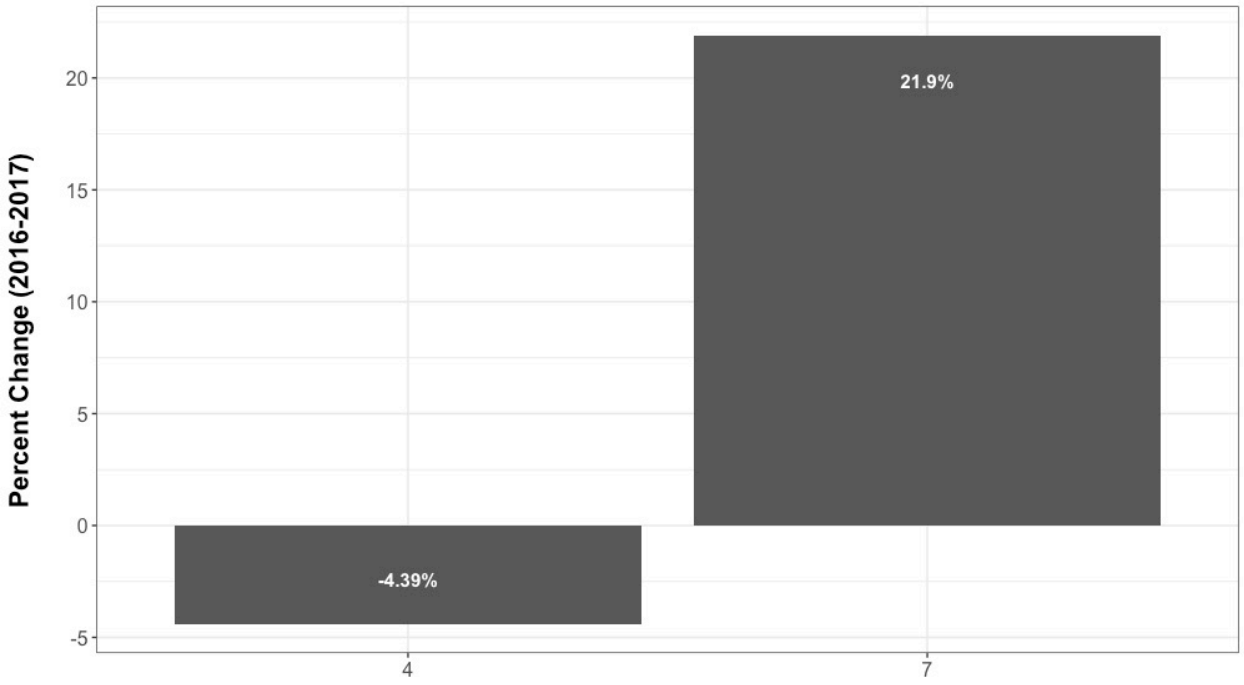


Fig. 2. Percentage Change in Writing Performance Gap Between General Education and Special Education Students by Grade Level, 2016-2017.

APPENDIX A. R Code

```
# ------------------------------------------------------------------
# KISD STAAR Analysis ----------------------------------------------
# Reading: 2016-2017 by year, school, grade ------------------------
# ------------------------------------------------------------------

# Load package libraries
library(dplyr)
library(ggplot2)
library(data.table)

# Equation 2.
p_change <- function(x, y){
  ((x - y)/y)*100
}

# Read in data
read <- readr::read_csv("~/Dropbox/Research Projects/TK/data/all_years
_reading.csv")

# READING: Overall, by year
overall <- read %>%
  group_by(year) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = gen_pct - sped_pct)

# Perentage point difference overall by year
ggplot(data = overall, aes(x = factor(year), y = p_diff,
  group = factor(year))) + geom_bar(stat = "identity") +
  scale_y_continuous(breaks = seq(0, 100, 10),
    name = "Percentage Point Difference\n") + theme_bw() +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(year), y = p_diff-5,
    label = round(p_diff, 2)),
    color = "white", fontface = "bold", size = 6) +
  theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12))

# Build melted dataframe for plotting
# Overall
year <- rep(c("2016", "2017"), times = 1, each = 1)
#grade <- rep(3:8, times = 6)
class <- rep(c("Gen. Ed.", "Sp. Ed."), each = 2)
pass_rate <- with(overall, c(gen_pct, sped_pct))
read_pass <- data.frame(year, class, pass_rate)
```

```
# Percentage pass rate between gened and sped in each grade, by year
ggplot(data = read_pass, aes(x = class, y = pass_rate)) +
  geom_bar(stat = "identity") +
  scale_y_continuous(limits = c(0, 100),
    breaks = seq(0, 100, 20), name = "Pass Rates\n") +
  scale_x_discrete(name = "") + theme_bw() +
  geom_text(aes(x = class, y = (pass_rate)-7,
    label = paste(round(pass_rate, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(~year) + theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))

# READING: By school, year, grade
by_school <- read %>%
  group_by(school, year, grade) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = gen_pct - sped_pct)

# READING: By year, grade
by_year <- read %>%
  group_by(year, grade) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = sped_pct - gen_pct) %>%
  arrange(grade)

# Perentage point difference between gened and sped in each grade, by
year
ggplot(data = by_year, aes(x = factor(year), y = p_diff,
  group = factor(grade))) + geom_bar(stat = "identity") +
  scale_y_continuous(breaks = seq(0, 100, 10),
    name = "Percentage Point Difference\n") + theme_bw() +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(year), y = p_diff-5,
    label = round(p_diff, 2)),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(~factor(grade)) + theme(axis.title = element_text(size =
16,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))
```

```
# 2016-2017
year <- rep(c("2016", "2017"), times = 2, each = 6)
grade <- rep(3:8, times = 2)
class <- rep(c("Gen. Ed.", "Sp. Ed."), each = 12)
pass_rate <- with(by_year, c(gen_pct, sped_pct))
read_pass <- data.frame(year, grade, class, pass_rate)

# Percentage pass rate between gened and sped in each grade, by year
ggplot(data = read_pass, aes(x = class, y = pass_rate)) +
  geom_bar(stat = "identity") +
  scale_y_continuous(limits = c(0, 100),
    breaks = seq(0, 100, 20), name = "Pass Rates\n") +
  scale_x_discrete(name = "") + theme_bw() +
  geom_text(aes(x = class, y = (pass_rate)-7,
    label = paste(round(pass_rate, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(year ~ grade) + theme(axis.title = element_text(size = 16
,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))

p_change(overall$p_diff[overall$year == 2016], overall$p_diff[overall$
year == 2015])

## numeric(0)

p_change(overall$p_diff[overall$year == 2017], overall$p_diff[overall$
year == 2016])

## [1] -11.28435

# Perentage change between gened and sped in each grade, 2016-2017
diff_16 <- subset(by_year, year == 2016, p_diff)
diff_17 <- subset(by_year, year == 2017, p_diff)
grade <- rep(3:8)
pct_diffs_b <- data.frame(grade, diff_16, diff_17)
names(pct_diffs_b) <- c("grade", "diff_16", "diff_17")
pct_diffs_b$pct_change <- with(pct_diffs_b, p_change(diff_17, diff_16)
)
pct_diffs_b$label <- with(pct_diffs_b, ifelse(pct_change < 0,
  pct_change + 5, pct_change - 5))

ggplot(data = pct_diffs_b, aes(x = factor(grade), y = pct_change)) +
  geom_bar(stat = "identity") + theme_bw() +
  scale_y_continuous(breaks = seq(-40, 40, 10),
    name = "Percent Change (2016-2017)\n") +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(grade), y = label,
    label = paste(round(pct_change, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12))
```

```
# ------------------------------------------------------------------------
# KISD STAAR Analysis ----------------------------------------------------
# Writing: 2016-2017 by year, school, grade ------------------------------
# ------------------------------------------------------------------------

# Read in data
write <- readr::read_csv("~/Dropbox/Research Projects/TK/data/all_year
s_writing.csv")

p_change(overall$p_diff[overall$year == 2017], overall$p_diff[overall$
year == 2016])

## [1] -11.28435

# WRITING: Overall, by year
overall <- write %>%
  group_by(year) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = gen_pct - sped_pct)

# Perentage point difference overall by year
ggplot(data = overall, aes(x = factor(year), y = p_diff,
  group = factor(year))) + geom_bar(stat = "identity") +
  scale_y_continuous(breaks = seq(0, 100, 10),
    name = "Percentage Point Difference\n") + theme_bw() +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(year), y = p_diff-5,
    label = round(p_diff, 2)),
    color = "white", fontface = "bold", size = 6) +
  theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12))

# Build melted dataframe for plotting
# Overall
year <- rep(c("2016", "2017"), times = 1, each = 1)
#grade <- rep(3:8, times = 6)
class <- rep(c("Gen. Ed.", "Sp. Ed."), each = 2)
pass_rate <- with(overall, c(gen_pct, sped_pct))
write_pass <- data.frame(year, class, pass_rate)

# Percentage pass rate between gened and sped in each grade, by year
ggplot(data = write_pass, aes(x = class, y = pass_rate)) +
  geom_bar(stat = "identity") +
  scale_y_continuous(limits = c(0, 100),
    breaks = seq(0, 100, 20), name = "Pass Rates\n") +
  scale_x_discrete(name = "") + theme_bw() +
  geom_text(aes(x = class, y = (pass_rate)-7,
    label = paste(round(pass_rate, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(~year) + theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
```

```
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))

# WRITING: By school, year, grade
by_school <- write %>%
  group_by(school, year, grade) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = gen_pct - sped_pct)

# WRITING: By year, grade
by_year <- write %>%
  group_by(year, grade) %>%
  filter(year != 2015) %>%
  summarize(gen_sum = sum(gen_total),
    gen_pass = sum(gen_pass),
    gen_pct = gen_pass/gen_sum*100,
    sped_sum = sum(sped_total),
    sped_pass = sum(sped_pass),
    sped_pct = sped_pass/sped_sum*100,
    p_diff = gen_pct - sped_pct) %>%
  arrange(grade)

# Perentage point difference between gened and sped in each grade, by
year
ggplot(data = by_year, aes(x = factor(year), y = p_diff,
  group = factor(grade))) + geom_bar(stat = "identity") +
  scale_y_continuous(breaks = seq(0, 100, 10),
    name = "Percentage Point Difference\n") + theme_bw() +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(year), y = p_diff-5,
    label = round(p_diff, 2)),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(~factor(grade)) + theme(axis.title = element_text(size =
16,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))

# 2016-2017
year <- rep(c("2016", "2017"), times = 2, each = 1)
grade <- rep(c(4, 7), each = 2, times = 1)
class <- rep(c("Gen. Ed.", "Sp. Ed."), each = 2, times = 2)
pass_rate <- with(by_year, c(gen_pct, sped_pct))
write_pass <- data.frame(year, grade, class, pass_rate)

# Percentage pass rate between gened and sped in each grade, by year
ggplot(data = write_pass, aes(x = class, y = pass_rate)) +
  geom_bar(stat = "identity") +
  scale_y_continuous(limits = c(0, 100),
    breaks = seq(0, 100, 20), name = "Pass Rates\n") +
  scale_x_discrete(name = "") + theme_bw() +
```

```
  geom_text(aes(x = class, y = (pass_rate)-7,
    label = paste(round(pass_rate, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  facet_grid(year ~ grade) + theme(axis.title = element_text(size = 16
,
    face = "bold"), axis.text = element_text(size = 12)) +
  theme(strip.text.x = element_text(size = 12, color = "gray30",
    face = "bold")) +
  theme(strip.text.y = element_text(size = 12, color = "gray30",
    face = "bold"))

p_change(overall$p_diff[overall$year == 2016], overall$p_diff[overall$
year == 2015])

p_change(overall$p_diff[overall$year == 2017], overall$p_diff[overall$
year == 2016])

# Perentage change between gened and sped in each grade, 2016-2017
diff_16 <- subset(by_year, year == 2016, p_diff)
diff_17 <- subset(by_year, year == 2017, p_diff)
grade <- rep(c(4, 7), times = 1)
pct_diffs_b <- data.frame(grade, diff_16, diff_17)
names(pct_diffs_b) <- c("grade", "diff_16", "diff_17")
pct_diffs_b$pct_change <- with(pct_diffs_b, p_change(diff_17, diff_16)
)
pct_diffs_b$label <- with(pct_diffs_b, ifelse(pct_change < 0,
  pct_change + 2, pct_change - 2))

ggplot(data = pct_diffs_b, aes(x = factor(grade), y = pct_change)) +
  geom_bar(stat = "identity") + theme_bw() +
  scale_y_continuous(breaks = seq(-5, 30, 5),
    name = "Percent Change (2016-2017)\n") +
  scale_x_discrete(name = "") +
  geom_text(aes(x = factor(grade), y = label,
    label = paste(round(pct_change, 2), "%", sep = "")),
    color = "white", fontface = "bold", size = 4) +
  theme(axis.title = element_text(size = 16,
    face = "bold"), axis.text = element_text(size = 12))
```