ThulasiRam_RuppaKrishnan_HW2

Thulasiram Ruppa Krishnan

April 17, 2019

```
########################################
## NAME YOUR R Files
##
## This file is an introduction to R
## for SYR.
##
## Week 1
##
## It looks at StoryTeller data
##
## Practice -
##     1) REading in csv
##     2) Looking at the data frame
##     3) Libraries
##     4) Setting a WD
##     5) installing
##     6) check for missing values
##     7) visual EDA part 1
##     8) Look at data types (str)
##
##     RENAME DATA FILES SO THEY HAVE NO SPECIAL CHAR
########################################################
## DO THIS ONCE
##install.packages("ggplot2")
library(ggplot2)
library(tidyverse)
```

```
## -- Attaching packages ---------------------------------------------------------------- tidy
verse 1.2.1 --
```

```
## v tibble  2.0.1       v purrr   0.3.0
## v tidyr   0.8.2       v dplyr   0.8.0.1
## v readr   1.3.1       v stringr 1.4.0
## v tibble  2.0.1       v forcats 0.4.0
```

```
## -- Conflicts ------------------------------------------------------------------- tidyverse_
conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(reshape2)
```

```
##
## Attaching package: 'reshape2'
```

```
## The following object is masked from 'package:tidyr':
##
##     smiths
```

```
library(ggrepel)
library(scales)
```

```
##
## Attaching package: 'scales'
```

```
## The following object is masked from 'package:purrr':
##
##     discard
```

```
## The following object is masked from 'package:readr':
##
##     col_factor
```

```
library(RColorBrewer)

# Clear objects
rm(list=ls())
## Set your working director to the path were your code AND datafile is
setwd("C:/Users/rkrishnan/Documents/01 Personal/MS/IST 707/week2")


## Read in .csv data
## Reference:C:\Users\rkrishnan\Documents\01 Personal\MS\IST 707\week2
## https://stat.ethz.ch/R-manual/R-devel/library/utils/html/read.table.html
## The data file and the R code must be in the SAME folder or you must use a path
## The name must be identical.

filename="data-storyteller.csv"
MyStoryData <- read.csv(filename, header = TRUE, na.strings = "NA")


## Look at the data as a data frame
(head(MyStoryData))
```

```
##   School Section Very.Ahead..5 Middling..0 Behind..1.5 More.Behind..6.10
## 1      A       1             0           5          54                 3
## 2      A       2             0           8          40                10
## 3      A       3             0           9          35                12
## 4      A       4             0          14          44                 5
## 5      A       5             0           9          42                 2
## 6      A       6             0           7          29                 3
##   Very.Behind..11 Completed
## 1               9        10
## 2              16         6
## 3              13        11
## 4              12        10
## 5              24         8
## 6              10         9
```

```
(str(MyStoryData))
```

```
## 'data.frame':    30 obs. of  8 variables:
##  $ School           : Factor w/ 5 levels "A","B","C","D",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Section          : int  1 2 3 4 5 6 7 8 9 10 ...
##  $ Very.Ahead..5    : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Middling..0      : int  5 8 9 14 9 7 19 3 6 13 ...
##  $ Behind..1.5      : int  54 40 35 44 42 29 22 37 29 40 ...
##  $ More.Behind..6.10: int  3 10 12 5 2 3 5 11 8 5 ...
##  $ Very.Behind..11  : int  9 16 13 12 24 10 14 18 12 5 ...
##  $ Completed        : int  10 6 11 10 8 9 19 5 10 20 ...
```

```
## NULL
```

```
## See all the "dots" in the column names?
## This is not good.
## Update the column names in MyStoryData...

## fix the data while reading and comment out the above code...
filename="data-storyteller.csv"
MyStoryData <- read.csv(filename, header = TRUE, na.strings = "NA",col.names = c("School","Secti
on","VeryAhead","Middling","Behind","MoreBehind","VeryBehind","Completed"))

# Section is not an integer. Changing it to factor
MyStoryData$Section <- as.factor(MyStoryData$Section)

## Look at the data as a data frame
(head(MyStoryData))
```

```
##   School Section VeryAhead Middling Behind MoreBehind VeryBehind Completed
## 1      A       1         0        5     54          3          9        10
## 2      A       2         0        8     40         10         16         6
## 3      A       3         0        9     35         12         13        11
## 4      A       4         0       14     44          5         12        10
## 5      A       5         0        9     42          2         24         8
## 6      A       6         0        7     29          3         10         9
```

```
## Check for missing values
Total <-sum(is.na(MyStoryData))
cat("The number of missing values in StoryTeller data is ", Total )
```

```
## The number of missing values in StoryTeller data is  0
```

```
## To clean this data, we can look through the variables and make sure that the data for each va
riable is in
## the proper range.
## The data shows the *number of students* in each category.
## This value cannot be negative - so 0 is the min. We do not know the max, but we
## might be suspecious of very large numbers.

## Let's check each numerical variable to see that it is >=

for(varname in names(MyStoryData)){
  ## Only check numeric variables
  if(sapply(MyStoryData[varname], is.numeric)){
    cat("\n", varname, " is numeric\n")
    ## Get median
    (Themedian <- sapply(MyStoryData[varname],FUN=median))
    ##print(Themedian)
    ## check/replace if the values are <=0
    MyStoryData[varname] <- replace(MyStoryData[varname], MyStoryData[varname] < 0, Themedian)
  }

}
```

```
##
##  VeryAhead  is numeric
##
##  Middling  is numeric
##
##  Behind  is numeric
##
##  MoreBehind  is numeric
##
##  VeryBehind  is numeric
##
##  Completed  is numeric
```

```
(MyStoryData)
```

```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
## 14      B       1         0        4     22          0          6
## 15      B       2         0        5      7          2          1
## 16      B       3         0        6     31          1          1
## 17      B       4         0        4      7          0          0
## 18      B       5         0        8     14          4          0
## 19      B       6         0        8     11          1          2
## 20      B       7         0        9     21          0          2
## 21      B       8         0       10     23          2          5
## 22      B       9         0       10     21          0          3
## 23      B      10         0        3      8          1          1
## 24      B      11         0        7     19          2          1
## 25      B      12         0       10     17          1          0
## 26      C       1         0        2     15          2          4
## 27      C       2         0        7     20          1          7
## 28      C       3         0        2      4          1          1
## 29      D       1         0        3      8          2          6
## 30      E       1         0       11     56          7         15
##    Completed
## 1         10
## 2          6
## 3         11
## 4         10
## 5          8
## 6          9
## 7         19
## 8          5
## 9         10
## 10        20
## 11        15
## 12        14
## 13         5
## 14         7
## 15         3
## 16         8
## 17         7
## 18        14
## 19        18
## 20        13
## 21         6
```

```
## 22         5
## 23        15
## 24        10
## 25        19
## 26        13
## 27         1
## 28         5
## 29         3
## 30        27
```

```
## EXPLORE!
## For all assignments, explore your data.

## Tables are great!
(table(MyStoryData$School))
```

```
##
##  A  B  C  D  E
## 13 12  3  1  1
```

```
## loops - make all the tables at once
for(i in 1:ncol(MyStoryData)){
  print(table(MyStoryData[i]))
}
```

```
##
##  A  B  C  D  E
## 13 12  3  1  1
##
##  1  2  3  4  5  6  7  8  9 10 11 12 13
##  5  3  3  2  2  2  2  2  2  2  2  2  1
##
##  0
## 30
##
##  2  3  4  5  6  7  8  9 10 11 13 14 19
##  3  3  2  2  2  3  4  3  4  1  1  1  1
##
##  4  7  8 11 14 15 16 17 19 20 21 22 23 29 30 31 32 35 37 40 42 44 54 56
##  1  2  2  1  1  1  1  1  1  1  2  2  1  2  1  1  1  1  1  2  1  1  1  1
##
##  0  1  2  3  4  5  7  8 10 11 12
##  4  6  7  3  2  3  1  1  1  1  1
##
##  0  1  2  3  4  5  6  7  8  9 10 12 13 14 15 16 18 24
##  3  5  2  2  1  2  2  1  1  1  2  2  1  1  1  1  1  1
##
##  1  3  5  6  7  8  9 10 11 13 14 15 18 19 20 27
##  1  2  4  2  2  2  1  4  1  2  2  2  1  2  1  1
```

```
(colnames(MyStoryData))
```

```
## [1] "School"     "Section"    "VeryAhead"  "Middling"   "Behind"
## [6] "MoreBehind" "VeryBehind" "Completed"
```

```
(head(MyStoryData))
```

```
##   School Section VeryAhead Middling Behind MoreBehind VeryBehind Completed
## 1      A       1         0        5     54          3          9        10
## 2      A       2         0        8     40         10         16         6
## 3      A       3         0        9     35         12         13        11
## 4      A       4         0       14     44          5         12        10
## 5      A       5         0        9     42          2         24         8
## 6      A       6         0        7     29          3         10         9
```

```
(MyStoryData)
```

```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
## 14      B       1         0        4     22          0          6
## 15      B       2         0        5      7          2          1
## 16      B       3         0        6     31          1          1
## 17      B       4         0        4      7          0          0
## 18      B       5         0        8     14          4          0
## 19      B       6         0        8     11          1          2
## 20      B       7         0        9     21          0          2
## 21      B       8         0       10     23          2          5
## 22      B       9         0       10     21          0          3
## 23      B      10         0        3      8          1          1
## 24      B      11         0        7     19          2          1
## 25      B      12         0       10     17          1          0
## 26      C       1         0        2     15          2          4
## 27      C       2         0        7     20          1          7
## 28      C       3         0        2      4          1          1
## 29      D       1         0        3      8          2          6
## 30      E       1         0       11     56          7         15
##    Completed
## 1         10
## 2          6
## 3         11
## 4         10
## 5          8
## 6          9
## 7         19
## 8          5
## 9         10
## 10        20
## 11        15
## 12        14
## 13         5
## 14         7
## 15         3
## 16         8
## 17         7
## 18        14
## 19        18
## 20        13
## 21         6
```

```
## 22         5
## 23        15
## 24        10
## 25        19
## 26        13
## 27         1
## 28         5
## 29         3
## 30        27
```

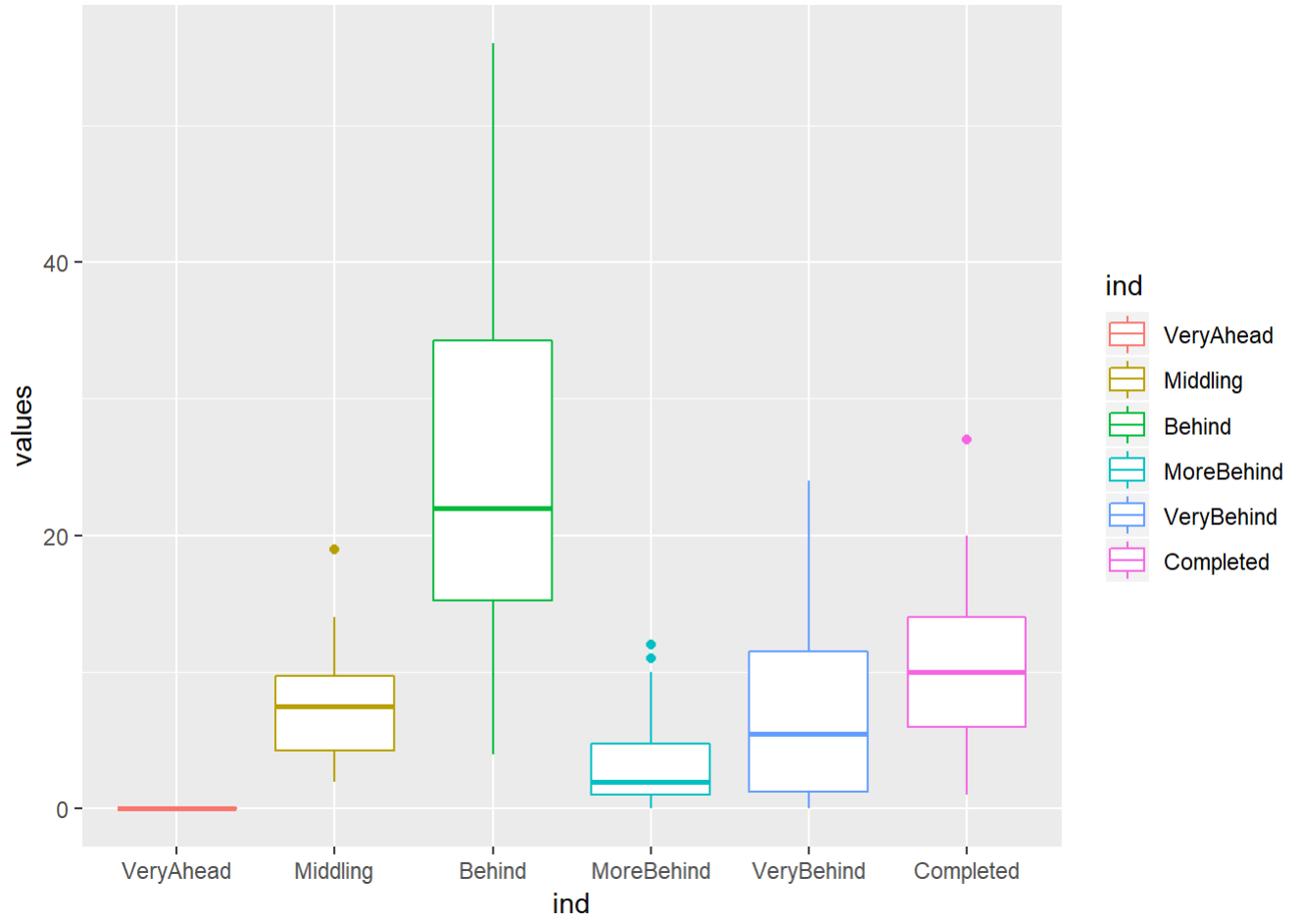
```
## WHich variables contain information?
## Does the Section?


## Now - look at each table.
## First, "School"
## The table shows us that we have 5 schools. but only 2 of them have much data
## Why is this important?

## Look at all the other variables.
## Are there outliers or odd values?

## The structure (types) of the data
(str(MyStoryData))
```

```
## 'data.frame':    30 obs. of  8 variables:
##  $ School    : Factor w/ 5 levels "A","B","C","D",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Section   : Factor w/ 13 levels "1","2","3","4",..: 1 2 3 4 5 6 7 8 9 10 ...
##  $ VeryAhead : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Middling  : int  5 8 9 14 9 7 19 3 6 13 ...
##  $ Behind    : int  54 40 35 44 42 29 22 37 29 40 ...
##  $ MoreBehind: int  3 10 12 5 2 3 5 11 8 5 ...
##  $ VeryBehind: int  9 16 13 12 24 10 14 18 12 5 ...
##  $ Completed : int  10 6 11 10 8 9 19 5 10 20 ...
```

```
## NULL
```

```
## Let's use visual EDA - boxplots and great
## What does this tell us?
ggplot(stack(MyStoryData), aes(x = ind, y = values, color=ind)) +
  geom_boxplot()
```

```
## Warning in stack.data.frame(MyStoryData): non-vector columns will be
## ignored
```




```
##
MyStoryData$School =="A"
```

```
##  [1]  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE  TRUE
## [12]  TRUE  TRUE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
## [23] FALSE FALSE FALSE FALSE FALSE FALSE FALSE FALSE
```

```
JustSchoolA<-subset(MyStoryData, School == "A" )
(JustSchoolA)
```

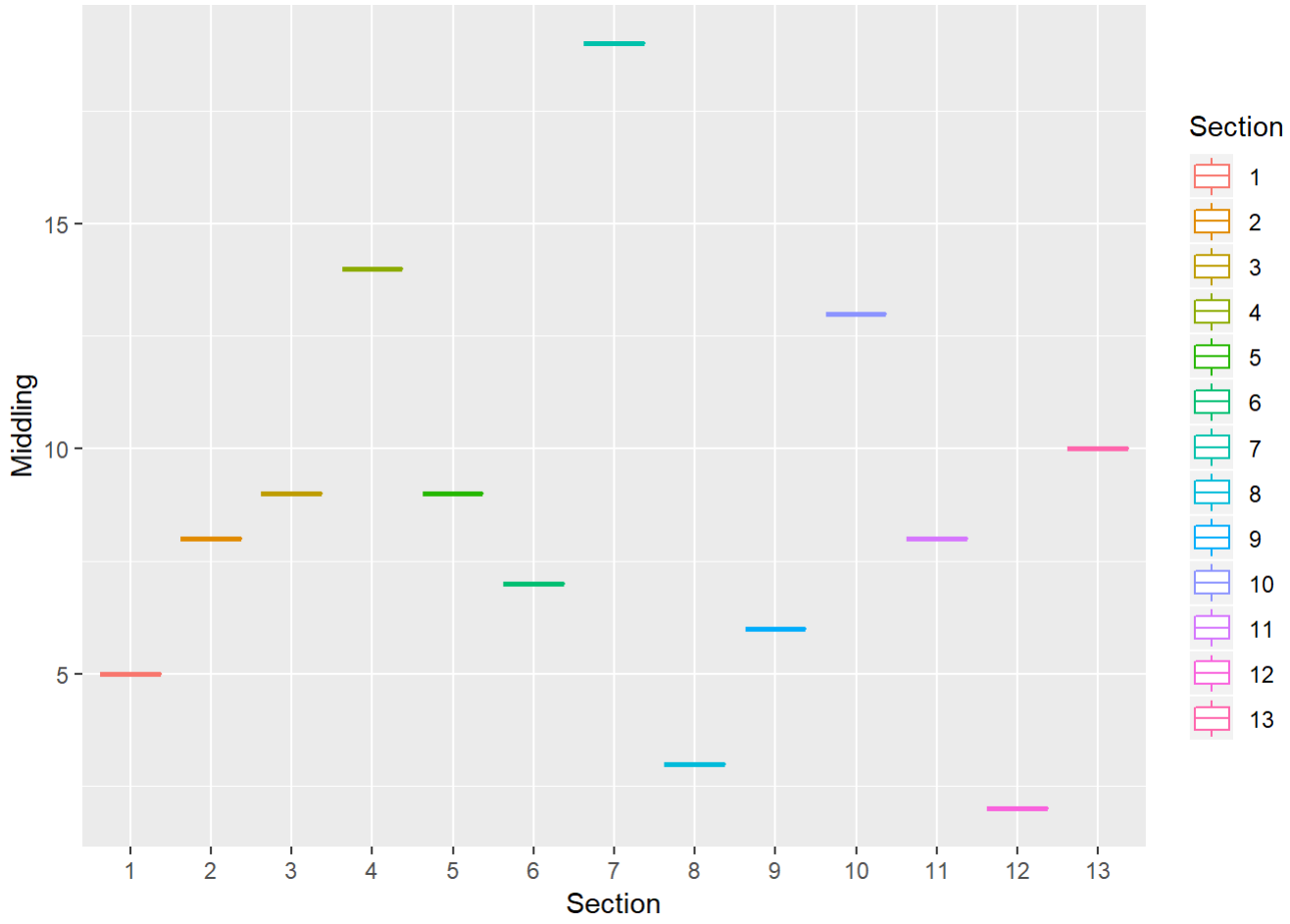
```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
##    Completed
## 1         10
## 2          6
## 3         11
## 4         10
## 5          8
## 6          9
## 7         19
## 8          5
## 9         10
## 10        20
## 11        15
## 12        14
## 13         5
```

```
(str(JustSchoolA))
```

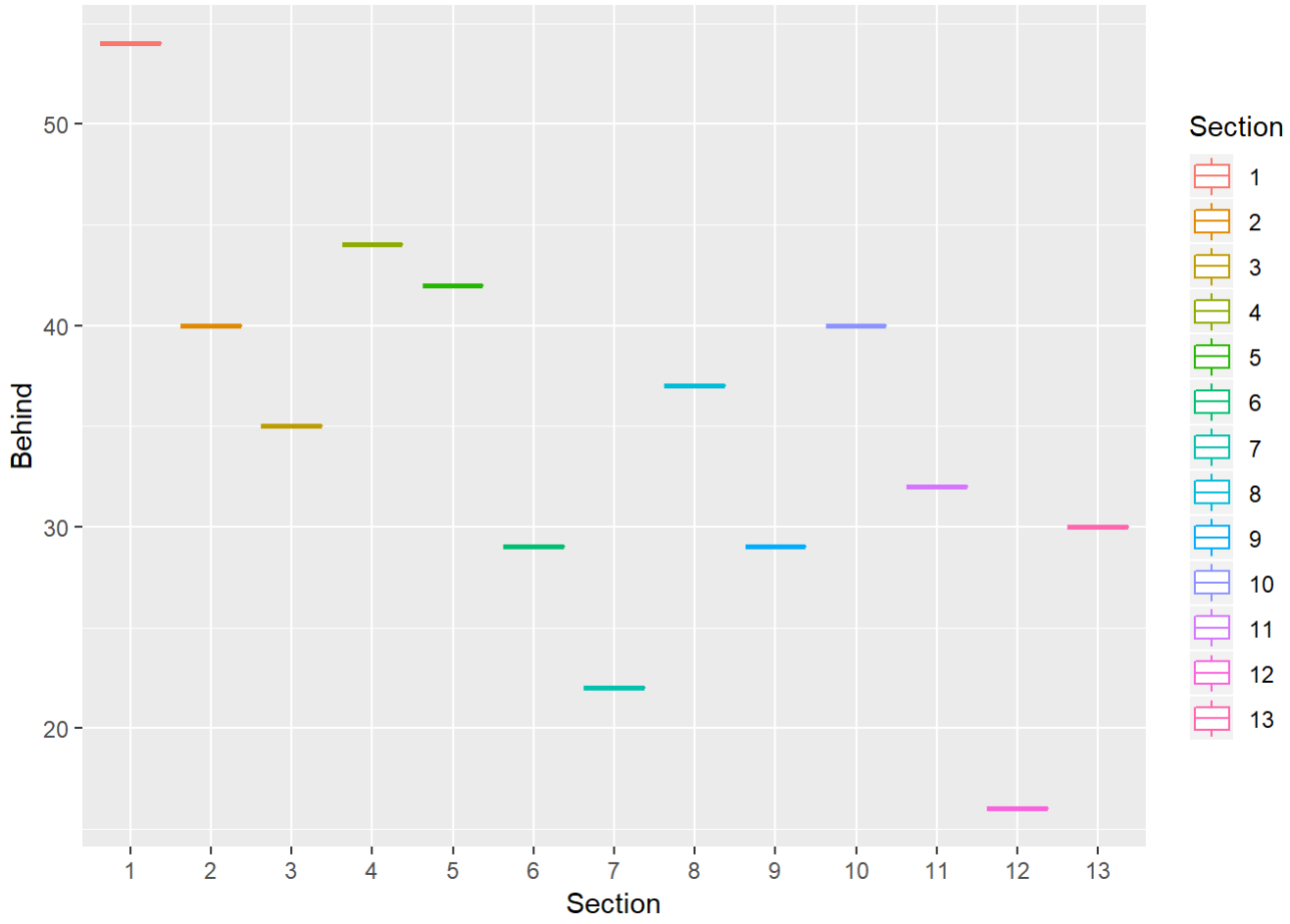
```
## 'data.frame':    13 obs. of  8 variables:
##  $ School    : Factor w/ 5 levels "A","B","C","D",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Section   : Factor w/ 13 levels "1","2","3","4",..: 1 2 3 4 5 6 7 8 9 10 ...
##  $ VeryAhead : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Middling  : int  5 8 9 14 9 7 19 3 6 13 ...
##  $ Behind    : int  54 40 35 44 42 29 22 37 29 40 ...
##  $ MoreBehind: int  3 10 12 5 2 3 5 11 8 5 ...
##  $ VeryBehind: int  9 16 13 12 24 10 14 18 12 5 ...
##  $ Completed : int  10 6 11 10 8 9 19 5 10 20 ...
```

```
## NULL
```

```
## Change Section to a factor
# JustSchoolA$Section<-as.factor(JustSchoolA$Section)

ggplot(JustSchoolA, aes(x = Section, y = Middling, color=Section)) +
  geom_boxplot()
```




```
ggplot(JustSchoolA, aes(x = Section, y = Behind, color=Section)) +
  geom_boxplot()
```




```
## Measures - mean, median, sums

library(plyr)
```

```
## ------------------------------------------------------------------------
```

```
## You have loaded plyr after dplyr - this is likely to cause problems.
## If you need functions from both plyr and dplyr, please load plyr first, then dplyr:
## library(plyr); library(dplyr)
```

```
## ------------------------------------------------------------------------
```

```
##
## Attaching package: 'plyr'
```

```
## The following objects are masked from 'package:dplyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```
## The following object is masked from 'package:purrr':
##
##     compact
```

```
## do once: install.packages("plyr")

## The following will sum all rows for each "School" and per variable in the data
## Let's save this new aggregated result as a DF
SumBySchoolDF <- ddply(MyStoryData, "School", numcolwise(sum))
(SumBySchoolDF)
```

```
##   School VeryAhead Middling Behind MoreBehind VeryBehind Completed
## 1      A         0      113    450         73        154       142
## 2      B         0       84    201         14         22       125
## 3      C         0       11     39          4         12        19
## 4      D         0        3      8          2          6         3
## 5      E         0       11     56          7         15        27
```

```
## Now, I want the total number of students for A - E
## I want to sum the columns for each row
## I will start with:

(SumBySchoolDF)
```

```
##   School VeryAhead Middling Behind MoreBehind VeryBehind Completed
## 1      A         0      113    450         73        154       142
## 2      B         0       84    201         14         22       125
## 3      C         0       11     39          4         12        19
## 4      D         0        3      8          2          6         3
## 5      E         0       11     56          7         15        27
```

```
SumBySchoolSectionDF <- MyStoryData
SumBySchoolSectionDF$SchoolSection <- paste(SumBySchoolSectionDF$School,SumBySchoolSectionDF$Sec
tion)

(SumBySchoolSectionDF)
```

```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
## 14      B       1         0        4     22          0          6
## 15      B       2         0        5      7          2          1
## 16      B       3         0        6     31          1          1
## 17      B       4         0        4      7          0          0
## 18      B       5         0        8     14          4          0
## 19      B       6         0        8     11          1          2
## 20      B       7         0        9     21          0          2
## 21      B       8         0       10     23          2          5
## 22      B       9         0       10     21          0          3
## 23      B      10         0        3      8          1          1
## 24      B      11         0        7     19          2          1
## 25      B      12         0       10     17          1          0
## 26      C       1         0        2     15          2          4
## 27      C       2         0        7     20          1          7
## 28      C       3         0        2      4          1          1
## 29      D       1         0        3      8          2          6
## 30      E       1         0       11     56          7         15
##    Completed SchoolSection
## 1         10           A 1
## 2          6           A 2
## 3         11           A 3
## 4         10           A 4
## 5          8           A 5
## 6          9           A 6
## 7         19           A 7
## 8          5           A 8
## 9         10           A 9
## 10        20          A 10
## 11        15          A 11
## 12        14          A 12
## 13         5          A 13
## 14         7           B 1
## 15         3           B 2
## 16         8           B 3
## 17         7           B 4
## 18        14           B 5
## 19        18           B 6
## 20        13           B 7
## 21         6           B 8
```

```
## 22         5          B 9
## 23        15         B 10
## 24        10         B 11
## 25        19         B 12
## 26        13          C 1
## 27         1          C 2
## 28         5          C 3
## 29         3          D 1
## 30        27          E 1
```

```
SumOfStudents <- rowSums(SumBySchoolDF[,c("VeryAhead", "Middling", "Behind",
                                          "MoreBehind","VeryBehind","Completed")])
(SumOfStudents)
```

```
## [1] 932 446  85  22 116
```

```
SumOfSecStudents <- rowSums(SumBySchoolSectionDF[,c("VeryAhead", "Middling", "Behind",
                                          "MoreBehind","VeryBehind","Completed")])
(SumOfSecStudents)
```

```
##  [1]  81  80  80  85  85  58  79  74  65  83  69  37  56  39  18  47  18
## [18]  40  40  45  46  39  28  39  47  36  36  13  22 116
```

```
StudentsSumPerSchool <- SumBySchoolDF
TotalPerSchool <- data.frame("School" = StudentsSumPerSchool$School,
                             "Total" = SumOfStudents)

(TotalPerSchool)
```

```
##   School Total
## 1      A   932
## 2      B   446
## 3      C    85
## 4      D    22
## 5      E   116
```

```
StudentsSumPerSection <- SumBySchoolSectionDF
TotalPerSection <- data.frame("SchoolSection" = StudentsSumPerSection$SchoolSection,
                             "Total" = SumOfSecStudents)

(TotalPerSection)
```

```
##    SchoolSection Total
## 1            A 1    81
## 2            A 2    80
## 3            A 3    80
## 4            A 4    85
## 5            A 5    85
## 6            A 6    58
## 7            A 7    79
## 8            A 8    74
## 9            A 9    65
## 10          A 10    83
## 11          A 11    69
## 12          A 12    37
## 13          A 13    56
## 14           B 1    39
## 15           B 2    18
## 16           B 3    47
## 17           B 4    18
## 18           B 5    40
## 19           B 6    40
## 20           B 7    45
## 21           B 8    46
## 22           B 9    39
## 23          B 10    28
## 24          B 11    39
## 25          B 12    47
## 26           C 1    36
## 27           C 2    36
## 28           C 3    13
## 29           D 1    22
## 30           E 1   116
```

```
# Merge TotalPerSchool and StudentsSumPerSchool in a new dataset
StudentsBySchool <- cbind(StudentsSumPerSchool,Total=TotalPerSchool$Total)
(StudentsBySchool)
```

```
##   School VeryAhead Middling Behind MoreBehind VeryBehind Completed Total
## 1      A         0      113    450         73        154       142   932
## 2      B         0       84    201         14         22       125   446
## 3      C         0       11     39          4         12        19    85
## 4      D         0        3      8          2          6         3    22
## 5      E         0       11     56          7         15        27   116
```

```
StudentsBySection <- cbind(StudentsSumPerSection,Total=TotalPerSection$Total)
(StudentsBySection)
```

```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
## 14      B       1         0        4     22          0          6
## 15      B       2         0        5      7          2          1
## 16      B       3         0        6     31          1          1
## 17      B       4         0        4      7          0          0
## 18      B       5         0        8     14          4          0
## 19      B       6         0        8     11          1          2
## 20      B       7         0        9     21          0          2
## 21      B       8         0       10     23          2          5
## 22      B       9         0       10     21          0          3
## 23      B      10         0        3      8          1          1
## 24      B      11         0        7     19          2          1
## 25      B      12         0       10     17          1          0
## 26      C       1         0        2     15          2          4
## 27      C       2         0        7     20          1          7
## 28      C       3         0        2      4          1          1
## 29      D       1         0        3      8          2          6
## 30      E       1         0       11     56          7         15
##    Completed SchoolSection Total
## 1         10           A 1    81
## 2          6           A 2    80
## 3         11           A 3    80
## 4         10           A 4    85
## 5          8           A 5    85
## 6          9           A 6    58
## 7         19           A 7    79
## 8          5           A 8    74
## 9         10           A 9    65
## 10        20          A 10    83
## 11        15          A 11    69
## 12        14          A 12    37
## 13         5          A 13    56
## 14         7           B 1    39
## 15         3           B 2    18
## 16         8           B 3    47
## 17         7           B 4    18
## 18        14           B 5    40
## 19        18           B 6    40
## 20        13           B 7    45
## 21         6           B 8    46
```

```
## 22         5          B 9    39
## 23        15          B 10   28
## 24        10          B 11   39
## 25        19          B 12   47
## 26        13          C 1    36
## 27         1          C 2    36
## 28         5          C 3    13
## 29         3          D 1    22
## 30        27          E 1   116
```

```
# Transform and Calculate % to get the numbers under one scale for comparison between schools

StudentsBySchool$Middling_Percent <- round(StudentsBySchool$Middling/StudentsBySchool$Total*100,
1)
StudentsBySchool$Behind_Percent <- round(StudentsBySchool$Behind/StudentsBySchool$Total*100,1)
StudentsBySchool$MoreBehind_Percent <- round(StudentsBySchool$MoreBehind/StudentsBySchool$Total*
100,1)
StudentsBySchool$VeryBehind_Percent <- round(StudentsBySchool$VeryBehind/StudentsBySchool$Total*
100,1)
StudentsBySchool$Completed_Percent <- round(StudentsBySchool$Completed/StudentsBySchool$Total*10
0,1)

StudentsBySection$Middling_Percent <- round(StudentsBySection$Middling/StudentsBySection$Total*1
00,1)
StudentsBySection$Behind_Percent <- round(StudentsBySection$Behind/StudentsBySection$Total*100,1
)
StudentsBySection$MoreBehind_Percent <- round(StudentsBySection$MoreBehind/StudentsBySection$Tot
al*100,1)
StudentsBySection$VeryBehind_Percent <- round(StudentsBySection$VeryBehind/StudentsBySection$Tot
al*100,1)
StudentsBySection$Completed_Percent <- round(StudentsBySection$Completed/StudentsBySection$Total
*100,1)

# combine Middling and Completed into one bucket and Behinds are into 2nd bucket to get a sense
 of % behind % ahead

StudentsBySchool$AllAheads <- StudentsBySchool$Completed+ StudentsBySchool$Middling +StudentsBySchool$VeryAhead
StudentsBySchool$AllBehinds <- StudentsBySchool$Behind+ StudentsBySchool$MoreBehind +StudentsBySchool$VeryBehind
StudentsBySchool$AllAheads_Percent <- round(StudentsBySchool$AllAheads/StudentsBySchool$Total*10
0,1)
StudentsBySchool$AllBehinds_Percent <- round(StudentsBySchool$AllBehinds/StudentsBySchool$Total*
100,1)
StudentsBySchool$Total_Scaled <- ifelse(round((StudentsBySchool$Total/sum(StudentsBySchool$Tota
l)),1)==0,0.1,round((StudentsBySchool$Total/sum(StudentsBySchool$Total)),1))

(StudentsBySchool)
```

```
##   School VeryAhead Middling Behind MoreBehind VeryBehind Completed Total
## 1      A         0      113    450         73        154       142   932
## 2      B         0       84    201         14         22       125   446
## 3      C         0       11     39          4         12        19    85
## 4      D         0        3      8          2          6         3    22
## 5      E         0       11     56          7         15        27   116
##   Middling_Percent Behind_Percent MoreBehind_Percent VeryBehind_Percent
## 1             12.1           48.3                7.8               16.5
## 2             18.8           45.1                3.1                4.9
## 3             12.9           45.9                4.7               14.1
## 4             13.6           36.4                9.1               27.3
## 5              9.5           48.3                6.0               12.9
##   Completed_Percent AllAheads AllBehinds AllAheads_Percent
## 1              15.2       255        677              27.4
## 2              28.0       209        237              46.9
## 3              22.4        30         55              35.3
## 4              13.6         6         16              27.3
## 5              23.3        38         78              32.8
##   AllBehinds_Percent Total_Scaled
## 1               72.6          0.6
## 2               53.1          0.3
## 3               64.7          0.1
## 4               72.7          0.1
## 5               67.2          0.1
```

```
StudentsBySection$AllAheads <- StudentsBySection$Completed+ StudentsBySection$Middling +Students
BySection$VeryAhead
StudentsBySection$AllBehinds <- StudentsBySection$Behind+ StudentsBySection$MoreBehind +Students
BySection$VeryBehind
StudentsBySection$AllAheads_Percent <- round(StudentsBySection$AllAheads/StudentsBySection$Total
*100,1)
StudentsBySection$AllBehinds_Percent <- round(StudentsBySection$AllBehinds/StudentsBySection$Tot
al*100,1)
StudentsBySection <-merge(StudentsBySection,`colnames<-`(StudentsBySchool[,c("School","Total")],
c("School","SchoolTotal")) ,by.x = "School",by.y = "School")
StudentsBySection$Total_Scaled <- ifelse(round((StudentsBySection$Total/StudentsBySection$School
Total),1)==0,0.1,round((StudentsBySection$Total/StudentsBySection$SchoolTotal),1))


(StudentsBySection)
```

```
##    School Section VeryAhead Middling Behind MoreBehind VeryBehind
## 1       A       1         0        5     54          3          9
## 2       A       2         0        8     40         10         16
## 3       A       3         0        9     35         12         13
## 4       A       4         0       14     44          5         12
## 5       A       5         0        9     42          2         24
## 6       A       6         0        7     29          3         10
## 7       A       7         0       19     22          5         14
## 8       A       8         0        3     37         11         18
## 9       A       9         0        6     29          8         12
## 10      A      10         0       13     40          5          5
## 11      A      11         0        8     32          4         10
## 12      A      12         0        2     16          2          3
## 13      A      13         0       10     30          3          8
## 14      B       1         0        4     22          0          6
## 15      B       2         0        5      7          2          1
## 16      B       3         0        6     31          1          1
## 17      B       4         0        4      7          0          0
## 18      B       5         0        8     14          4          0
## 19      B       6         0        8     11          1          2
## 20      B       7         0        9     21          0          2
## 21      B       8         0       10     23          2          5
## 22      B       9         0       10     21          0          3
## 23      B      10         0        3      8          1          1
## 24      B      11         0        7     19          2          1
## 25      B      12         0       10     17          1          0
## 26      C       1         0        2     15          2          4
## 27      C       2         0        7     20          1          7
## 28      C       3         0        2      4          1          1
## 29      D       1         0        3      8          2          6
## 30      E       1         0       11     56          7         15
##    Completed SchoolSection Total Middling_Percent Behind_Percent
## 1         10           A 1    81              6.2           66.7
## 2          6           A 2    80             10.0           50.0
## 3         11           A 3    80             11.2           43.8
## 4         10           A 4    85             16.5           51.8
## 5          8           A 5    85             10.6           49.4
## 6          9           A 6    58             12.1           50.0
## 7         19           A 7    79             24.1           27.8
## 8          5           A 8    74              4.1           50.0
## 9         10           A 9    65              9.2           44.6
## 10        20          A 10    83             15.7           48.2
## 11        15          A 11    69             11.6           46.4
## 12        14          A 12    37              5.4           43.2
## 13         5          A 13    56             17.9           53.6
## 14         7           B 1    39             10.3           56.4
## 15         3           B 2    18             27.8           38.9
## 16         8           B 3    47             12.8           66.0
## 17         7           B 4    18             22.2           38.9
## 18        14           B 5    40             20.0           35.0
## 19        18           B 6    40             20.0           27.5
## 20        13           B 7    45             20.0           46.7
## 21         6           B 8    46             21.7           50.0
```

```
## 22         5           B 9    39            25.6           53.8
## 23        15          B 10    28            10.7           28.6
## 24        10          B 11    39            17.9           48.7
## 25        19          B 12    47            21.3           36.2
## 26        13           C 1    36             5.6           41.7
## 27         1           C 2    36            19.4           55.6
## 28         5           C 3    13            15.4           30.8
## 29         3           D 1    22            13.6           36.4
## 30        27           E 1   116             9.5           48.3
##    MoreBehind_Percent VeryBehind_Percent Completed_Percent AllAheads
## 1                 3.7               11.1              12.3        15
## 2                12.5               20.0               7.5        14
## 3                15.0               16.2              13.8        20
## 4                 5.9               14.1              11.8        24
## 5                 2.4               28.2               9.4        17
## 6                 5.2               17.2              15.5        16
## 7                 6.3               17.7              24.1        38
## 8                14.9               24.3               6.8         8
## 9                12.3               18.5              15.4        16
## 10                6.0                6.0              24.1        33
## 11                5.8               14.5              21.7        23
## 12                5.4                8.1              37.8        16
## 13                5.4               14.3               8.9        15
## 14                0.0               15.4              17.9        11
## 15               11.1                5.6              16.7         8
## 16                2.1                2.1              17.0        14
## 17                0.0                0.0              38.9        11
## 18               10.0                0.0              35.0        22
## 19                2.5                5.0              45.0        26
## 20                0.0                4.4              28.9        22
## 21                4.3               10.9              13.0        16
## 22                0.0                7.7              12.8        15
## 23                3.6                3.6              53.6        18
## 24                5.1                2.6              25.6        17
## 25                2.1                0.0              40.4        29
## 26                5.6               11.1              36.1        15
## 27                2.8               19.4               2.8         8
## 28                7.7                7.7              38.5         7
## 29                9.1               27.3              13.6         6
## 30                6.0               12.9              23.3        38
##    AllBehinds AllAheads_Percent AllBehinds_Percent SchoolTotal
## 1          66              18.5               81.5         932
## 2          66              17.5               82.5         932
## 3          60              25.0               75.0         932
## 4          61              28.2               71.8         932
## 5          68              20.0               80.0         932
## 6          42              27.6               72.4         932
## 7          41              48.1               51.9         932
## 8          66              10.8               89.2         932
## 9          49              24.6               75.4         932
## 10         50              39.8               60.2         932
## 11         46              33.3               66.7         932
## 12         21              43.2               56.8         932
## 13         41              26.8               73.2         932
```

```
## 14         28              28.2              71.8         446
## 15         10              44.4              55.6         446
## 16         33              29.8              70.2         446
## 17          7              61.1              38.9         446
## 18         18              55.0              45.0         446
## 19         14              65.0              35.0         446
## 20         23              48.9              51.1         446
## 21         30              34.8              65.2         446
## 22         24              38.5              61.5         446
## 23         10              64.3              35.7         446
## 24         22              43.6              56.4         446
## 25         18              61.7              38.3         446
## 26         21              41.7              58.3          85
## 27         28              22.2              77.8          85
## 28          6              53.8              46.2          85
## 29         16              27.3              72.7          22
## 30         78              32.8              67.2         116
##    Total_Scaled
## 1           0.1
## 2           0.1
## 3           0.1
## 4           0.1
## 5           0.1
## 6           0.1
## 7           0.1
## 8           0.1
## 9           0.1
## 10          0.1
## 11          0.1
## 12          0.1
## 13          0.1
## 14          0.1
## 15          0.1
## 16          0.1
## 17          0.1
## 18          0.1
## 19          0.1
## 20          0.1
## 21          0.1
## 22          0.1
## 23          0.1
## 24          0.1
## 25          0.1
## 26          0.4
## 27          0.4
## 28          0.2
## 29          1.0
## 30          1.0
```

```
# melting StudentsBySchool to convert columns to row format for plotting
StudentsBySchool_Melted <- melt(StudentsBySchool)
```

```
## Using School as id variables
```

```
(StudentsBySchool_Melted)
```

```
##    School           variable value
## 1       A          VeryAhead   0.0
## 2       B          VeryAhead   0.0
## 3       C          VeryAhead   0.0
## 4       D          VeryAhead   0.0
## 5       E          VeryAhead   0.0
## 6       A           Middling 113.0
## 7       B           Middling  84.0
## 8       C           Middling  11.0
## 9       D           Middling   3.0
## 10      E           Middling  11.0
## 11      A             Behind 450.0
## 12      B             Behind 201.0
## 13      C             Behind  39.0
## 14      D             Behind   8.0
## 15      E             Behind  56.0
## 16      A         MoreBehind  73.0
## 17      B         MoreBehind  14.0
## 18      C         MoreBehind   4.0
## 19      D         MoreBehind   2.0
## 20      E         MoreBehind   7.0
## 21      A         VeryBehind 154.0
## 22      B         VeryBehind  22.0
## 23      C         VeryBehind  12.0
## 24      D         VeryBehind   6.0
## 25      E         VeryBehind  15.0
## 26      A          Completed 142.0
## 27      B          Completed 125.0
## 28      C          Completed  19.0
## 29      D          Completed   3.0
## 30      E          Completed  27.0
## 31      A              Total 932.0
## 32      B              Total 446.0
## 33      C              Total  85.0
## 34      D              Total  22.0
## 35      E              Total 116.0
## 36      A   Middling_Percent  12.1
## 37      B   Middling_Percent  18.8
## 38      C   Middling_Percent  12.9
## 39      D   Middling_Percent  13.6
## 40      E   Middling_Percent   9.5
## 41      A     Behind_Percent  48.3
## 42      B     Behind_Percent  45.1
## 43      C     Behind_Percent  45.9
## 44      D     Behind_Percent  36.4
## 45      E     Behind_Percent  48.3
## 46      A MoreBehind_Percent   7.8
## 47      B MoreBehind_Percent   3.1
## 48      C MoreBehind_Percent   4.7
## 49      D MoreBehind_Percent   9.1
## 50      E MoreBehind_Percent   6.0
## 51      A VeryBehind_Percent  16.5
## 52      B VeryBehind_Percent   4.9
```

```
## 53      C VeryBehind_Percent  14.1
## 54      D VeryBehind_Percent  27.3
## 55      E VeryBehind_Percent  12.9
## 56      A  Completed_Percent  15.2
## 57      B  Completed_Percent  28.0
## 58      C  Completed_Percent  22.4
## 59      D  Completed_Percent  13.6
## 60      E  Completed_Percent  23.3
## 61      A          AllAheads 255.0
## 62      B          AllAheads 209.0
## 63      C          AllAheads  30.0
## 64      D          AllAheads   6.0
## 65      E          AllAheads  38.0
## 66      A         AllBehinds 677.0
## 67      B         AllBehinds 237.0
## 68      C         AllBehinds  55.0
## 69      D         AllBehinds  16.0
## 70      E         AllBehinds  78.0
## 71      A  AllAheads_Percent  27.4
## 72      B  AllAheads_Percent  46.9
## 73      C  AllAheads_Percent  35.3
## 74      D  AllAheads_Percent  27.3
## 75      E  AllAheads_Percent  32.8
## 76      A AllBehinds_Percent  72.6
## 77      B AllBehinds_Percent  53.1
## 78      C AllBehinds_Percent  64.7
## 79      D AllBehinds_Percent  72.7
## 80      E AllBehinds_Percent  67.2
## 81      A       Total_Scaled   0.6
## 82      B       Total_Scaled   0.3
## 83      C       Total_Scaled   0.1
## 84      D       Total_Scaled   0.1
## 85      E       Total_Scaled   0.1
```

```
StudentsBySection_Melted <- melt(StudentsBySection)
```

```
## Using School, Section, SchoolSection as id variables
```

```
(StudentsBySection_Melted)
```

```
##     School Section SchoolSection          variable value
## 1       A       1           A 1         VeryAhead   0.0
## 2       A       2           A 2         VeryAhead   0.0
## 3       A       3           A 3         VeryAhead   0.0
## 4       A       4           A 4         VeryAhead   0.0
## 5       A       5           A 5         VeryAhead   0.0
## 6       A       6           A 6         VeryAhead   0.0
## 7       A       7           A 7         VeryAhead   0.0
## 8       A       8           A 8         VeryAhead   0.0
## 9       A       9           A 9         VeryAhead   0.0
## 10      A      10          A 10         VeryAhead   0.0
## 11      A      11          A 11         VeryAhead   0.0
## 12      A      12          A 12         VeryAhead   0.0
## 13      A      13          A 13         VeryAhead   0.0
## 14      B       1           B 1         VeryAhead   0.0
## 15      B       2           B 2         VeryAhead   0.0
## 16      B       3           B 3         VeryAhead   0.0
## 17      B       4           B 4         VeryAhead   0.0
## 18      B       5           B 5         VeryAhead   0.0
## 19      B       6           B 6         VeryAhead   0.0
## 20      B       7           B 7         VeryAhead   0.0
## 21      B       8           B 8         VeryAhead   0.0
## 22      B       9           B 9         VeryAhead   0.0
## 23      B      10          B 10         VeryAhead   0.0
## 24      B      11          B 11         VeryAhead   0.0
## 25      B      12          B 12         VeryAhead   0.0
## 26      C       1           C 1         VeryAhead   0.0
## 27      C       2           C 2         VeryAhead   0.0
## 28      C       3           C 3         VeryAhead   0.0
## 29      D       1           D 1         VeryAhead   0.0
## 30      E       1           E 1         VeryAhead   0.0
## 31      A       1           A 1          Middling   5.0
## 32      A       2           A 2          Middling   8.0
## 33      A       3           A 3          Middling   9.0
## 34      A       4           A 4          Middling  14.0
## 35      A       5           A 5          Middling   9.0
## 36      A       6           A 6          Middling   7.0
## 37      A       7           A 7          Middling  19.0
## 38      A       8           A 8          Middling   3.0
## 39      A       9           A 9          Middling   6.0
## 40      A      10          A 10          Middling  13.0
## 41      A      11          A 11          Middling   8.0
## 42      A      12          A 12          Middling   2.0
## 43      A      13          A 13          Middling  10.0
## 44      B       1           B 1          Middling   4.0
## 45      B       2           B 2          Middling   5.0
## 46      B       3           B 3          Middling   6.0
## 47      B       4           B 4          Middling   4.0
## 48      B       5           B 5          Middling   8.0
## 49      B       6           B 6          Middling   8.0
## 50      B       7           B 7          Middling   9.0
## 51      B       8           B 8          Middling  10.0
## 52      B       9           B 9          Middling  10.0
```

```
## 53       B      10          B 10          Middling   3.0
## 54       B      11          B 11          Middling   7.0
## 55       B      12          B 12          Middling  10.0
## 56       C       1           C 1          Middling   2.0
## 57       C       2           C 2          Middling   7.0
## 58       C       3           C 3          Middling   2.0
## 59       D       1           D 1          Middling   3.0
## 60       E       1           E 1          Middling  11.0
## 61       A       1           A 1            Behind  54.0
## 62       A       2           A 2            Behind  40.0
## 63       A       3           A 3            Behind  35.0
## 64       A       4           A 4            Behind  44.0
## 65       A       5           A 5            Behind  42.0
## 66       A       6           A 6            Behind  29.0
## 67       A       7           A 7            Behind  22.0
## 68       A       8           A 8            Behind  37.0
## 69       A       9           A 9            Behind  29.0
## 70       A      10          A 10            Behind  40.0
## 71       A      11          A 11            Behind  32.0
## 72       A      12          A 12            Behind  16.0
## 73       A      13          A 13            Behind  30.0
## 74       B       1           B 1            Behind  22.0
## 75       B       2           B 2            Behind   7.0
## 76       B       3           B 3            Behind  31.0
## 77       B       4           B 4            Behind   7.0
## 78       B       5           B 5            Behind  14.0
## 79       B       6           B 6            Behind  11.0
## 80       B       7           B 7            Behind  21.0
## 81       B       8           B 8            Behind  23.0
## 82       B       9           B 9            Behind  21.0
## 83       B      10          B 10            Behind   8.0
## 84       B      11          B 11            Behind  19.0
## 85       B      12          B 12            Behind  17.0
## 86       C       1           C 1            Behind  15.0
## 87       C       2           C 2            Behind  20.0
## 88       C       3           C 3            Behind   4.0
## 89       D       1           D 1            Behind   8.0
## 90       E       1           E 1            Behind  56.0
## 91       A       1           A 1       MoreBehind   3.0
## 92       A       2           A 2       MoreBehind  10.0
## 93       A       3           A 3       MoreBehind  12.0
## 94       A       4           A 4       MoreBehind   5.0
## 95       A       5           A 5       MoreBehind   2.0
## 96       A       6           A 6       MoreBehind   3.0
## 97       A       7           A 7       MoreBehind   5.0
## 98       A       8           A 8       MoreBehind  11.0
## 99       A       9           A 9       MoreBehind   8.0
## 100      A      10          A 10       MoreBehind   5.0
## 101      A      11          A 11       MoreBehind   4.0
## 102      A      12          A 12       MoreBehind   2.0
## 103      A      13          A 13       MoreBehind   3.0
## 104      B       1           B 1       MoreBehind   0.0
## 105      B       2           B 2       MoreBehind   2.0
## 106      B       3           B 3       MoreBehind   1.0
```

```
## 107      B       4           B 4         MoreBehind   0.0
## 108      B       5           B 5         MoreBehind   4.0
## 109      B       6           B 6         MoreBehind   1.0
## 110      B       7           B 7         MoreBehind   0.0
## 111      B       8           B 8         MoreBehind   2.0
## 112      B       9           B 9         MoreBehind   0.0
## 113      B      10          B 10         MoreBehind   1.0
## 114      B      11          B 11         MoreBehind   2.0
## 115      B      12          B 12         MoreBehind   1.0
## 116      C       1           C 1         MoreBehind   2.0
## 117      C       2           C 2         MoreBehind   1.0
## 118      C       3           C 3         MoreBehind   1.0
## 119      D       1           D 1         MoreBehind   2.0
## 120      E       1           E 1         MoreBehind   7.0
## 121      A       1           A 1         VeryBehind   9.0
## 122      A       2           A 2         VeryBehind  16.0
## 123      A       3           A 3         VeryBehind  13.0
## 124      A       4           A 4         VeryBehind  12.0
## 125      A       5           A 5         VeryBehind  24.0
## 126      A       6           A 6         VeryBehind  10.0
## 127      A       7           A 7         VeryBehind  14.0
## 128      A       8           A 8         VeryBehind  18.0
## 129      A       9           A 9         VeryBehind  12.0
## 130      A      10          A 10         VeryBehind   5.0
## 131      A      11          A 11         VeryBehind  10.0
## 132      A      12          A 12         VeryBehind   3.0
## 133      A      13          A 13         VeryBehind   8.0
## 134      B       1           B 1         VeryBehind   6.0
## 135      B       2           B 2         VeryBehind   1.0
## 136      B       3           B 3         VeryBehind   1.0
## 137      B       4           B 4         VeryBehind   0.0
## 138      B       5           B 5         VeryBehind   0.0
## 139      B       6           B 6         VeryBehind   2.0
## 140      B       7           B 7         VeryBehind   2.0
## 141      B       8           B 8         VeryBehind   5.0
## 142      B       9           B 9         VeryBehind   3.0
## 143      B      10          B 10         VeryBehind   1.0
## 144      B      11          B 11         VeryBehind   1.0
## 145      B      12          B 12         VeryBehind   0.0
## 146      C       1           C 1         VeryBehind   4.0
## 147      C       2           C 2         VeryBehind   7.0
## 148      C       3           C 3         VeryBehind   1.0
## 149      D       1           D 1         VeryBehind   6.0
## 150      E       1           E 1         VeryBehind  15.0
## 151      A       1           A 1          Completed  10.0
## 152      A       2           A 2          Completed   6.0
## 153      A       3           A 3          Completed  11.0
## 154      A       4           A 4          Completed  10.0
## 155      A       5           A 5          Completed   8.0
## 156      A       6           A 6          Completed   9.0
## 157      A       7           A 7          Completed  19.0
## 158      A       8           A 8          Completed   5.0
## 159      A       9           A 9          Completed  10.0
## 160      A      10          A 10          Completed  20.0
```

```
## 161      A      11          A 11          Completed  15.0
## 162      A      12          A 12          Completed  14.0
## 163      A      13          A 13          Completed   5.0
## 164      B       1           B 1          Completed   7.0
## 165      B       2           B 2          Completed   3.0
## 166      B       3           B 3          Completed   8.0
## 167      B       4           B 4          Completed   7.0
## 168      B       5           B 5          Completed  14.0
## 169      B       6           B 6          Completed  18.0
## 170      B       7           B 7          Completed  13.0
## 171      B       8           B 8          Completed   6.0
## 172      B       9           B 9          Completed   5.0
## 173      B      10          B 10          Completed  15.0
## 174      B      11          B 11          Completed  10.0
## 175      B      12          B 12          Completed  19.0
## 176      C       1           C 1          Completed  13.0
## 177      C       2           C 2          Completed   1.0
## 178      C       3           C 3          Completed   5.0
## 179      D       1           D 1          Completed   3.0
## 180      E       1           E 1          Completed  27.0
## 181      A       1           A 1              Total  81.0
## 182      A       2           A 2              Total  80.0
## 183      A       3           A 3              Total  80.0
## 184      A       4           A 4              Total  85.0
## 185      A       5           A 5              Total  85.0
## 186      A       6           A 6              Total  58.0
## 187      A       7           A 7              Total  79.0
## 188      A       8           A 8              Total  74.0
## 189      A       9           A 9              Total  65.0
## 190      A      10          A 10              Total  83.0
## 191      A      11          A 11              Total  69.0
## 192      A      12          A 12              Total  37.0
## 193      A      13          A 13              Total  56.0
## 194      B       1           B 1              Total  39.0
## 195      B       2           B 2              Total  18.0
## 196      B       3           B 3              Total  47.0
## 197      B       4           B 4              Total  18.0
## 198      B       5           B 5              Total  40.0
## 199      B       6           B 6              Total  40.0
## 200      B       7           B 7              Total  45.0
## 201      B       8           B 8              Total  46.0
## 202      B       9           B 9              Total  39.0
## 203      B      10          B 10              Total  28.0
## 204      B      11          B 11              Total  39.0
## 205      B      12          B 12              Total  47.0
## 206      C       1           C 1              Total  36.0
## 207      C       2           C 2              Total  36.0
## 208      C       3           C 3              Total  13.0
## 209      D       1           D 1              Total  22.0
## 210      E       1           E 1              Total 116.0
## 211      A       1           A 1   Middling_Percent   6.2
## 212      A       2           A 2   Middling_Percent  10.0
## 213      A       3           A 3   Middling_Percent  11.2
## 214      A       4           A 4   Middling_Percent  16.5
```

```
## 215      A       5          A 5   Middling_Percent  10.6
## 216      A       6          A 6   Middling_Percent  12.1
## 217      A       7          A 7   Middling_Percent  24.1
## 218      A       8          A 8   Middling_Percent   4.1
## 219      A       9          A 9   Middling_Percent   9.2
## 220      A      10         A 10   Middling_Percent  15.7
## 221      A      11         A 11   Middling_Percent  11.6
## 222      A      12         A 12   Middling_Percent   5.4
## 223      A      13         A 13   Middling_Percent  17.9
## 224      B       1          B 1   Middling_Percent  10.3
## 225      B       2          B 2   Middling_Percent  27.8
## 226      B       3          B 3   Middling_Percent  12.8
## 227      B       4          B 4   Middling_Percent  22.2
## 228      B       5          B 5   Middling_Percent  20.0
## 229      B       6          B 6   Middling_Percent  20.0
## 230      B       7          B 7   Middling_Percent  20.0
## 231      B       8          B 8   Middling_Percent  21.7
## 232      B       9          B 9   Middling_Percent  25.6
## 233      B      10         B 10   Middling_Percent  10.7
## 234      B      11         B 11   Middling_Percent  17.9
## 235      B      12         B 12   Middling_Percent  21.3
## 236      C       1          C 1   Middling_Percent   5.6
## 237      C       2          C 2   Middling_Percent  19.4
## 238      C       3          C 3   Middling_Percent  15.4
## 239      D       1          D 1   Middling_Percent  13.6
## 240      E       1          E 1   Middling_Percent   9.5
## 241      A       1          A 1     Behind_Percent  66.7
## 242      A       2          A 2     Behind_Percent  50.0
## 243      A       3          A 3     Behind_Percent  43.8
## 244      A       4          A 4     Behind_Percent  51.8
## 245      A       5          A 5     Behind_Percent  49.4
## 246      A       6          A 6     Behind_Percent  50.0
## 247      A       7          A 7     Behind_Percent  27.8
## 248      A       8          A 8     Behind_Percent  50.0
## 249      A       9          A 9     Behind_Percent  44.6
## 250      A      10         A 10     Behind_Percent  48.2
## 251      A      11         A 11     Behind_Percent  46.4
## 252      A      12         A 12     Behind_Percent  43.2
## 253      A      13         A 13     Behind_Percent  53.6
## 254      B       1          B 1     Behind_Percent  56.4
## 255      B       2          B 2     Behind_Percent  38.9
## 256      B       3          B 3     Behind_Percent  66.0
## 257      B       4          B 4     Behind_Percent  38.9
## 258      B       5          B 5     Behind_Percent  35.0
## 259      B       6          B 6     Behind_Percent  27.5
## 260      B       7          B 7     Behind_Percent  46.7
## 261      B       8          B 8     Behind_Percent  50.0
## 262      B       9          B 9     Behind_Percent  53.8
## 263      B      10         B 10     Behind_Percent  28.6
## 264      B      11         B 11     Behind_Percent  48.7
## 265      B      12         B 12     Behind_Percent  36.2
## 266      C       1          C 1     Behind_Percent  41.7
## 267      C       2          C 2     Behind_Percent  55.6
## 268      C       3          C 3     Behind_Percent  30.8
```

```
## 269      D       1           D 1     Behind_Percent  36.4
## 270      E       1           E 1     Behind_Percent  48.3
## 271      A       1           A 1 MoreBehind_Percent   3.7
## 272      A       2           A 2 MoreBehind_Percent  12.5
## 273      A       3           A 3 MoreBehind_Percent  15.0
## 274      A       4           A 4 MoreBehind_Percent   5.9
## 275      A       5           A 5 MoreBehind_Percent   2.4
## 276      A       6           A 6 MoreBehind_Percent   5.2
## 277      A       7           A 7 MoreBehind_Percent   6.3
## 278      A       8           A 8 MoreBehind_Percent  14.9
## 279      A       9           A 9 MoreBehind_Percent  12.3
## 280      A      10          A 10 MoreBehind_Percent   6.0
## 281      A      11          A 11 MoreBehind_Percent   5.8
## 282      A      12          A 12 MoreBehind_Percent   5.4
## 283      A      13          A 13 MoreBehind_Percent   5.4
## 284      B       1           B 1 MoreBehind_Percent   0.0
## 285      B       2           B 2 MoreBehind_Percent  11.1
## 286      B       3           B 3 MoreBehind_Percent   2.1
## 287      B       4           B 4 MoreBehind_Percent   0.0
## 288      B       5           B 5 MoreBehind_Percent  10.0
## 289      B       6           B 6 MoreBehind_Percent   2.5
## 290      B       7           B 7 MoreBehind_Percent   0.0
## 291      B       8           B 8 MoreBehind_Percent   4.3
## 292      B       9           B 9 MoreBehind_Percent   0.0
## 293      B      10          B 10 MoreBehind_Percent   3.6
## 294      B      11          B 11 MoreBehind_Percent   5.1
## 295      B      12          B 12 MoreBehind_Percent   2.1
## 296      C       1           C 1 MoreBehind_Percent   5.6
## 297      C       2           C 2 MoreBehind_Percent   2.8
## 298      C       3           C 3 MoreBehind_Percent   7.7
## 299      D       1           D 1 MoreBehind_Percent   9.1
## 300      E       1           E 1 MoreBehind_Percent   6.0
## 301      A       1           A 1 VeryBehind_Percent  11.1
## 302      A       2           A 2 VeryBehind_Percent  20.0
## 303      A       3           A 3 VeryBehind_Percent  16.2
## 304      A       4           A 4 VeryBehind_Percent  14.1
## 305      A       5           A 5 VeryBehind_Percent  28.2
## 306      A       6           A 6 VeryBehind_Percent  17.2
## 307      A       7           A 7 VeryBehind_Percent  17.7
## 308      A       8           A 8 VeryBehind_Percent  24.3
## 309      A       9           A 9 VeryBehind_Percent  18.5
## 310      A      10          A 10 VeryBehind_Percent   6.0
## 311      A      11          A 11 VeryBehind_Percent  14.5
## 312      A      12          A 12 VeryBehind_Percent   8.1
## 313      A      13          A 13 VeryBehind_Percent  14.3
## 314      B       1           B 1 VeryBehind_Percent  15.4
## 315      B       2           B 2 VeryBehind_Percent   5.6
## 316      B       3           B 3 VeryBehind_Percent   2.1
## 317      B       4           B 4 VeryBehind_Percent   0.0
## 318      B       5           B 5 VeryBehind_Percent   0.0
## 319      B       6           B 6 VeryBehind_Percent   5.0
## 320      B       7           B 7 VeryBehind_Percent   4.4
## 321      B       8           B 8 VeryBehind_Percent  10.9
## 322      B       9           B 9 VeryBehind_Percent   7.7
```

```
## 323      B      10          B 10 VeryBehind_Percent   3.6
## 324      B      11          B 11 VeryBehind_Percent   2.6
## 325      B      12          B 12 VeryBehind_Percent   0.0
## 326      C       1           C 1 VeryBehind_Percent  11.1
## 327      C       2           C 2 VeryBehind_Percent  19.4
## 328      C       3           C 3 VeryBehind_Percent   7.7
## 329      D       1           D 1 VeryBehind_Percent  27.3
## 330      E       1           E 1 VeryBehind_Percent  12.9
## 331      A       1           A 1  Completed_Percent  12.3
## 332      A       2           A 2  Completed_Percent   7.5
## 333      A       3           A 3  Completed_Percent  13.8
## 334      A       4           A 4  Completed_Percent  11.8
## 335      A       5           A 5  Completed_Percent   9.4
## 336      A       6           A 6  Completed_Percent  15.5
## 337      A       7           A 7  Completed_Percent  24.1
## 338      A       8           A 8  Completed_Percent   6.8
## 339      A       9           A 9  Completed_Percent  15.4
## 340      A      10          A 10  Completed_Percent  24.1
## 341      A      11          A 11  Completed_Percent  21.7
## 342      A      12          A 12  Completed_Percent  37.8
## 343      A      13          A 13  Completed_Percent   8.9
## 344      B       1           B 1  Completed_Percent  17.9
## 345      B       2           B 2  Completed_Percent  16.7
## 346      B       3           B 3  Completed_Percent  17.0
## 347      B       4           B 4  Completed_Percent  38.9
## 348      B       5           B 5  Completed_Percent  35.0
## 349      B       6           B 6  Completed_Percent  45.0
## 350      B       7           B 7  Completed_Percent  28.9
## 351      B       8           B 8  Completed_Percent  13.0
## 352      B       9           B 9  Completed_Percent  12.8
## 353      B      10          B 10  Completed_Percent  53.6
## 354      B      11          B 11  Completed_Percent  25.6
## 355      B      12          B 12  Completed_Percent  40.4
## 356      C       1           C 1  Completed_Percent  36.1
## 357      C       2           C 2  Completed_Percent   2.8
## 358      C       3           C 3  Completed_Percent  38.5
## 359      D       1           D 1  Completed_Percent  13.6
## 360      E       1           E 1  Completed_Percent  23.3
## 361      A       1           A 1          AllAheads  15.0
## 362      A       2           A 2          AllAheads  14.0
## 363      A       3           A 3          AllAheads  20.0
## 364      A       4           A 4          AllAheads  24.0
## 365      A       5           A 5          AllAheads  17.0
## 366      A       6           A 6          AllAheads  16.0
## 367      A       7           A 7          AllAheads  38.0
## 368      A       8           A 8          AllAheads   8.0
## 369      A       9           A 9          AllAheads  16.0
## 370      A      10          A 10          AllAheads  33.0
## 371      A      11          A 11          AllAheads  23.0
## 372      A      12          A 12          AllAheads  16.0
## 373      A      13          A 13          AllAheads  15.0
## 374      B       1           B 1          AllAheads  11.0
## 375      B       2           B 2          AllAheads   8.0
## 376      B       3           B 3          AllAheads  14.0
```

```
## 377      B       4          B 4          AllAheads  11.0
## 378      B       5          B 5          AllAheads  22.0
## 379      B       6          B 6          AllAheads  26.0
## 380      B       7          B 7          AllAheads  22.0
## 381      B       8          B 8          AllAheads  16.0
## 382      B       9          B 9          AllAheads  15.0
## 383      B      10         B 10          AllAheads  18.0
## 384      B      11         B 11          AllAheads  17.0
## 385      B      12         B 12          AllAheads  29.0
## 386      C       1          C 1          AllAheads  15.0
## 387      C       2          C 2          AllAheads   8.0
## 388      C       3          C 3          AllAheads   7.0
## 389      D       1          D 1          AllAheads   6.0
## 390      E       1          E 1          AllAheads  38.0
## 391      A       1          A 1         AllBehinds  66.0
## 392      A       2          A 2         AllBehinds  66.0
## 393      A       3          A 3         AllBehinds  60.0
## 394      A       4          A 4         AllBehinds  61.0
## 395      A       5          A 5         AllBehinds  68.0
## 396      A       6          A 6         AllBehinds  42.0
## 397      A       7          A 7         AllBehinds  41.0
## 398      A       8          A 8         AllBehinds  66.0
## 399      A       9          A 9         AllBehinds  49.0
## 400      A      10         A 10         AllBehinds  50.0
## 401      A      11         A 11         AllBehinds  46.0
## 402      A      12         A 12         AllBehinds  21.0
## 403      A      13         A 13         AllBehinds  41.0
## 404      B       1          B 1         AllBehinds  28.0
## 405      B       2          B 2         AllBehinds  10.0
## 406      B       3          B 3         AllBehinds  33.0
## 407      B       4          B 4         AllBehinds   7.0
## 408      B       5          B 5         AllBehinds  18.0
## 409      B       6          B 6         AllBehinds  14.0
## 410      B       7          B 7         AllBehinds  23.0
## 411      B       8          B 8         AllBehinds  30.0
## 412      B       9          B 9         AllBehinds  24.0
## 413      B      10         B 10         AllBehinds  10.0
## 414      B      11         B 11         AllBehinds  22.0
## 415      B      12         B 12         AllBehinds  18.0
## 416      C       1          C 1         AllBehinds  21.0
## 417      C       2          C 2         AllBehinds  28.0
## 418      C       3          C 3         AllBehinds   6.0
## 419      D       1          D 1         AllBehinds  16.0
## 420      E       1          E 1         AllBehinds  78.0
## 421      A       1          A 1  AllAheads_Percent  18.5
## 422      A       2          A 2  AllAheads_Percent  17.5
## 423      A       3          A 3  AllAheads_Percent  25.0
## 424      A       4          A 4  AllAheads_Percent  28.2
## 425      A       5          A 5  AllAheads_Percent  20.0
## 426      A       6          A 6  AllAheads_Percent  27.6
## 427      A       7          A 7  AllAheads_Percent  48.1
## 428      A       8          A 8  AllAheads_Percent  10.8
## 429      A       9          A 9  AllAheads_Percent  24.6
## 430      A      10         A 10  AllAheads_Percent  39.8
```

```
## 431      A      11          A 11  AllAheads_Percent  33.3
## 432      A      12          A 12  AllAheads_Percent  43.2
## 433      A      13          A 13  AllAheads_Percent  26.8
## 434      B       1           B 1  AllAheads_Percent  28.2
## 435      B       2           B 2  AllAheads_Percent  44.4
## 436      B       3           B 3  AllAheads_Percent  29.8
## 437      B       4           B 4  AllAheads_Percent  61.1
## 438      B       5           B 5  AllAheads_Percent  55.0
## 439      B       6           B 6  AllAheads_Percent  65.0
## 440      B       7           B 7  AllAheads_Percent  48.9
## 441      B       8           B 8  AllAheads_Percent  34.8
## 442      B       9           B 9  AllAheads_Percent  38.5
## 443      B      10          B 10  AllAheads_Percent  64.3
## 444      B      11          B 11  AllAheads_Percent  43.6
## 445      B      12          B 12  AllAheads_Percent  61.7
## 446      C       1           C 1  AllAheads_Percent  41.7
## 447      C       2           C 2  AllAheads_Percent  22.2
## 448      C       3           C 3  AllAheads_Percent  53.8
## 449      D       1           D 1  AllAheads_Percent  27.3
## 450      E       1           E 1  AllAheads_Percent  32.8
## 451      A       1           A 1 AllBehinds_Percent  81.5
## 452      A       2           A 2 AllBehinds_Percent  82.5
## 453      A       3           A 3 AllBehinds_Percent  75.0
## 454      A       4           A 4 AllBehinds_Percent  71.8
## 455      A       5           A 5 AllBehinds_Percent  80.0
## 456      A       6           A 6 AllBehinds_Percent  72.4
## 457      A       7           A 7 AllBehinds_Percent  51.9
## 458      A       8           A 8 AllBehinds_Percent  89.2
## 459      A       9           A 9 AllBehinds_Percent  75.4
## 460      A      10          A 10 AllBehinds_Percent  60.2
## 461      A      11          A 11 AllBehinds_Percent  66.7
## 462      A      12          A 12 AllBehinds_Percent  56.8
## 463      A      13          A 13 AllBehinds_Percent  73.2
## 464      B       1           B 1 AllBehinds_Percent  71.8
## 465      B       2           B 2 AllBehinds_Percent  55.6
## 466      B       3           B 3 AllBehinds_Percent  70.2
## 467      B       4           B 4 AllBehinds_Percent  38.9
## 468      B       5           B 5 AllBehinds_Percent  45.0
## 469      B       6           B 6 AllBehinds_Percent  35.0
## 470      B       7           B 7 AllBehinds_Percent  51.1
## 471      B       8           B 8 AllBehinds_Percent  65.2
## 472      B       9           B 9 AllBehinds_Percent  61.5
## 473      B      10          B 10 AllBehinds_Percent  35.7
## 474      B      11          B 11 AllBehinds_Percent  56.4
## 475      B      12          B 12 AllBehinds_Percent  38.3
## 476      C       1           C 1 AllBehinds_Percent  58.3
## 477      C       2           C 2 AllBehinds_Percent  77.8
## 478      C       3           C 3 AllBehinds_Percent  46.2
## 479      D       1           D 1 AllBehinds_Percent  72.7
## 480      E       1           E 1 AllBehinds_Percent  67.2
## 481      A       1           A 1        SchoolTotal 932.0
## 482      A       2           A 2        SchoolTotal 932.0
## 483      A       3           A 3        SchoolTotal 932.0
## 484      A       4           A 4        SchoolTotal 932.0
```

```
## 485      A       5          A 5       SchoolTotal 932.0
## 486      A       6          A 6       SchoolTotal 932.0
## 487      A       7          A 7       SchoolTotal 932.0
## 488      A       8          A 8       SchoolTotal 932.0
## 489      A       9          A 9       SchoolTotal 932.0
## 490      A      10         A 10       SchoolTotal 932.0
## 491      A      11         A 11       SchoolTotal 932.0
## 492      A      12         A 12       SchoolTotal 932.0
## 493      A      13         A 13       SchoolTotal 932.0
## 494      B       1          B 1       SchoolTotal 446.0
## 495      B       2          B 2       SchoolTotal 446.0
## 496      B       3          B 3       SchoolTotal 446.0
## 497      B       4          B 4       SchoolTotal 446.0
## 498      B       5          B 5       SchoolTotal 446.0
## 499      B       6          B 6       SchoolTotal 446.0
## 500      B       7          B 7       SchoolTotal 446.0
## 501      B       8          B 8       SchoolTotal 446.0
## 502      B       9          B 9       SchoolTotal 446.0
## 503      B      10         B 10       SchoolTotal 446.0
## 504      B      11         B 11       SchoolTotal 446.0
## 505      B      12         B 12       SchoolTotal 446.0
## 506      C       1          C 1       SchoolTotal  85.0
## 507      C       2          C 2       SchoolTotal  85.0
## 508      C       3          C 3       SchoolTotal  85.0
## 509      D       1          D 1       SchoolTotal  22.0
## 510      E       1          E 1       SchoolTotal 116.0
## 511      A       1          A 1      Total_Scaled   0.1
## 512      A       2          A 2      Total_Scaled   0.1
## 513      A       3          A 3      Total_Scaled   0.1
## 514      A       4          A 4      Total_Scaled   0.1
## 515      A       5          A 5      Total_Scaled   0.1
## 516      A       6          A 6      Total_Scaled   0.1
## 517      A       7          A 7      Total_Scaled   0.1
## 518      A       8          A 8      Total_Scaled   0.1
## 519      A       9          A 9      Total_Scaled   0.1
## 520      A      10         A 10      Total_Scaled   0.1
## 521      A      11         A 11      Total_Scaled   0.1
## 522      A      12         A 12      Total_Scaled   0.1
## 523      A      13         A 13      Total_Scaled   0.1
## 524      B       1          B 1      Total_Scaled   0.1
## 525      B       2          B 2      Total_Scaled   0.1
## 526      B       3          B 3      Total_Scaled   0.1
## 527      B       4          B 4      Total_Scaled   0.1
## 528      B       5          B 5      Total_Scaled   0.1
## 529      B       6          B 6      Total_Scaled   0.1
## 530      B       7          B 7      Total_Scaled   0.1
## 531      B       8          B 8      Total_Scaled   0.1
## 532      B       9          B 9      Total_Scaled   0.1
## 533      B      10         B 10      Total_Scaled   0.1
## 534      B      11         B 11      Total_Scaled   0.1
## 535      B      12         B 12      Total_Scaled   0.1
## 536      C       1          C 1      Total_Scaled   0.4
## 537      C       2          C 2      Total_Scaled   0.4
## 538      C       3          C 3      Total_Scaled   0.2
```

```
## 539      D       1           D 1       Total_Scaled   1.0
## 540      E       1           E 1       Total_Scaled   1.0
```

```
# store "AllAheads","AllBehinds" in a dataset to plot
AheadsBehindsBySchool <- cbind(StudentsBySchool_Melted[which(StudentsBySchool_Melted$variable==
"AllAheads"|StudentsBySchool_Melted$variable=="AllBehinds"),],(StudentsBySchool_Melted[which(Stu
dentsBySchool_Melted$variable=="AllAheads_Percent"|StudentsBySchool_Melted$variable=="AllBehinds
_Percent"),][3]))
colnames(AheadsBehindsBySchool)[4] <-"value_percent"
AheadsBehindsBySchool <- merge(AheadsBehindsBySchool, StudentsBySchool[,c("School","Total")],by.
x = "School",by.y = "School")
AheadsBehindsBySchool$Total <- ifelse(round((AheadsBehindsBySchool$Total/sum(StudentsBySchool$To
tal)),1)==0,0.1,round((AheadsBehindsBySchool$Total/sum(StudentsBySchool$Total)),1))
AheadsBehindsBySchool <-AheadsBehindsBySchool[order(AheadsBehindsBySchool$variable),]
(AheadsBehindsBySchool)
```

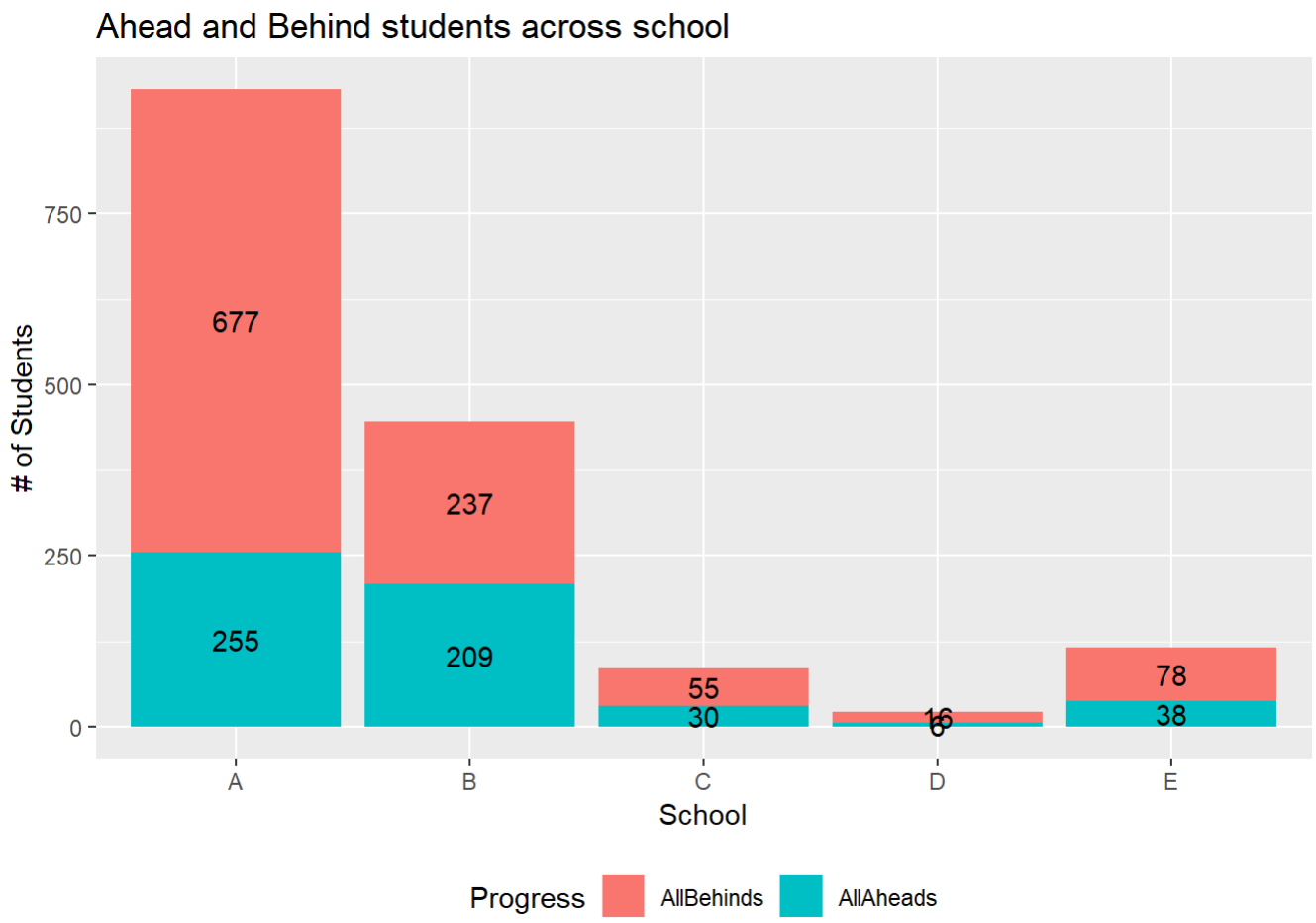
```
##    School   variable value value_percent Total
## 1       A  AllAheads   255          27.4   0.6
## 4       B  AllAheads   209          46.9   0.3
## 6       C  AllAheads    30          35.3   0.1
## 8       D  AllAheads     6          27.3   0.1
## 9       E  AllAheads    38          32.8   0.1
## 2       A AllBehinds   677          72.6   0.6
## 3       B AllBehinds   237          53.1   0.3
## 5       C AllBehinds    55          64.7   0.1
## 7       D AllBehinds    16          72.7   0.1
## 10      E AllBehinds    78          67.2   0.1
```

```
AheadsBehindsBySection <- cbind(StudentsBySection_Melted[which(StudentsBySection_Melted$variable
=="AllAheads"|StudentsBySection_Melted$variable=="AllBehinds"),],(StudentsBySection_Melted[which
(StudentsBySection_Melted$variable=="AllAheads_Percent"|StudentsBySection_Melted$variable=="AllB
ehinds_Percent"),][5]))
colnames(AheadsBehindsBySection)[6] <-"value_percent"
AheadsBehindsBySection <- merge(AheadsBehindsBySection, StudentsBySection[,c("SchoolSection","Sc
hoolTotal")],by.x = "SchoolSection",by.y = "SchoolSection")
#AheadsBehindsBySection$SchoolTotal <- ifelse(round((AheadsBehindsBySection$SchoolTotal/sum(Stud
entsBySection$SchoolTotal)),1)==0,0.1,round((AheadsBehindsBySection$SchoolTotal/sum(StudentsBySe
ction$SchoolTotal)),1))
AheadsBehindsBySection <-AheadsBehindsBySection[order(AheadsBehindsBySection$variable),]
(AheadsBehindsBySection)
```

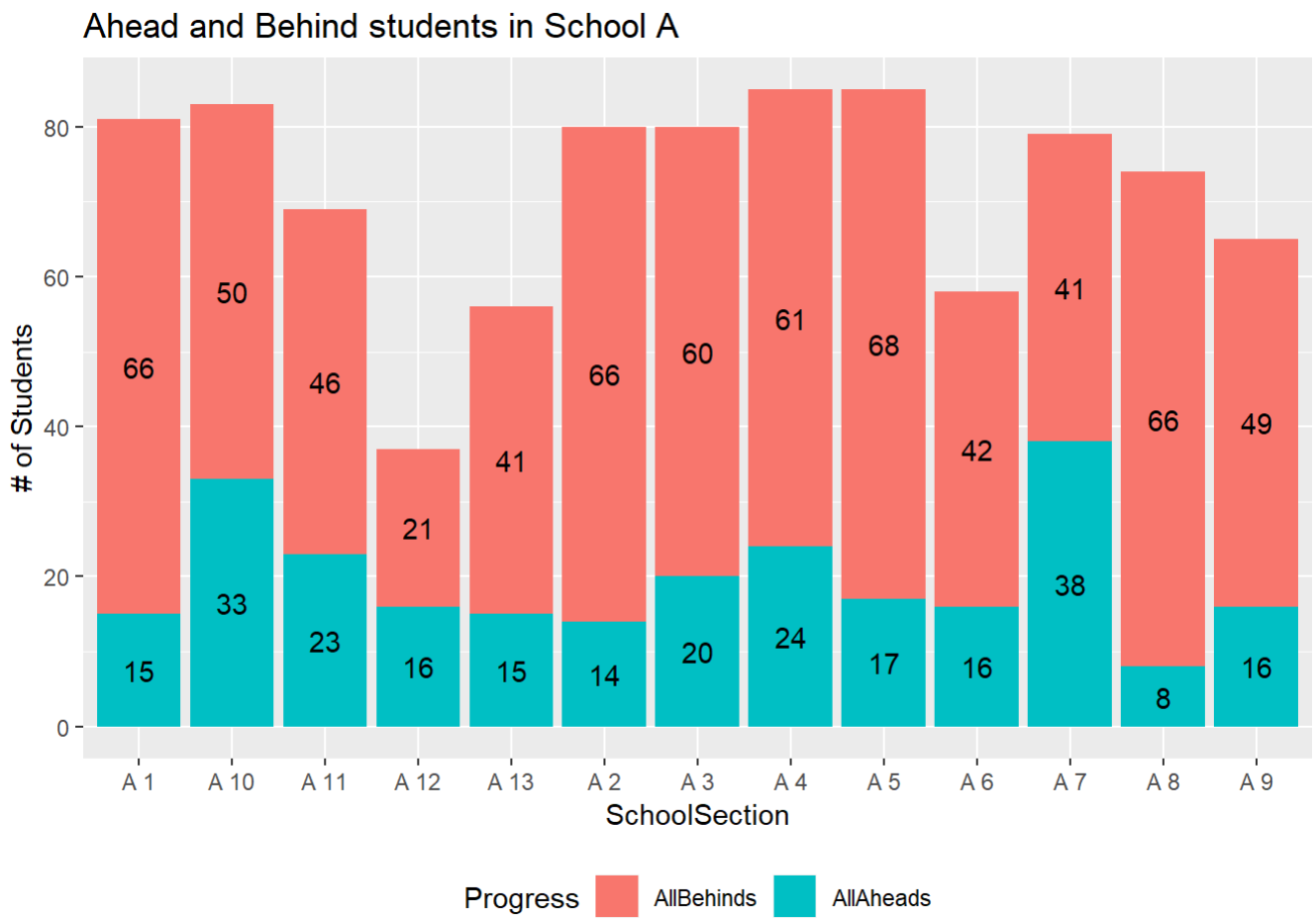
```
##    SchoolSection School Section   variable value value_percent SchoolTotal
## 1            A 1      A       1  AllAheads    15          18.5         932
## 3           A 10      A      10  AllAheads    33          39.8         932
## 5           A 11      A      11  AllAheads    23          33.3         932
## 7           A 12      A      12  AllAheads    16          43.2         932
## 10          A 13      A      13  AllAheads    15          26.8         932
## 11           A 2      A       2  AllAheads    14          17.5         932
## 13           A 3      A       3  AllAheads    20          25.0         932
## 15           A 4      A       4  AllAheads    24          28.2         932
## 18           A 5      A       5  AllAheads    17          20.0         932
## 19           A 6      A       6  AllAheads    16          27.6         932
## 21           A 7      A       7  AllAheads    38          48.1         932
## 23           A 8      A       8  AllAheads     8          10.8         932
## 26           A 9      A       9  AllAheads    16          24.6         932
## 27           B 1      B       1  AllAheads    11          28.2         446
## 29          B 10      B      10  AllAheads    18          64.3         446
## 31          B 11      B      11  AllAheads    17          43.6         446
## 33          B 12      B      12  AllAheads    29          61.7         446
## 35           B 2      B       2  AllAheads     8          44.4         446
## 37           B 3      B       3  AllAheads    14          29.8         446
## 39           B 4      B       4  AllAheads    11          61.1         446
## 42           B 5      B       5  AllAheads    22          55.0         446
## 43           B 6      B       6  AllAheads    26          65.0         446
## 45           B 7      B       7  AllAheads    22          48.9         446
## 47           B 8      B       8  AllAheads    16          34.8         446
## 50           B 9      B       9  AllAheads    15          38.5         446
## 52           C 1      C       1  AllAheads    15          41.7          85
## 53           C 2      C       2  AllAheads     8          22.2          85
## 55           C 3      C       3  AllAheads     7          53.8          85
## 57           D 1      D       1  AllAheads     6          27.3          22
## 59           E 1      E       1  AllAheads    38          32.8         116
## 2            A 1      A       1 AllBehinds    66          81.5         932
## 4           A 10      A      10 AllBehinds    50          60.2         932
## 6           A 11      A      11 AllBehinds    46          66.7         932
## 8           A 12      A      12 AllBehinds    21          56.8         932
## 9           A 13      A      13 AllBehinds    41          73.2         932
## 12           A 2      A       2 AllBehinds    66          82.5         932
## 14           A 3      A       3 AllBehinds    60          75.0         932
## 16           A 4      A       4 AllBehinds    61          71.8         932
## 17           A 5      A       5 AllBehinds    68          80.0         932
## 20           A 6      A       6 AllBehinds    42          72.4         932
## 22           A 7      A       7 AllBehinds    41          51.9         932
## 24           A 8      A       8 AllBehinds    66          89.2         932
## 25           A 9      A       9 AllBehinds    49          75.4         932
## 28           B 1      B       1 AllBehinds    28          71.8         446
## 30          B 10      B      10 AllBehinds    10          35.7         446
## 32          B 11      B      11 AllBehinds    22          56.4         446
## 34          B 12      B      12 AllBehinds    18          38.3         446
## 36           B 2      B       2 AllBehinds    10          55.6         446
## 38           B 3      B       3 AllBehinds    33          70.2         446
## 40           B 4      B       4 AllBehinds     7          38.9         446
## 41           B 5      B       5 AllBehinds    18          45.0         446
## 44           B 6      B       6 AllBehinds    14          35.0         446
```

```
## 46          B 7      B       7 AllBehinds    23          51.1         446
## 48          B 8      B       8 AllBehinds    30          65.2         446
## 49          B 9      B       9 AllBehinds    24          61.5         446
## 51          C 1      C       1 AllBehinds    21          58.3          85
## 54          C 2      C       2 AllBehinds    28          77.8          85
## 56          C 3      C       3 AllBehinds     6          46.2          85
## 58          D 1      D       1 AllBehinds    16          72.7          22
## 60          E 1      E       1 AllBehinds    78          67.2         116
```

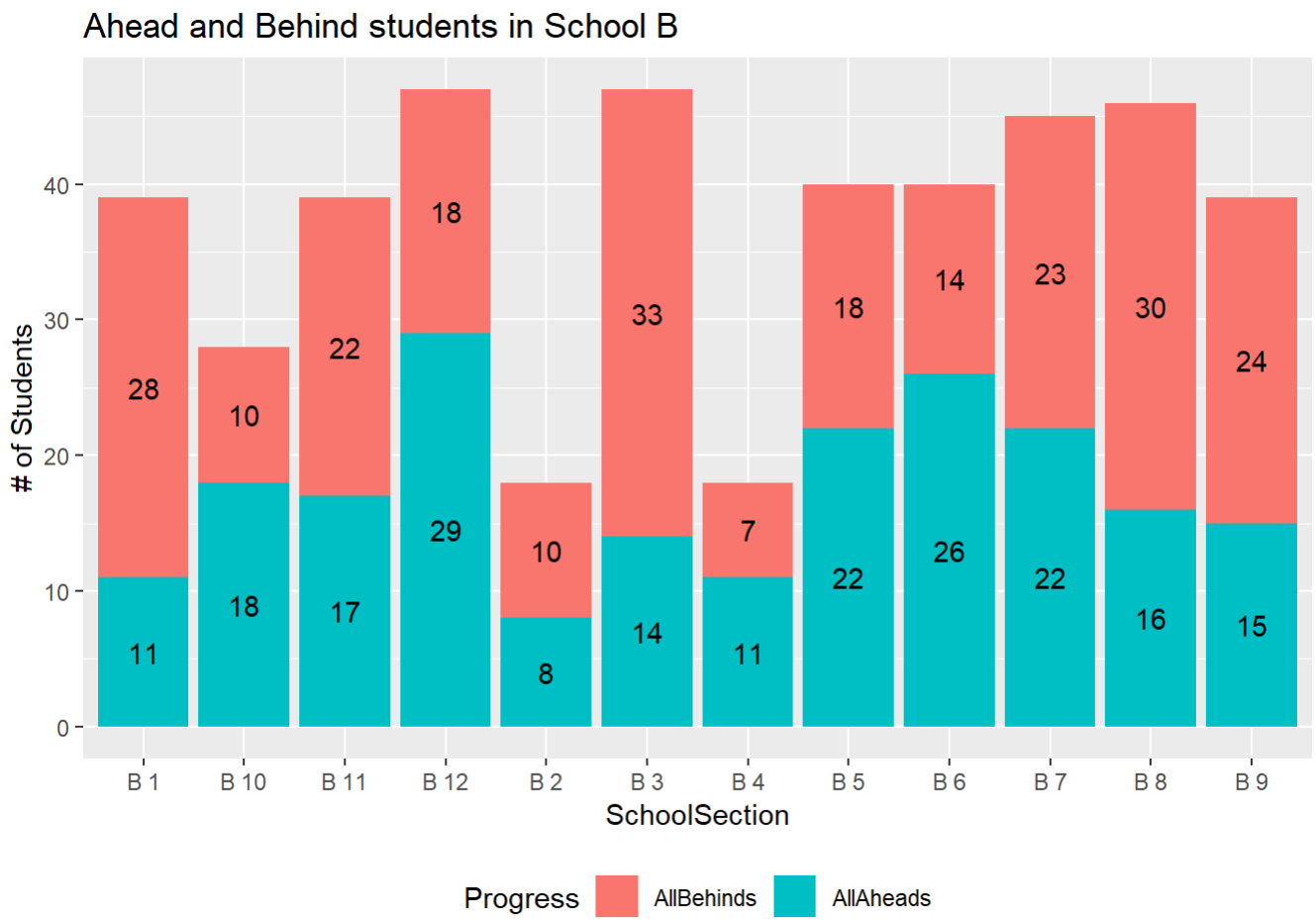
```
# AheadsBehindsBySchool <- data.frame(rbind(
# cbind(School=as.character(StudentsBySchool$School),Total=as.numeric(ifelse(round((StudentsBySchool$Total/sum(StudentsBySchool$Total)),1)==0,0.1,round((StudentsBySchool$Total/sum(StudentsBySchool$Total)),1))),variable="AllAheads",value=StudentsBySchool$AllAheads,value_percent=StudentsBySchool$AllAheads_Percent),
#cbind(School=as.character(StudentsBySchool$School),Total=as.numeric(ifelse(round((StudentsBySchool$Total/sum(StudentsBySchool$Total)),1)==0,0.1,round((StudentsBySchool$Total/sum(StudentsBySchool$Total)),1))),variable="AllBehinds",value=StudentsBySchool$AllBehinds,value_percent=StudentsBySchool$AllBehinds_Percent)
# ))

#AheadsBehindsBySchool$Total <- as.double(AheadsBehindsBySchool$Total)
#AheadsBehindsBySchool$value <- as.numeric(AheadsBehindsBySchool$value)
#AheadsBehindsBySchool$value_percent <- as.double(AheadsBehindsBySchool$value_percent)


#ggplot(data = StudentsBySchool_Melted[which(StudentsBySchool_Melted$variable==c("AllAheads","AllBehinds","AllAheads_Percent","AllBehinds_Percent" ),], mapping = aes(x = value)) + geom_histogram(bins = 20) + facet_wrap(~variable, scales = 'free_x')
# Let's just plot AllAheads and AllBehinds between schools and do a comparison

# Plotting actual number of student and their progress in two broader buckets by School
ggplot() +
  geom_bar(data = AheadsBehindsBySchool,aes(x=School,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="School",y="# of Students",title = "Ahead and Behind students across school",fill="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySchool,aes(x=School,y=value,label = value), position = position_stack(vjust = 0.5))
```



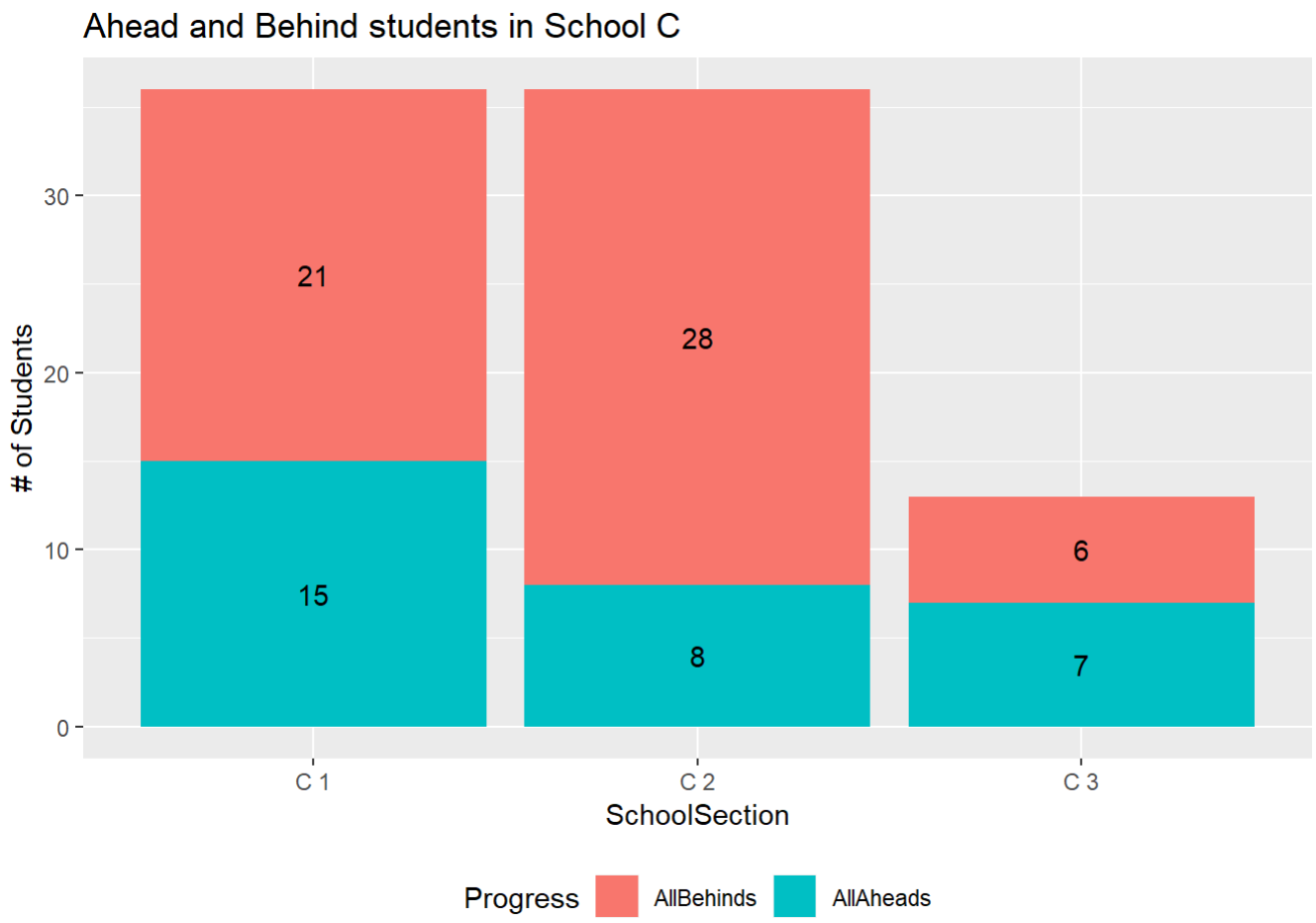

```
# Plotting actual number of student and their progress in two broader buckets by Section in Scho
ol A
ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="A"),],aes(x=Schoo
lSection,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="SchoolSection",y="# of Students",title = "Ahead and Behind students in School A",fill
="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="A"),],aes(x=Schoo
lSection,y=value,label = value), position = position_stack(vjust = 0.5))
```



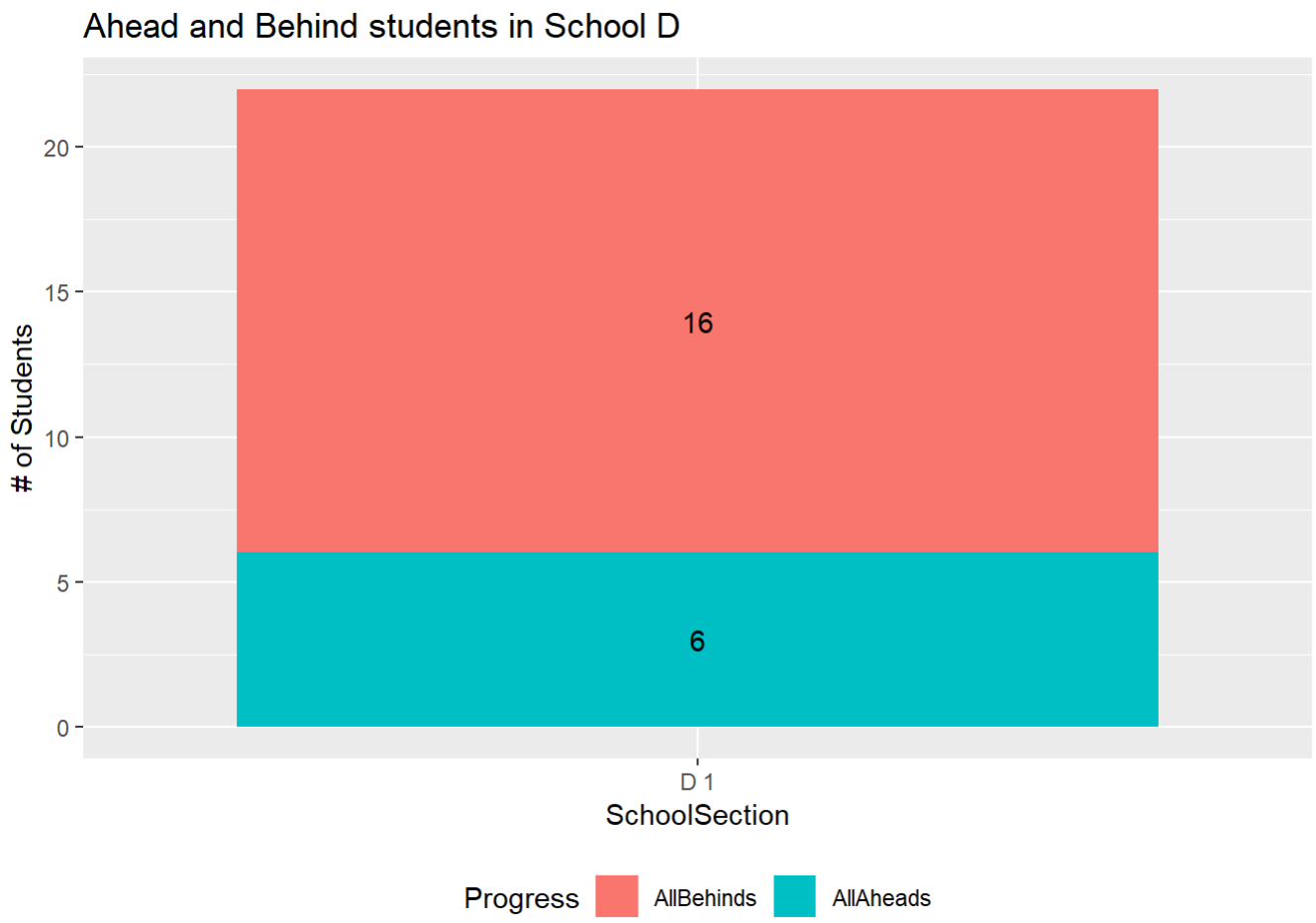

```
# Plotting actual number of student and their progress in two broader buckets by Section in Scho
ol B
ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="B"),],aes(x=Schoo
lSection,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="SchoolSection",y="# of Students",title = "Ahead and Behind students in School B",fill
="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="B"),],aes(x=Schoo
lSection,y=value,label = value), position = position_stack(vjust = 0.5))
```



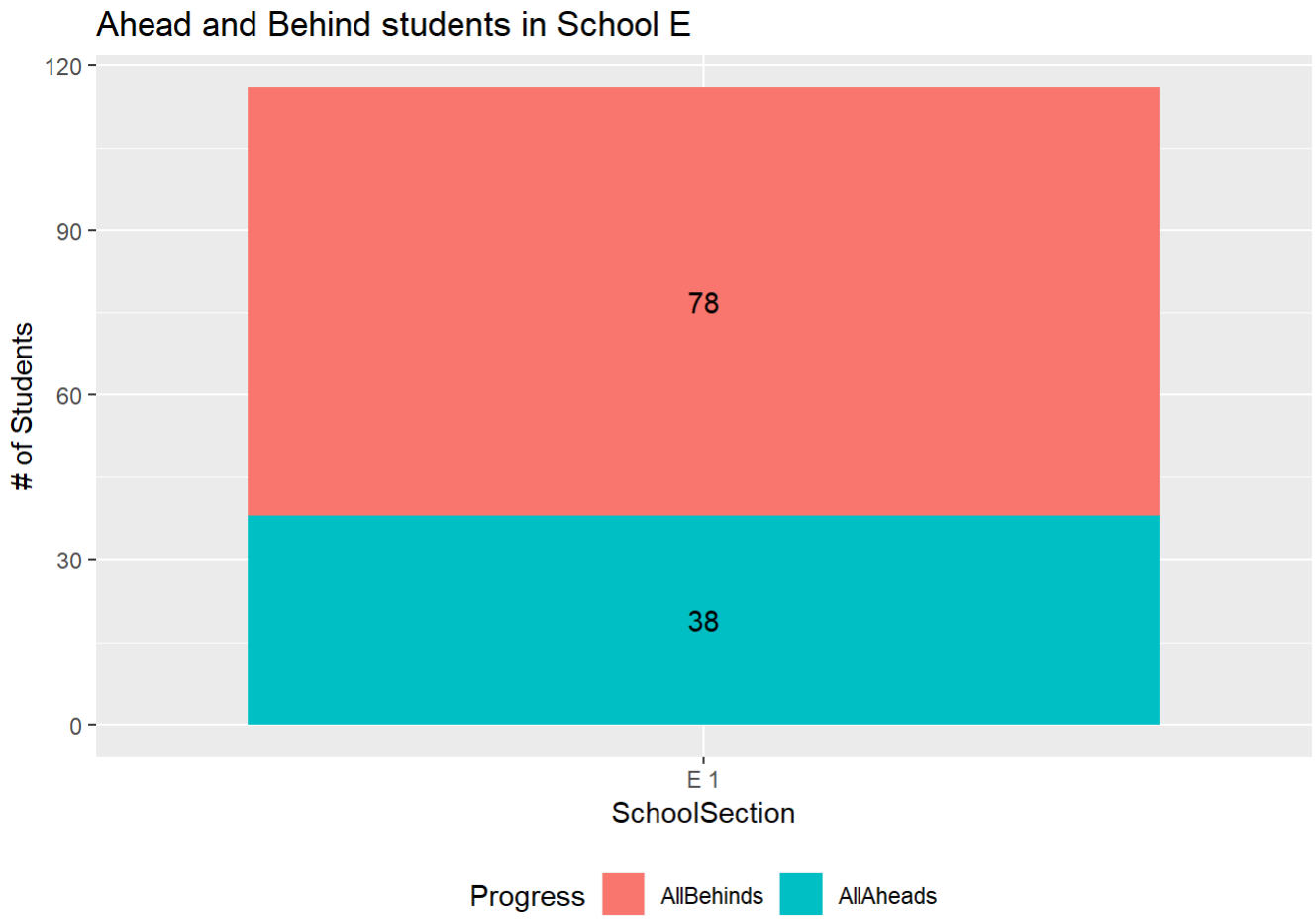

```
# Plotting actual number of student and their progress in two broader buckets by Section in Scho
ol C
ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="C"),],aes(x=Schoo
lSection,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="SchoolSection",y="# of Students",title = "Ahead and Behind students in School C",fill
="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="C"),],aes(x=Schoo
lSection,y=value,label = value), position = position_stack(vjust = 0.5))
```



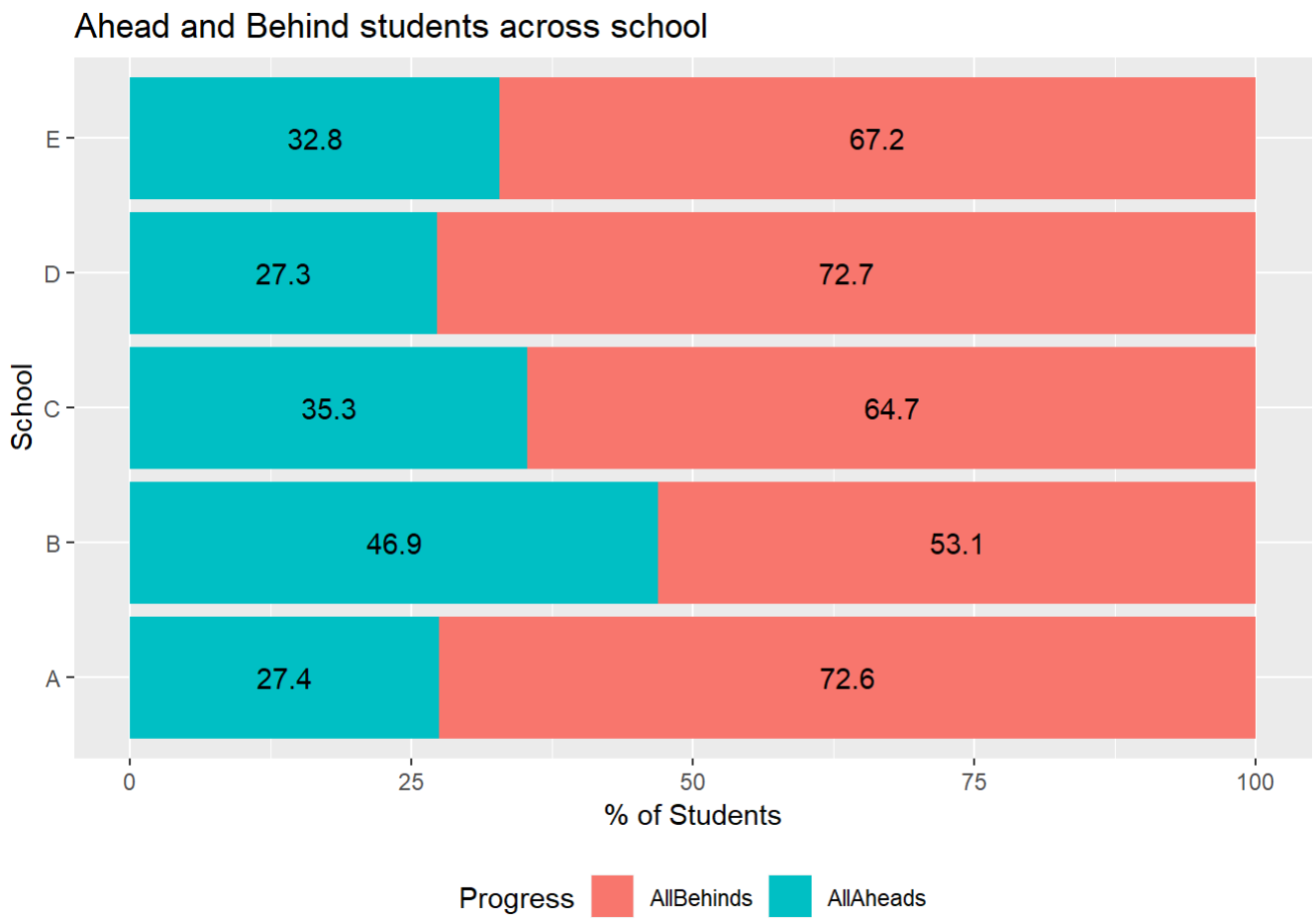

```
# Plotting actual number of student and their progress in two broader buckets by Section in Scho
ol D
ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="D"),],aes(x=Schoo
lSection,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="SchoolSection",y="# of Students",title = "Ahead and Behind students in School D",fill
="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="D"),],aes(x=Schoo
lSection,y=value,label = value), position = position_stack(vjust = 0.5))
```



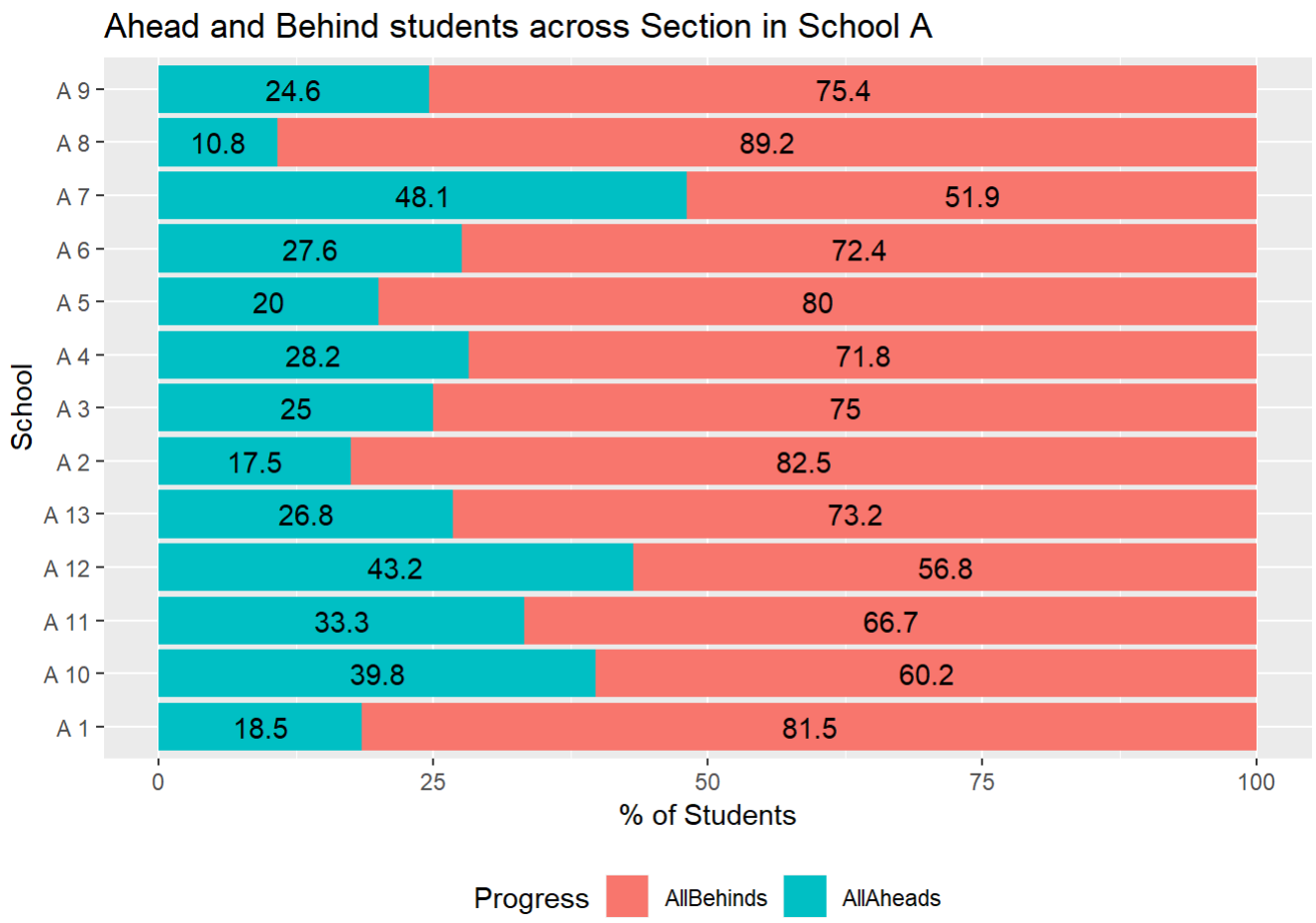

```
# Plotting actual number of student and their progress in two broader buckets by Section in Scho
ol E
ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="E"),],aes(x=Schoo
lSection,y=value,fill=factor(variable, levels=c("AllBehinds","AllAheads"))),stat="identity")+
  labs (x="SchoolSection",y="# of Students",title = "Ahead and Behind students in School E",fill
="Progress") +
  theme(legend.position = "bottom") +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="E"),],aes(x=Schoo
lSection,y=value,label = value), position = position_stack(vjust = 0.5))
```



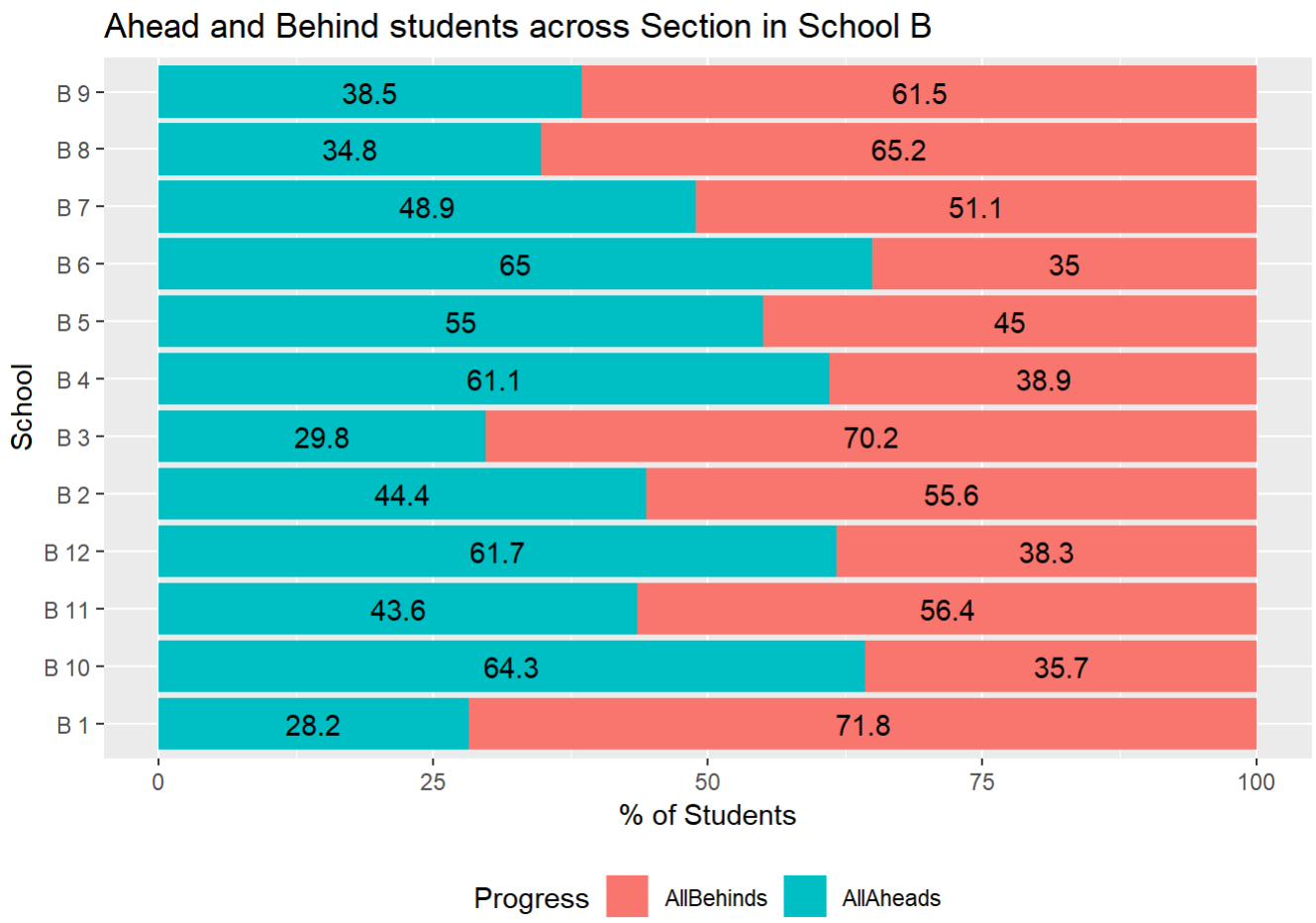

```
# Plotting % of student and their pregress in two broader buckets By School
ggplot() +
  geom_bar(data = AheadsBehindsBySchool,aes(x=School,y=value_percent,fill=factor(variable, level
s=c("AllBehinds","AllAheads"))
                                          #,width=Total
                                          ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across school",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySchool,aes(x=School,y=value_percent,label = value_percent), pos
ition = position_stack(vjust = 0.5))
```



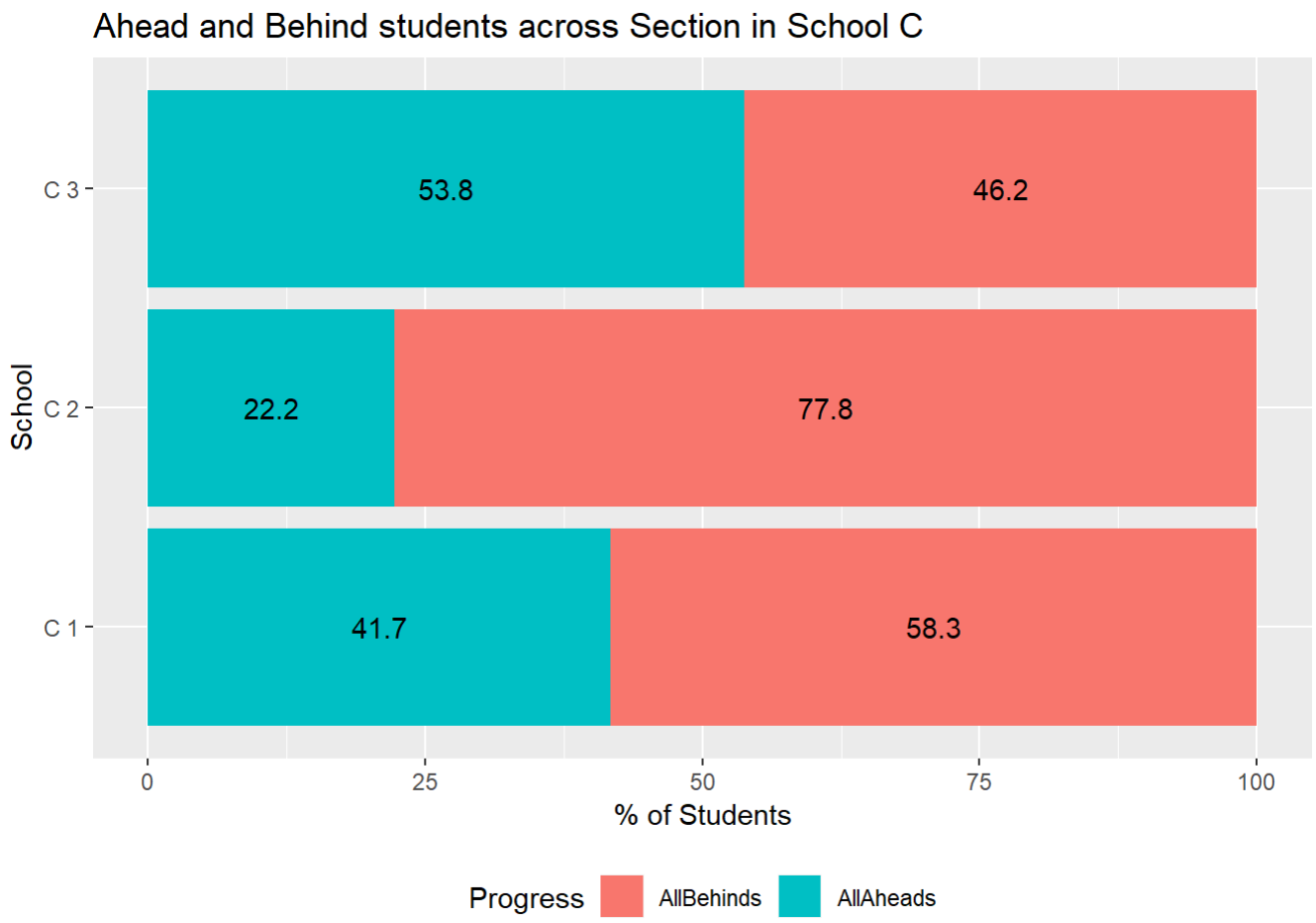

```
# Plotting % of student and their pregress in two broader buckets By Section in School A

ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="A"),],aes(x=Schoo
lSection,y=value_percent,fill=factor(variable, levels=c("AllBehinds","AllAheads"))
                                                #,width=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across Section in School
A",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="A"),],aes(x=Schoo
lSection,y=value_percent,label = value_percent), position = position_stack(vjust = 0.5))
```



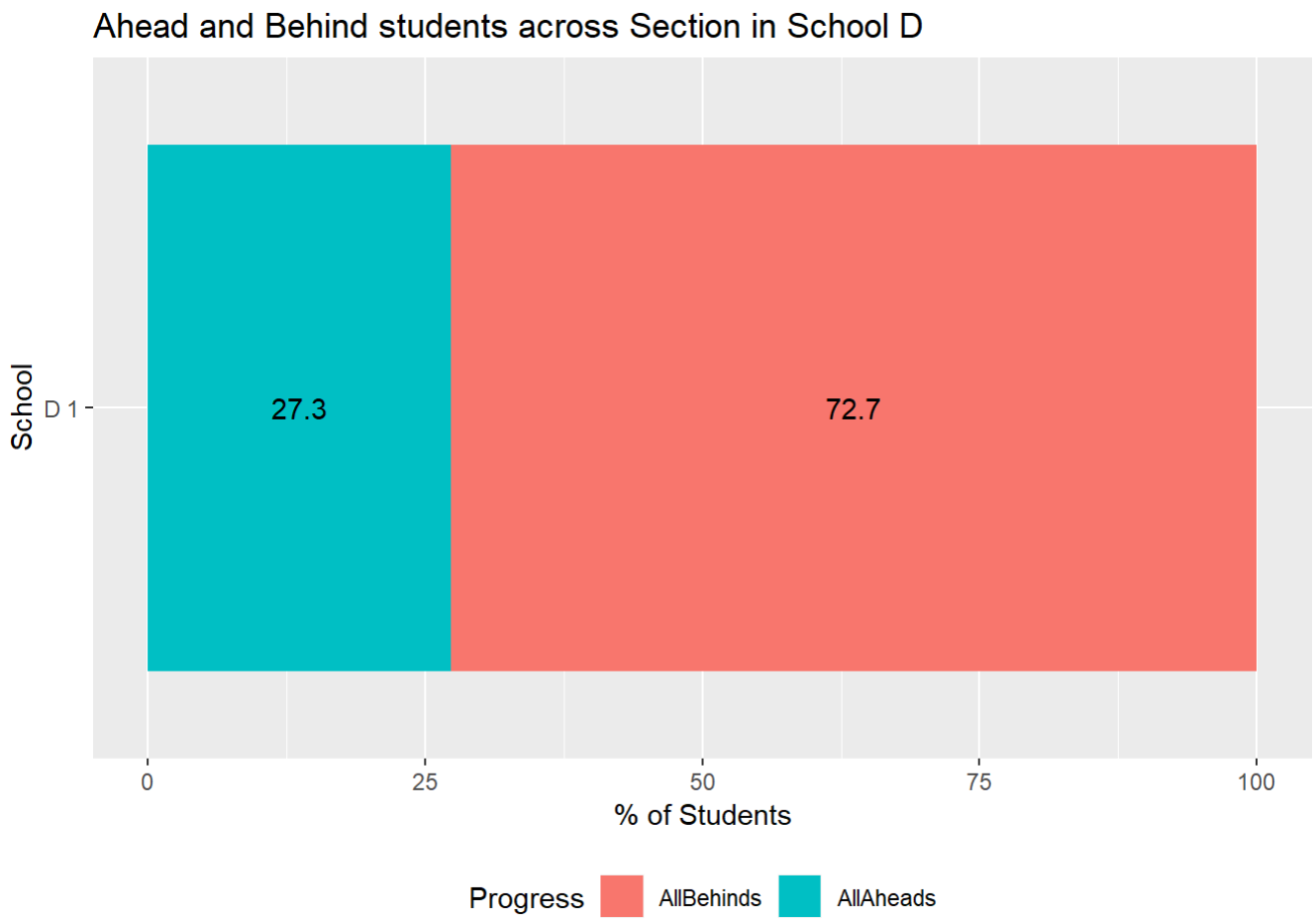

```
# Plotting % of student and their pregress in two broader buckets By Section in School B

ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="B"),],aes(x=Schoo
lSection,y=value_percent,fill=factor(variable, levels=c("AllBehinds","AllAheads"))
                                                                                    #,width
=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across Section in School
B",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="B"),],aes(x=Schoo
lSection,y=value_percent,label = value_percent), position = position_stack(vjust = 0.5))
```



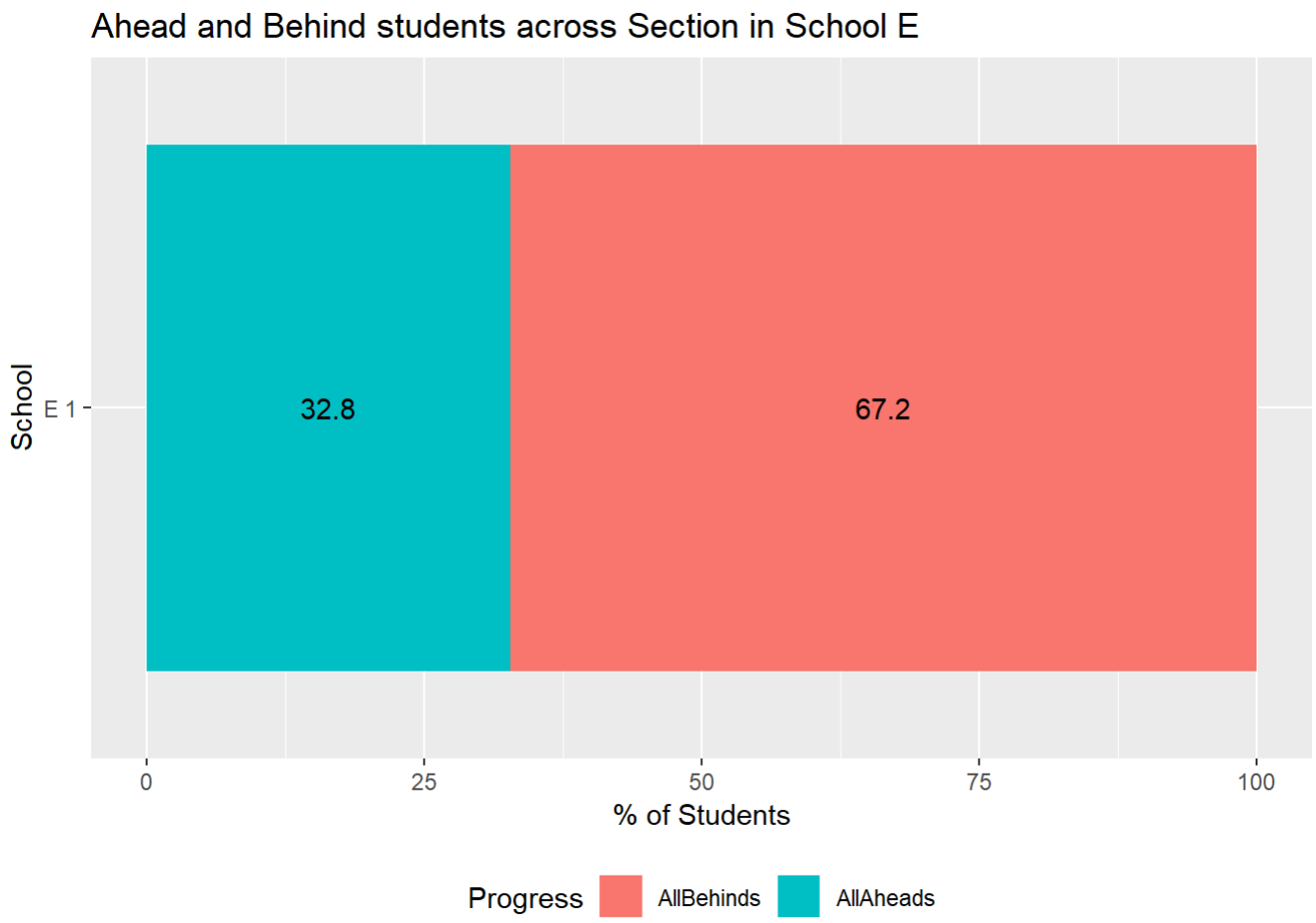

```
# Plotting % of student and their pregress in two broader buckets By Section in School C

ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="C"),],aes(x=Schoo
lSection,y=value_percent,fill=factor(variable, levels=c("AllBehinds","AllAheads"))
                                                                                    #,width
=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across Section in School
C",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="C"),],aes(x=Schoo
lSection,y=value_percent,label = value_percent), position = position_stack(vjust = 0.5))
```




```
# Plotting % of student and their pregress in two broader buckets By Section in School D

ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="D"),],aes(x=Schoo
lSection,y=value_percent,fill=factor(variable, levels=c("AllBehinds","AllAheads"))
                                                                                      #,width
=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across Section in School
D",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="D"),],aes(x=Schoo
lSection,y=value_percent,label = value_percent), position = position_stack(vjust = 0.5))
```

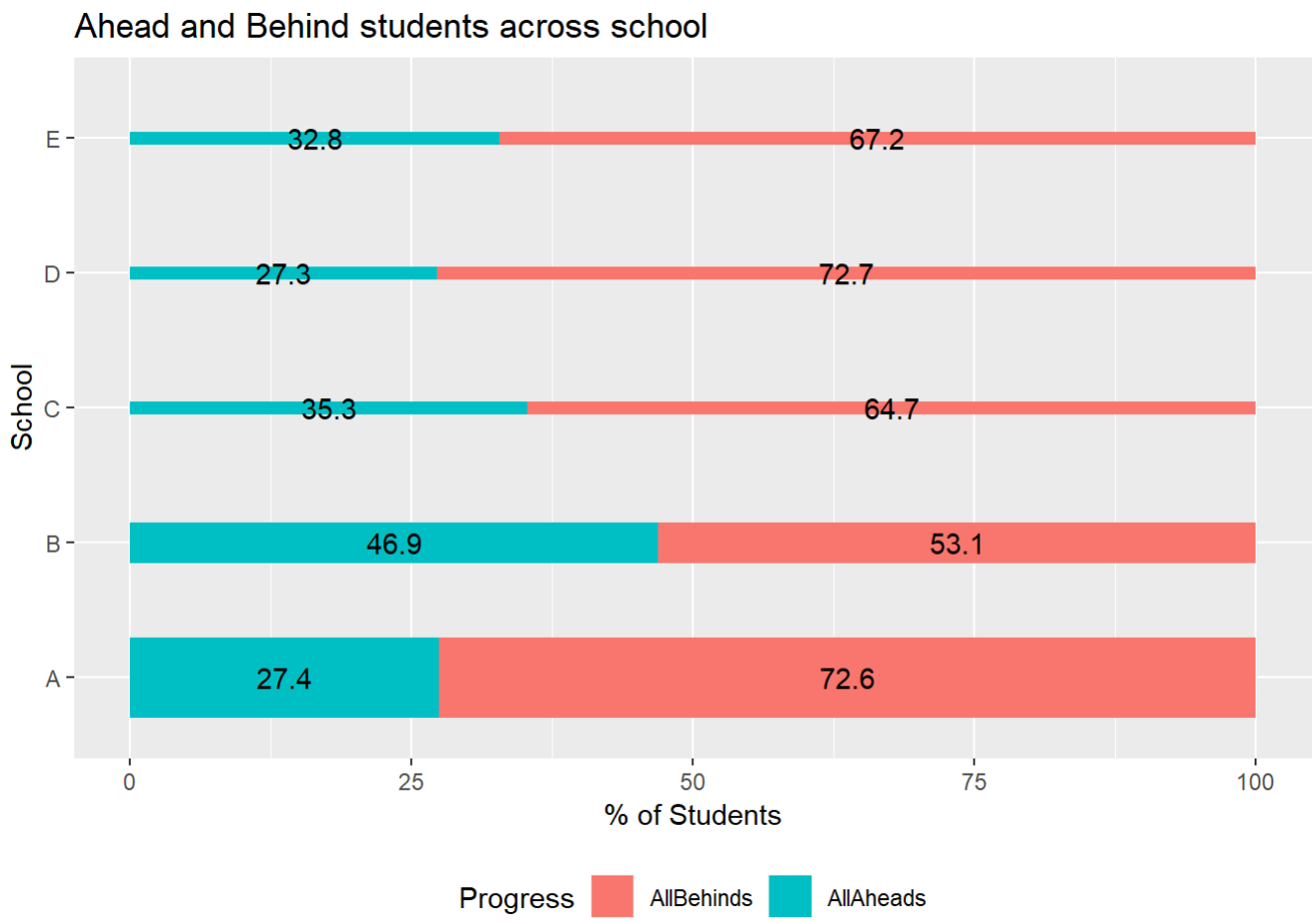



```
# Plotting % of student and their pregress in two broader buckets By Section in School E

ggplot() +
  geom_bar(data = AheadsBehindsBySection[which(AheadsBehindsBySection$School=="E"),],aes(x=Schoo
lSection,y=value_percent,fill=factor(variable, levels=c("AllBehinds","AllAheads"))
                                                                                    #,width
=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across Section in School
E",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySection[which(AheadsBehindsBySection$School=="E"),],aes(x=Schoo
lSection,y=value_percent,label = value_percent), position = position_stack(vjust = 0.5))
```




```
# Plotting % of student and their pregress in two broader buckets, Adjusting width according to
 the size of school
ggplot() +
  geom_bar(data = AheadsBehindsBySchool,aes(x=School,y=value_percent,fill=factor(variable, level
s=c("AllBehinds","AllAheads"))
                                            ,width=Total
  ),stat="identity")+
  labs (x="School",y="% of Students",title = "Ahead and Behind students across school",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip() +
  geom_text(data =AheadsBehindsBySchool,aes(x=School,y=value_percent,label = value_percent), pos
ition = position_stack(vjust = 0.5))
```

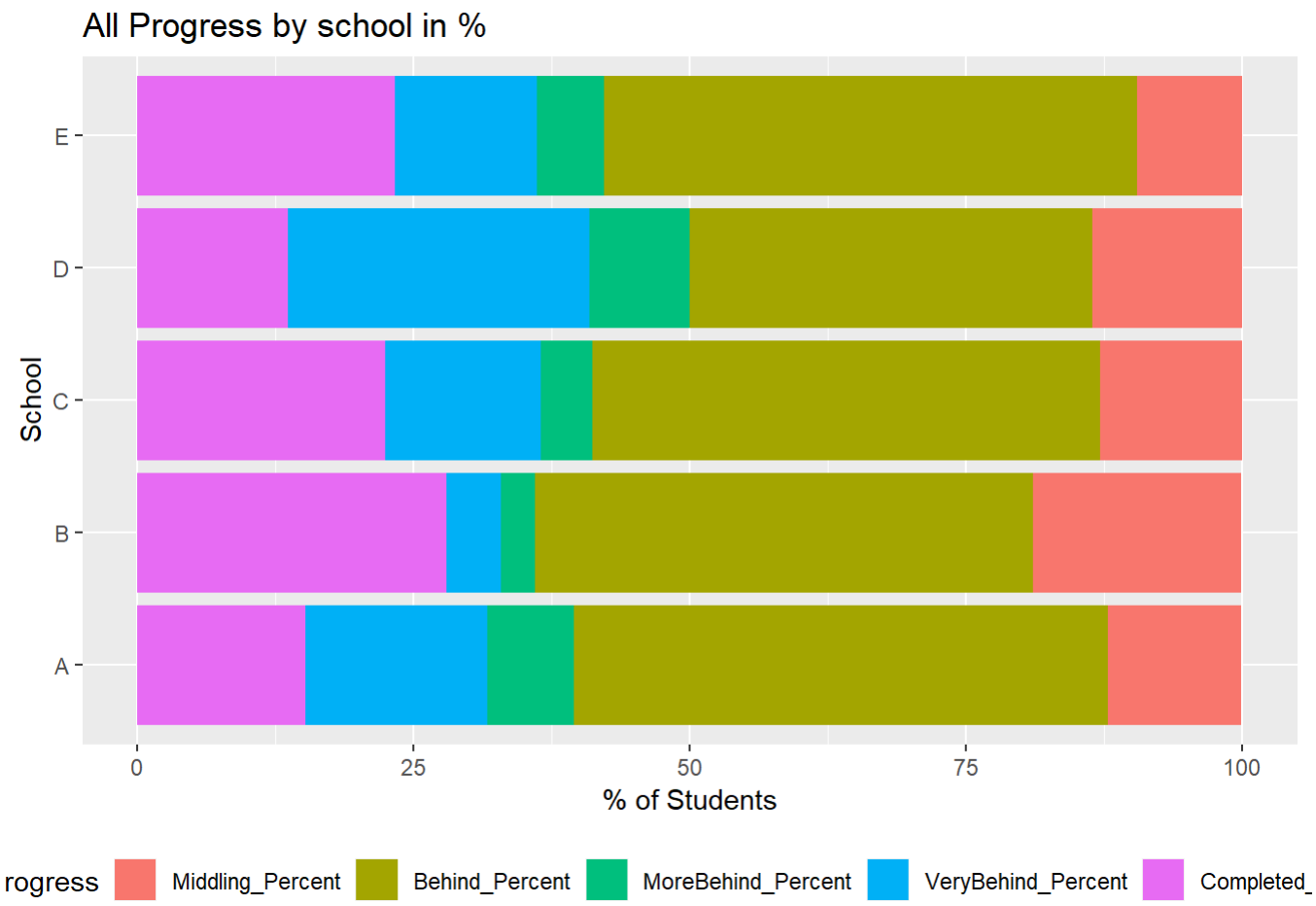
```
## Warning: Ignoring unknown aesthetics: width
```




```
# Plot all progress in % by school . Filter the melted data only for percentage

AllProgressbySchool <-StudentsBySchool_Melted[which(StudentsBySchool_Melted$variable=="Middling_
Percent"|StudentsBySchool_Melted$variable=="Behind_Percent"|StudentsBySchool_Melted$variable=="M
oreBehind_Percent"|StudentsBySchool_Melted$variable=="VeryBehind_Percent"|StudentsBySchool_Melte
d$variable=="Completed_Percent"),]
(AllProgressbySchool)
```

```
##    School           variable value
## 36      A   Middling_Percent  12.1
## 37      B   Middling_Percent  18.8
## 38      C   Middling_Percent  12.9
## 39      D   Middling_Percent  13.6
## 40      E   Middling_Percent   9.5
## 41      A     Behind_Percent  48.3
## 42      B     Behind_Percent  45.1
## 43      C     Behind_Percent  45.9
## 44      D     Behind_Percent  36.4
## 45      E     Behind_Percent  48.3
## 46      A MoreBehind_Percent   7.8
## 47      B MoreBehind_Percent   3.1
## 48      C MoreBehind_Percent   4.7
## 49      D MoreBehind_Percent   9.1
## 50      E MoreBehind_Percent   6.0
## 51      A VeryBehind_Percent  16.5
## 52      B VeryBehind_Percent   4.9
## 53      C VeryBehind_Percent  14.1
## 54      D VeryBehind_Percent  27.3
## 55      E VeryBehind_Percent  12.9
## 56      A  Completed_Percent  15.2
## 57      B  Completed_Percent  28.0
## 58      C  Completed_Percent  22.4
## 59      D  Completed_Percent  13.6
## 60      E  Completed_Percent  23.3
```

```
ggplot() +
  geom_bar(data = AllProgressbySchool,aes(x=School,y=value,fill=factor(variable, levels=c("Middl
ing_Percent","Behind_Percent","MoreBehind_Percent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by school in %",fill="Progress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



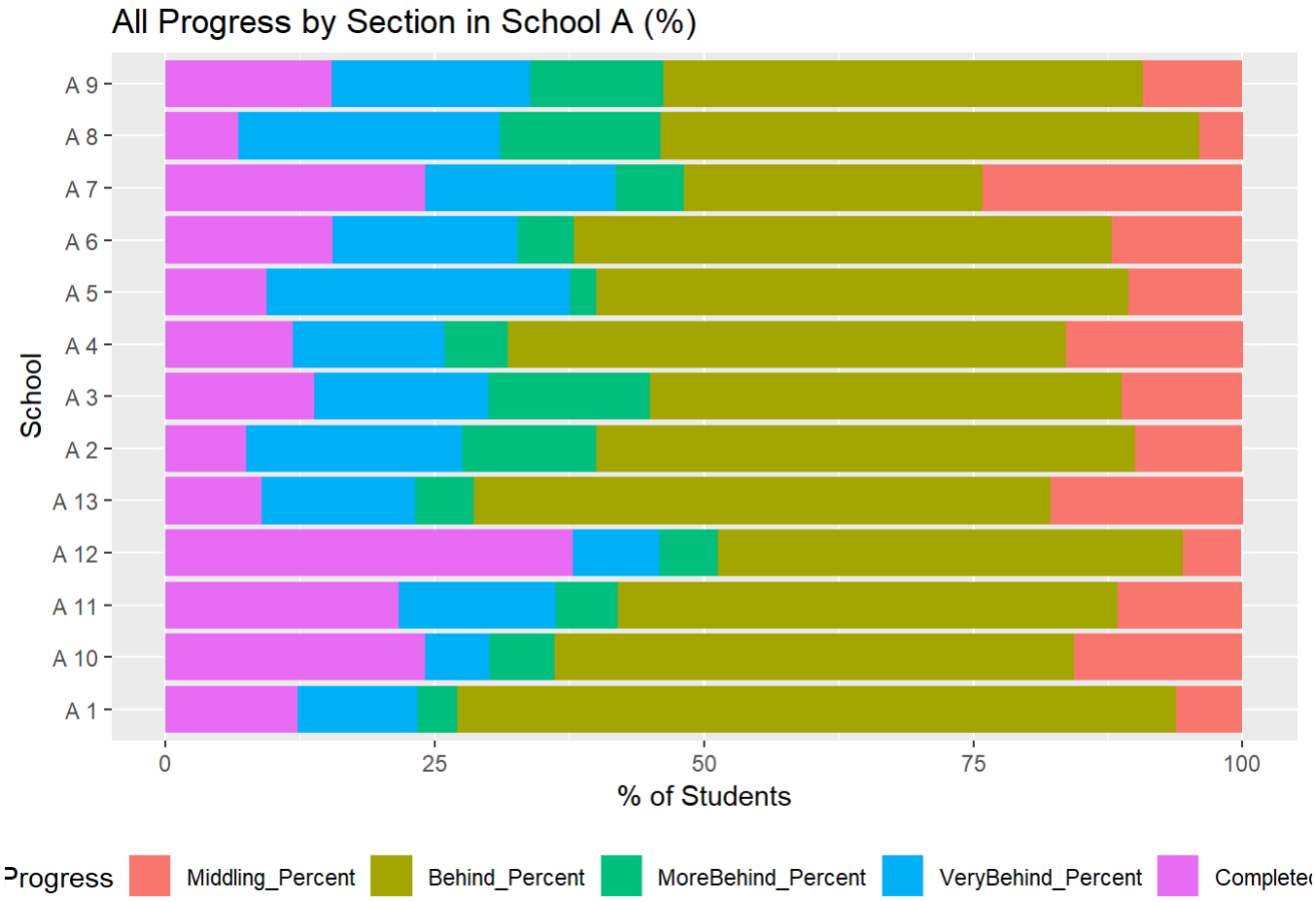

```
  #+ geom_text(data =AllProgressbySchool,aes(x=School,y=value,label = value), position = positio
n_stack(vjust = 0.5))

# Plot all progress in % by Section . Filter the melted data only for percentage

AllProgressbySection <-StudentsBySection_Melted[which(StudentsBySection_Melted$variable=="Middli
ng_Percent"|StudentsBySection_Melted$variable=="Behind_Percent"|StudentsBySection_Melted$variabl
e=="MoreBehind_Percent"|StudentsBySection_Melted$variable=="VeryBehind_Percent"|StudentsBySectio
n_Melted$variable=="Completed_Percent"),]
(AllProgressbySection)
```

```
##     School Section SchoolSection           variable value
## 211      A       1            A 1   Middling_Percent   6.2
## 212      A       2            A 2   Middling_Percent  10.0
## 213      A       3            A 3   Middling_Percent  11.2
## 214      A       4            A 4   Middling_Percent  16.5
## 215      A       5            A 5   Middling_Percent  10.6
## 216      A       6            A 6   Middling_Percent  12.1
## 217      A       7            A 7   Middling_Percent  24.1
## 218      A       8            A 8   Middling_Percent   4.1
## 219      A       9            A 9   Middling_Percent   9.2
## 220      A      10           A 10   Middling_Percent  15.7
## 221      A      11           A 11   Middling_Percent  11.6
## 222      A      12           A 12   Middling_Percent   5.4
## 223      A      13           A 13   Middling_Percent  17.9
## 224      B       1            B 1   Middling_Percent  10.3
## 225      B       2            B 2   Middling_Percent  27.8
## 226      B       3            B 3   Middling_Percent  12.8
## 227      B       4            B 4   Middling_Percent  22.2
## 228      B       5            B 5   Middling_Percent  20.0
## 229      B       6            B 6   Middling_Percent  20.0
## 230      B       7            B 7   Middling_Percent  20.0
## 231      B       8            B 8   Middling_Percent  21.7
## 232      B       9            B 9   Middling_Percent  25.6
## 233      B      10           B 10   Middling_Percent  10.7
## 234      B      11           B 11   Middling_Percent  17.9
## 235      B      12           B 12   Middling_Percent  21.3
## 236      C       1            C 1   Middling_Percent   5.6
## 237      C       2            C 2   Middling_Percent  19.4
## 238      C       3            C 3   Middling_Percent  15.4
## 239      D       1            D 1   Middling_Percent  13.6
## 240      E       1            E 1   Middling_Percent   9.5
## 241      A       1            A 1     Behind_Percent  66.7
## 242      A       2            A 2     Behind_Percent  50.0
## 243      A       3            A 3     Behind_Percent  43.8
## 244      A       4            A 4     Behind_Percent  51.8
## 245      A       5            A 5     Behind_Percent  49.4
## 246      A       6            A 6     Behind_Percent  50.0
## 247      A       7            A 7     Behind_Percent  27.8
## 248      A       8            A 8     Behind_Percent  50.0
## 249      A       9            A 9     Behind_Percent  44.6
## 250      A      10           A 10     Behind_Percent  48.2
## 251      A      11           A 11     Behind_Percent  46.4
## 252      A      12           A 12     Behind_Percent  43.2
## 253      A      13           A 13     Behind_Percent  53.6
## 254      B       1            B 1     Behind_Percent  56.4
## 255      B       2            B 2     Behind_Percent  38.9
## 256      B       3            B 3     Behind_Percent  66.0
## 257      B       4            B 4     Behind_Percent  38.9
## 258      B       5            B 5     Behind_Percent  35.0
## 259      B       6            B 6     Behind_Percent  27.5
## 260      B       7            B 7     Behind_Percent  46.7
## 261      B       8            B 8     Behind_Percent  50.0
## 262      B       9            B 9     Behind_Percent  53.8
```

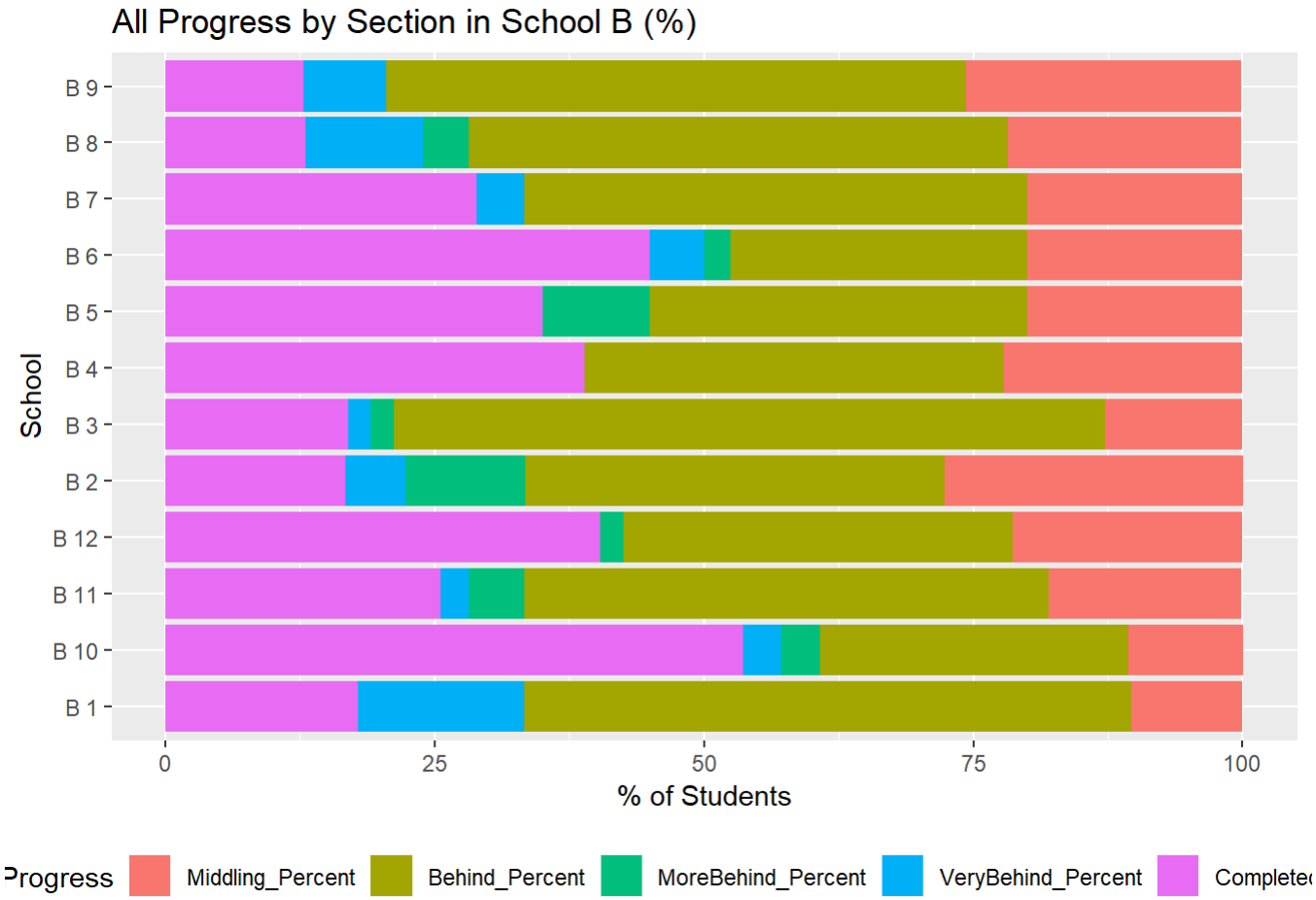
```
## 263      B      10          B 10     Behind_Percent  28.6
## 264      B      11          B 11     Behind_Percent  48.7
## 265      B      12          B 12     Behind_Percent  36.2
## 266      C       1           C 1     Behind_Percent  41.7
## 267      C       2           C 2     Behind_Percent  55.6
## 268      C       3           C 3     Behind_Percent  30.8
## 269      D       1           D 1     Behind_Percent  36.4
## 270      E       1           E 1     Behind_Percent  48.3
## 271      A       1           A 1 MoreBehind_Percent   3.7
## 272      A       2           A 2 MoreBehind_Percent  12.5
## 273      A       3           A 3 MoreBehind_Percent  15.0
## 274      A       4           A 4 MoreBehind_Percent   5.9
## 275      A       5           A 5 MoreBehind_Percent   2.4
## 276      A       6           A 6 MoreBehind_Percent   5.2
## 277      A       7           A 7 MoreBehind_Percent   6.3
## 278      A       8           A 8 MoreBehind_Percent  14.9
## 279      A       9           A 9 MoreBehind_Percent  12.3
## 280      A      10          A 10 MoreBehind_Percent   6.0
## 281      A      11          A 11 MoreBehind_Percent   5.8
## 282      A      12          A 12 MoreBehind_Percent   5.4
## 283      A      13          A 13 MoreBehind_Percent   5.4
## 284      B       1           B 1 MoreBehind_Percent   0.0
## 285      B       2           B 2 MoreBehind_Percent  11.1
## 286      B       3           B 3 MoreBehind_Percent   2.1
## 287      B       4           B 4 MoreBehind_Percent   0.0
## 288      B       5           B 5 MoreBehind_Percent  10.0
## 289      B       6           B 6 MoreBehind_Percent   2.5
## 290      B       7           B 7 MoreBehind_Percent   0.0
## 291      B       8           B 8 MoreBehind_Percent   4.3
## 292      B       9           B 9 MoreBehind_Percent   0.0
## 293      B      10          B 10 MoreBehind_Percent   3.6
## 294      B      11          B 11 MoreBehind_Percent   5.1
## 295      B      12          B 12 MoreBehind_Percent   2.1
## 296      C       1           C 1 MoreBehind_Percent   5.6
## 297      C       2           C 2 MoreBehind_Percent   2.8
## 298      C       3           C 3 MoreBehind_Percent   7.7
## 299      D       1           D 1 MoreBehind_Percent   9.1
## 300      E       1           E 1 MoreBehind_Percent   6.0
## 301      A       1           A 1 VeryBehind_Percent  11.1
## 302      A       2           A 2 VeryBehind_Percent  20.0
## 303      A       3           A 3 VeryBehind_Percent  16.2
## 304      A       4           A 4 VeryBehind_Percent  14.1
## 305      A       5           A 5 VeryBehind_Percent  28.2
## 306      A       6           A 6 VeryBehind_Percent  17.2
## 307      A       7           A 7 VeryBehind_Percent  17.7
## 308      A       8           A 8 VeryBehind_Percent  24.3
## 309      A       9           A 9 VeryBehind_Percent  18.5
## 310      A      10          A 10 VeryBehind_Percent   6.0
## 311      A      11          A 11 VeryBehind_Percent  14.5
## 312      A      12          A 12 VeryBehind_Percent   8.1
## 313      A      13          A 13 VeryBehind_Percent  14.3
## 314      B       1           B 1 VeryBehind_Percent  15.4
## 315      B       2           B 2 VeryBehind_Percent   5.6
## 316      B       3           B 3 VeryBehind_Percent   2.1
```

```
## 317      B       4           B 4 VeryBehind_Percent   0.0
## 318      B       5           B 5 VeryBehind_Percent   0.0
## 319      B       6           B 6 VeryBehind_Percent   5.0
## 320      B       7           B 7 VeryBehind_Percent   4.4
## 321      B       8           B 8 VeryBehind_Percent  10.9
## 322      B       9           B 9 VeryBehind_Percent   7.7
## 323      B      10          B 10 VeryBehind_Percent   3.6
## 324      B      11          B 11 VeryBehind_Percent   2.6
## 325      B      12          B 12 VeryBehind_Percent   0.0
## 326      C       1           C 1 VeryBehind_Percent  11.1
## 327      C       2           C 2 VeryBehind_Percent  19.4
## 328      C       3           C 3 VeryBehind_Percent   7.7
## 329      D       1           D 1 VeryBehind_Percent  27.3
## 330      E       1           E 1 VeryBehind_Percent  12.9
## 331      A       1           A 1  Completed_Percent  12.3
## 332      A       2           A 2  Completed_Percent   7.5
## 333      A       3           A 3  Completed_Percent  13.8
## 334      A       4           A 4  Completed_Percent  11.8
## 335      A       5           A 5  Completed_Percent   9.4
## 336      A       6           A 6  Completed_Percent  15.5
## 337      A       7           A 7  Completed_Percent  24.1
## 338      A       8           A 8  Completed_Percent   6.8
## 339      A       9           A 9  Completed_Percent  15.4
## 340      A      10          A 10  Completed_Percent  24.1
## 341      A      11          A 11  Completed_Percent  21.7
## 342      A      12          A 12  Completed_Percent  37.8
## 343      A      13          A 13  Completed_Percent   8.9
## 344      B       1           B 1  Completed_Percent  17.9
## 345      B       2           B 2  Completed_Percent  16.7
## 346      B       3           B 3  Completed_Percent  17.0
## 347      B       4           B 4  Completed_Percent  38.9
## 348      B       5           B 5  Completed_Percent  35.0
## 349      B       6           B 6  Completed_Percent  45.0
## 350      B       7           B 7  Completed_Percent  28.9
## 351      B       8           B 8  Completed_Percent  13.0
## 352      B       9           B 9  Completed_Percent  12.8
## 353      B      10          B 10  Completed_Percent  53.6
## 354      B      11          B 11  Completed_Percent  25.6
## 355      B      12          B 12  Completed_Percent  40.4
## 356      C       1           C 1  Completed_Percent  36.1
## 357      C       2           C 2  Completed_Percent   2.8
## 358      C       3           C 3  Completed_Percent  38.5
## 359      D       1           D 1  Completed_Percent  13.6
## 360      E       1           E 1  Completed_Percent  23.3
```

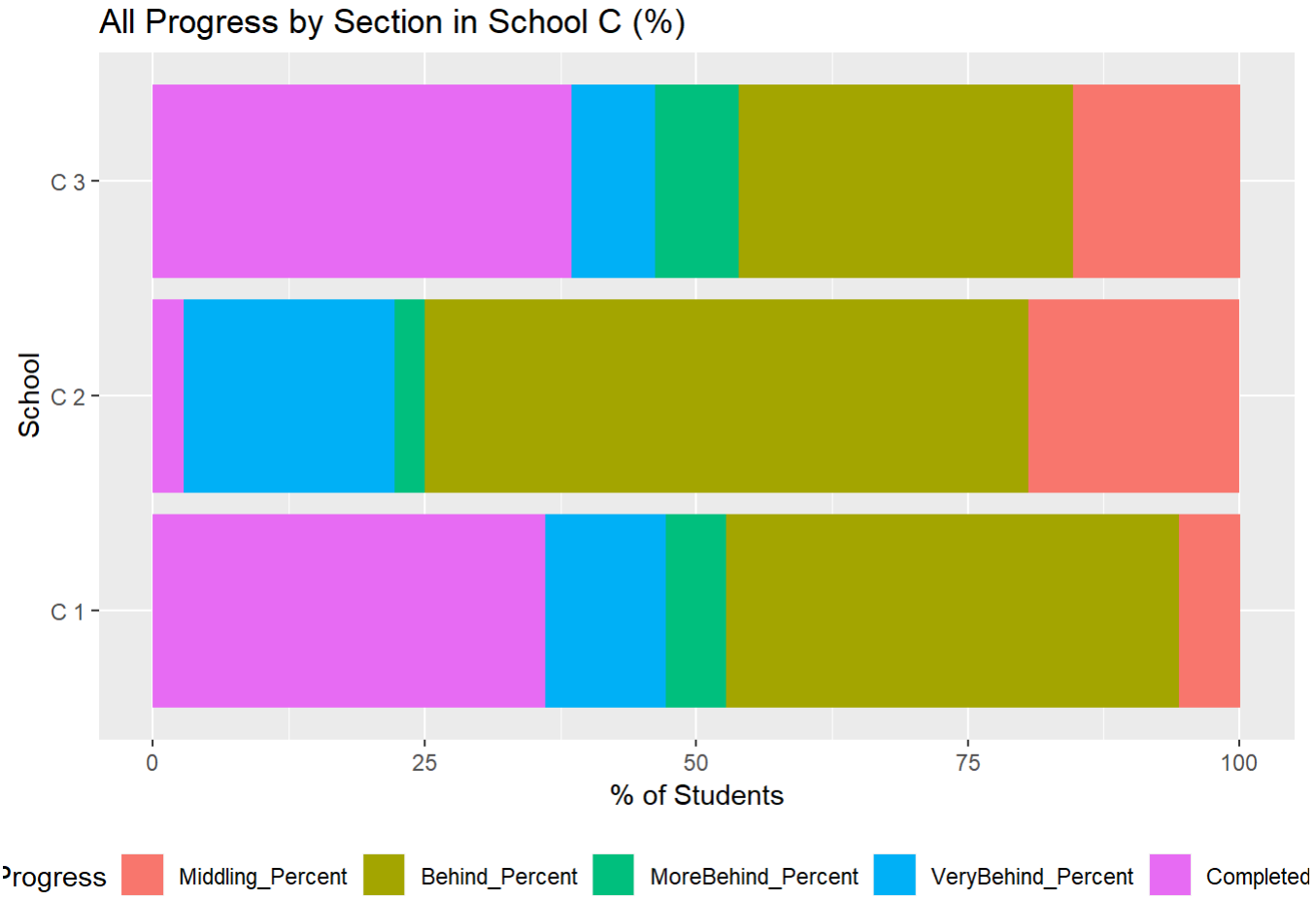
```
# Plot all progress in % by Section in School A

ggplot() +
  geom_bar(data = AllProgressbySection[which(AllProgressbySection$School=="A"),],aes(x=SchoolSec
tion,y=value,fill=factor(variable, levels=c("Middling_Percent","Behind_Percent","MoreBehind_Perc
ent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by Section in School A (%)",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



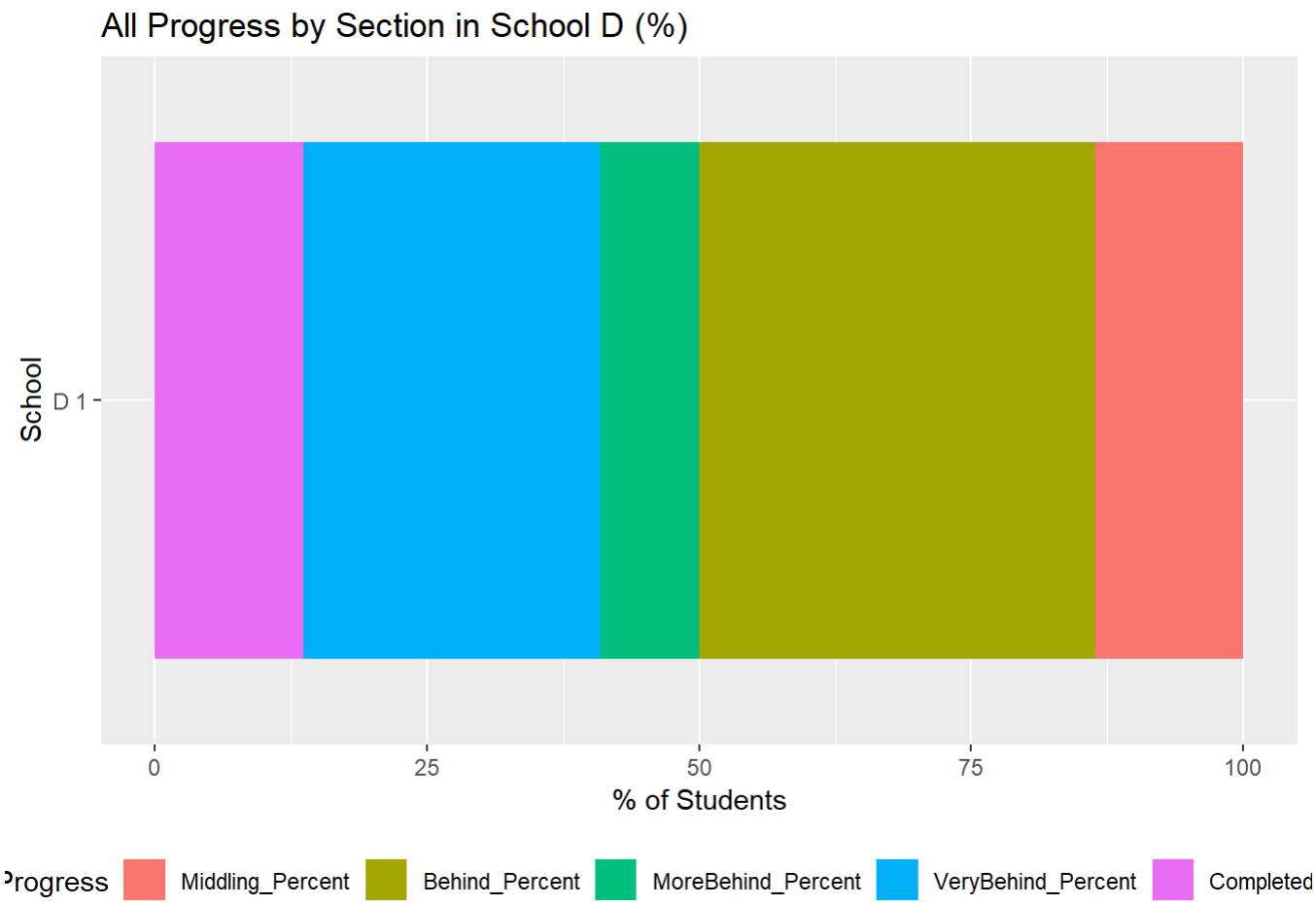
```
#+ geom_text(data =AllProgressbySchool,aes(x=School,y=value,label = value), position = position_
stack(vjust = 0.5))

# Plot all progress in % by Section in School B

ggplot() +
  geom_bar(data = AllProgressbySection[which(AllProgressbySection$School=="B"),],aes(x=SchoolSec
tion,y=value,fill=factor(variable, levels=c("Middling_Percent","Behind_Percent","MoreBehind_Perc
ent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by Section in School B (%)",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



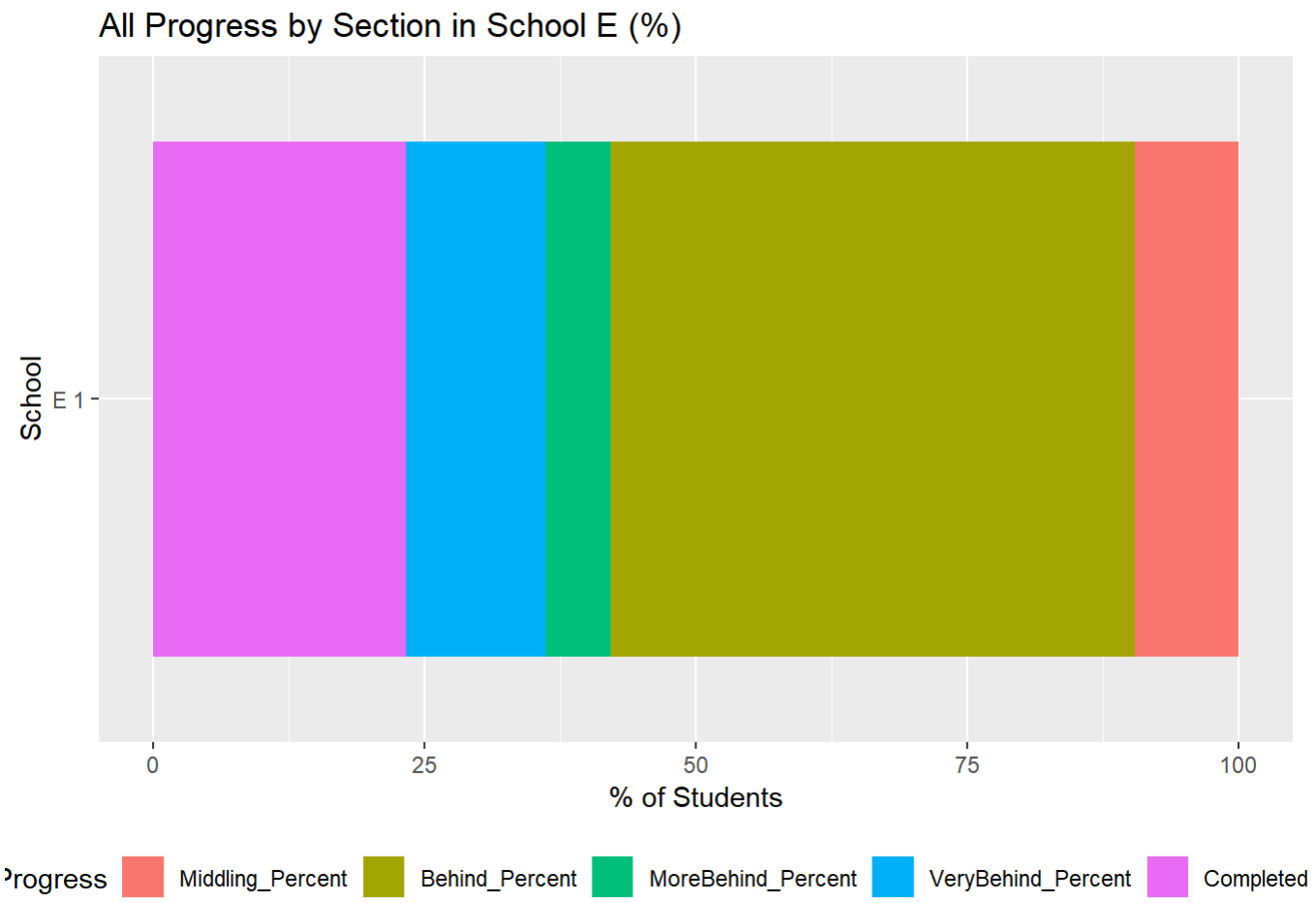
```
# Plot all progress in % by Section in School C

ggplot() +
  geom_bar(data = AllProgressbySection[which(AllProgressbySection$School=="C"),],aes(x=SchoolSec
tion,y=value,fill=factor(variable, levels=c("Middling_Percent","Behind_Percent","MoreBehind_Perc
ent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by Section in School C (%)",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



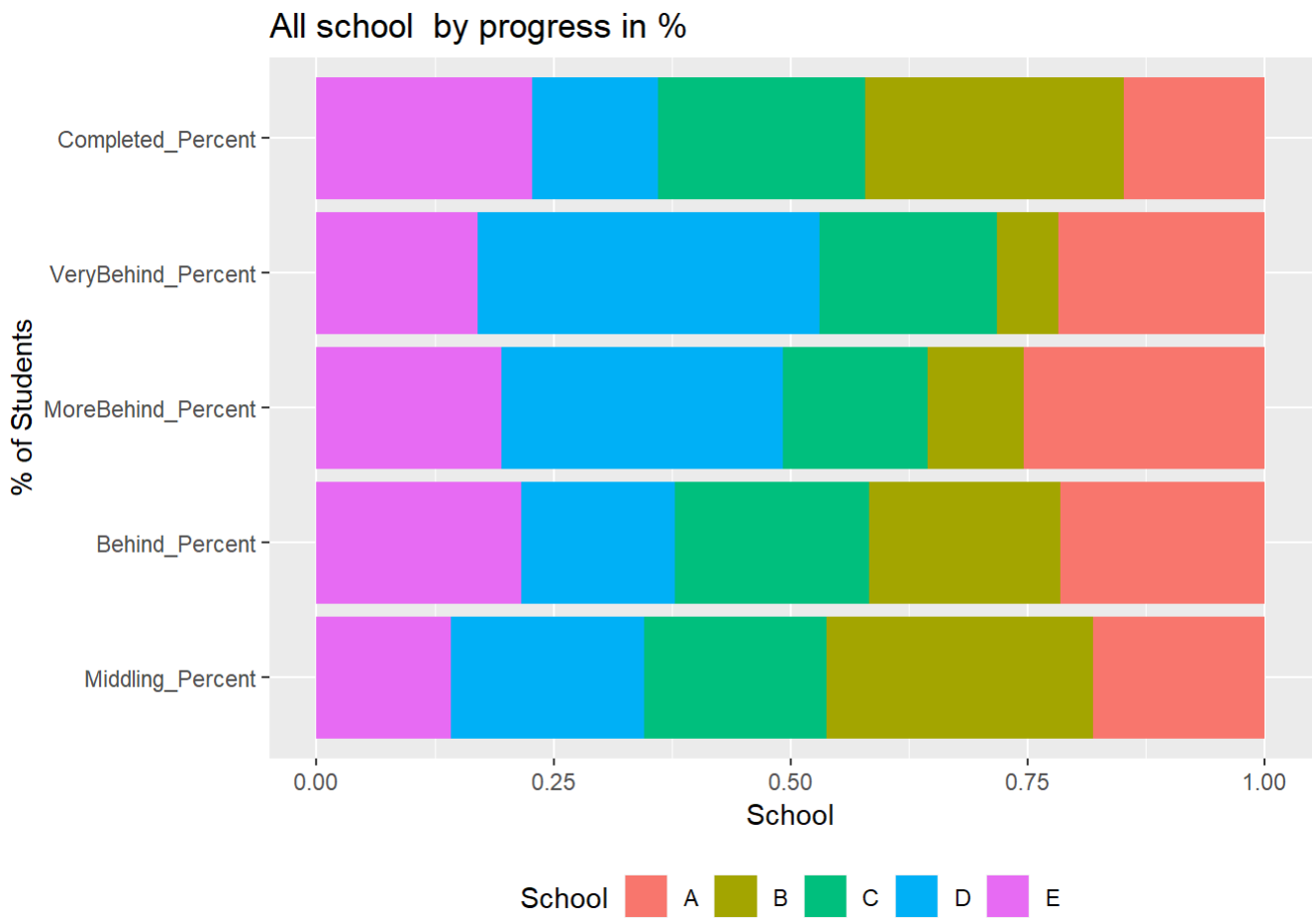

```
# Plot all progress in % by Section in School D

ggplot() +
  geom_bar(data = AllProgressbySection[which(AllProgressbySection$School=="D"),],aes(x=SchoolSec
tion,y=value,fill=factor(variable, levels=c("Middling_Percent","Behind_Percent","MoreBehind_Perc
ent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by Section in School D (%)",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



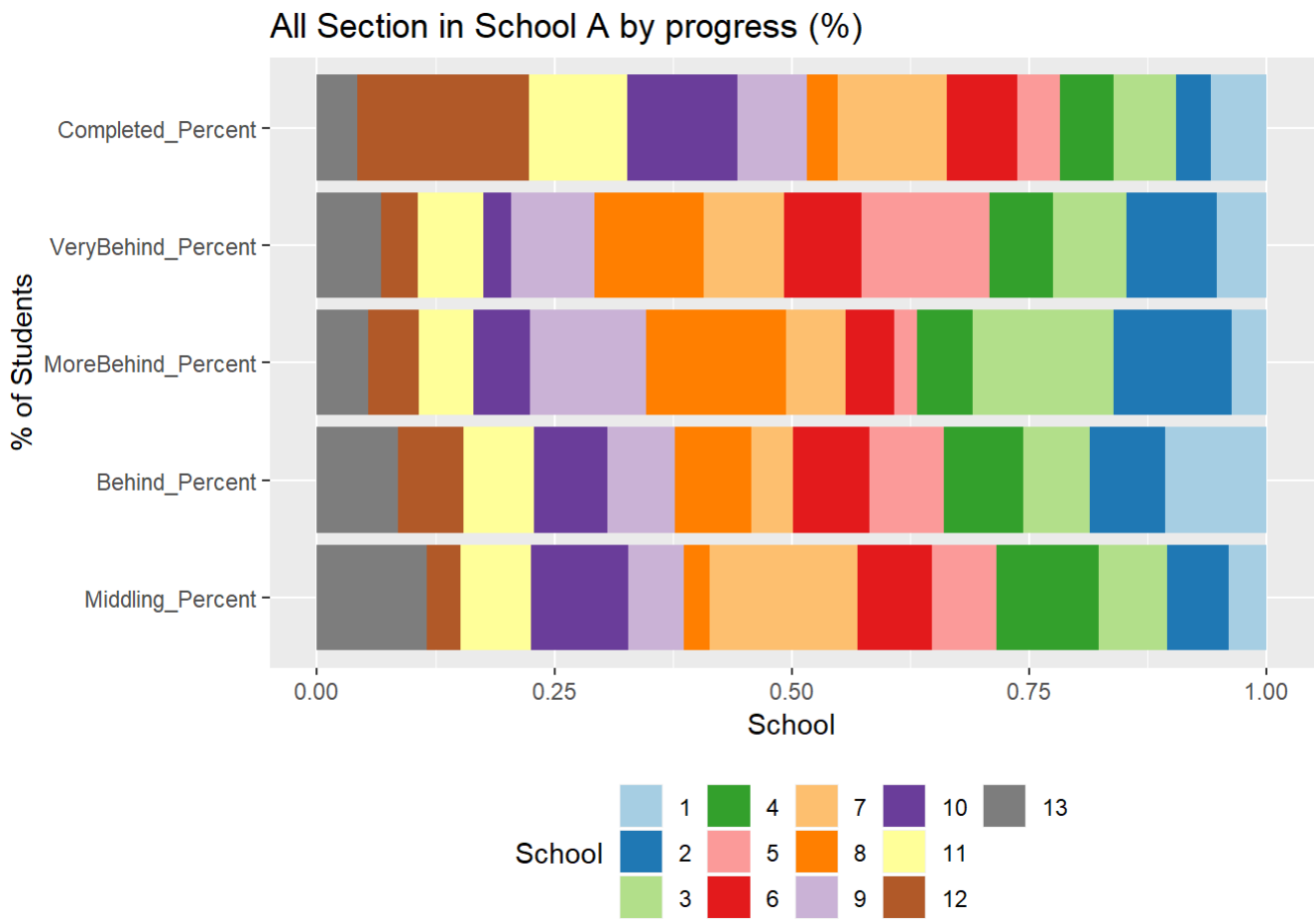

```
# Plot all progress in % by Section in School E

ggplot() +
  geom_bar(data = AllProgressbySection[which(AllProgressbySection$School=="E"),],aes(x=SchoolSec
tion,y=value,fill=factor(variable, levels=c("Middling_Percent","Behind_Percent","MoreBehind_Perc
ent","VeryBehind_Percent","Completed_Percent"))

  ),stat="identity")+
  labs (x="School",y="% of Students",title = "All Progress by Section in School E (%)",fill="Pro
gress" ) +
  theme(legend.position = "bottom") +
  coord_flip()
```



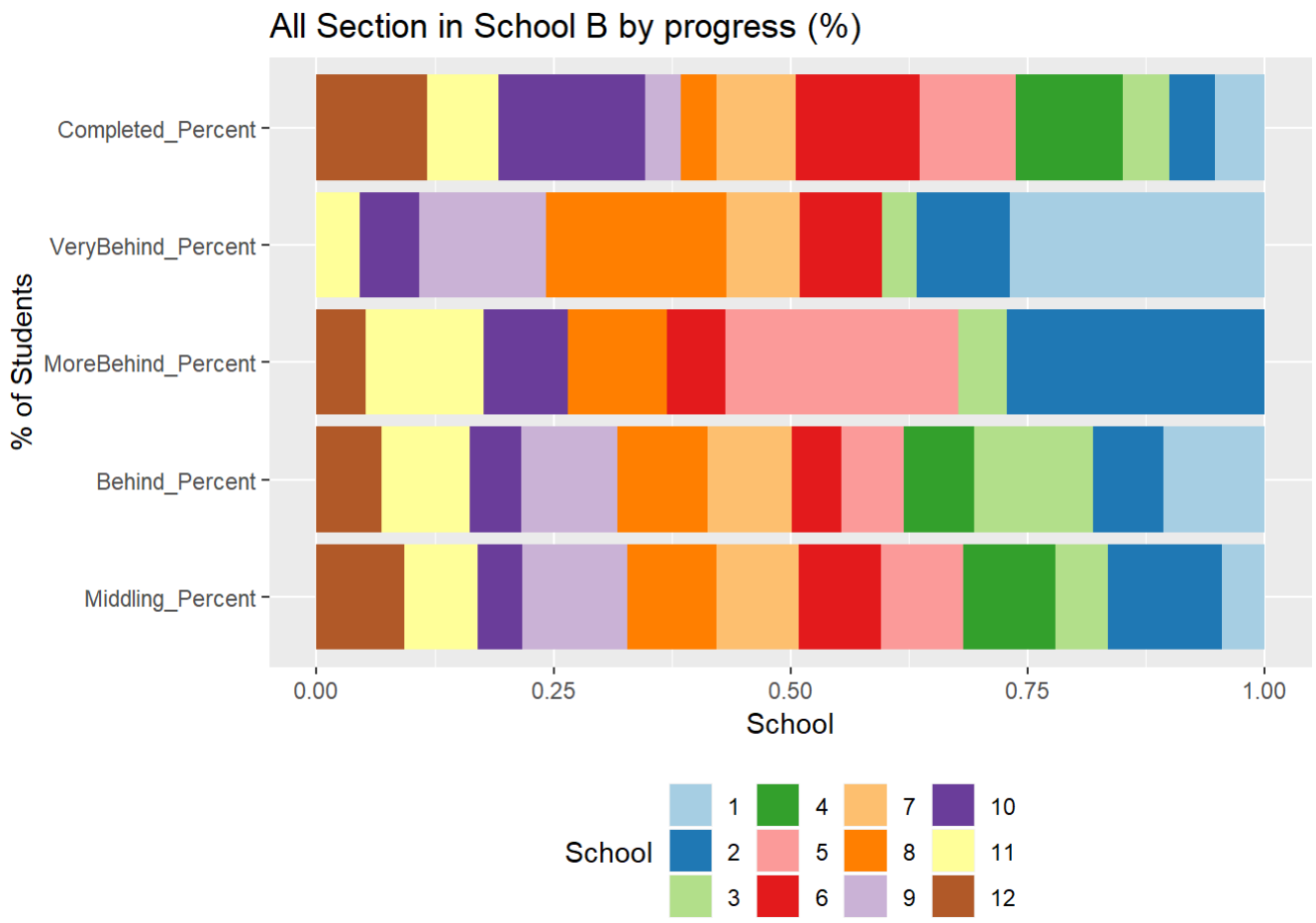

```
# Plot all school by progress . Filter the melted data only for percentage

# trying to place value in the stacked bar and not able to make it working
# AllProgressbySchool$value/sum(AllProgressbySchool[which(AllProgressbySchool$variable==AllProgr
essbySchool$variable),"value"])
#table(AllProgressbySchool$variable)

ggplot(data = AllProgressbySchool,aes(x=variable,y=value,fill=factor(School, levels=c("A","B",
"C","D","E"))
                                      )) +
  geom_bar(stat="identity",position = "fill")+
  labs (y="School",x="% of Students",title = "All school  by progress in %",fill="School" ) +
  theme(legend.position = "bottom")  +
  coord_flip()
```



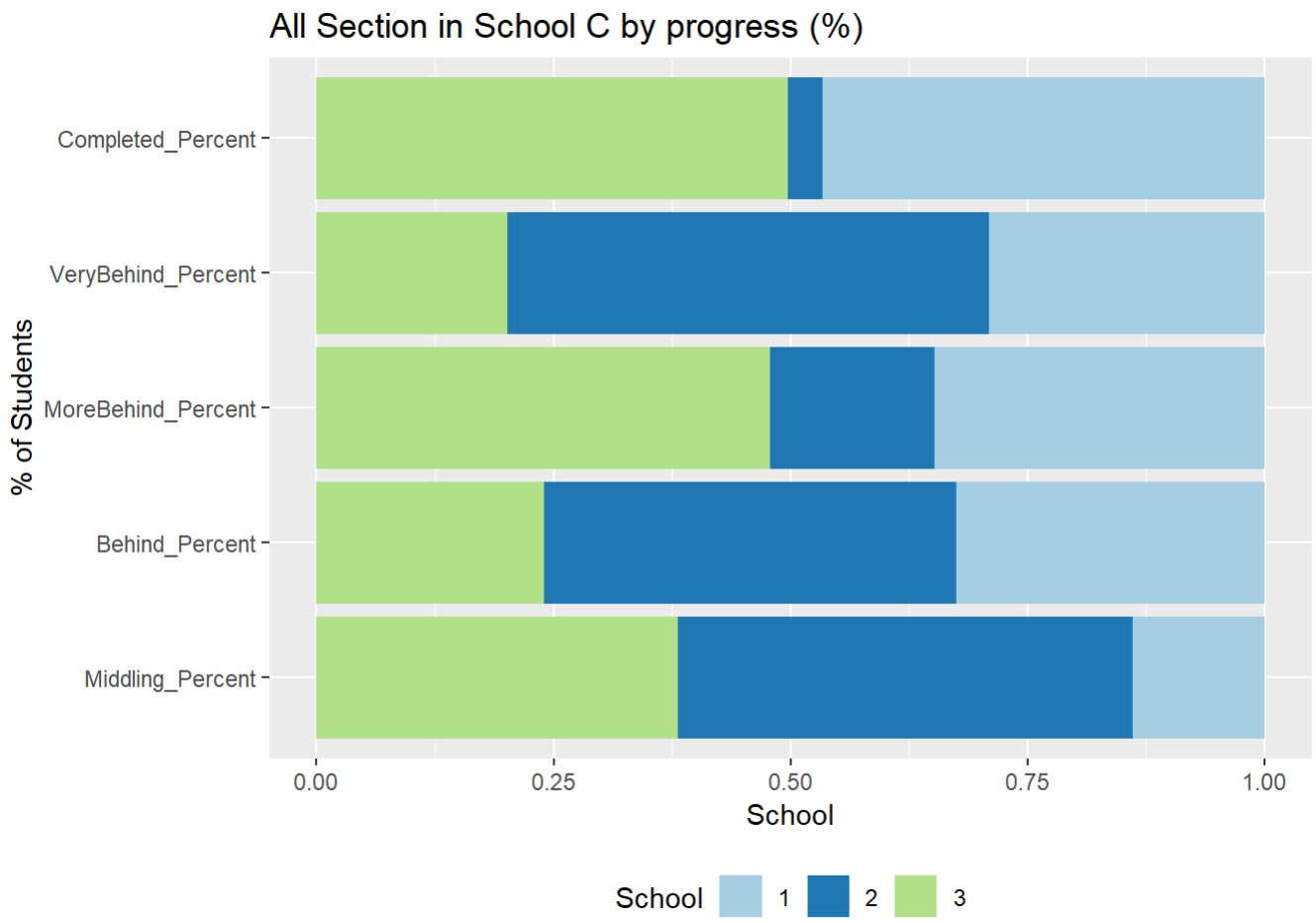

```
# +  geom_text(aes(label = value,y=rescale(value, to = c(0, 1), from = range(value, na.rm = TRU
E, finite = TRUE))/4), size = 3, hjust = 0.5, vjust = 3, position =     "stack")

# Plot all Section in School A by progress

# Barplot using RColorBrewer
# barplot(c(1:12), col=brewer.pal(12,"Paired"))
# barplot(c(1:30),col=c(brewer.pal(12,"Paired"),brewer.pal(9,"Pastel1"),brewer.pal(9,"Set1")))

ggplot(data = AllProgressbySection[which(AllProgressbySection$School=="A"),],aes(x=variable,y=va
lue,fill=factor(Section, levels=c(1:13))
)) +
  geom_bar(stat="identity",position = "fill" )+
  labs (y="School",x="% of Students",title = "All Section in School A by progress (%)",fill="Sch
ool" ) +
  theme(legend.position = "bottom")  +
  coord_flip() + scale_fill_manual(values=c(brewer.pal(12,"Paired"),"#7D7D7D"))
```



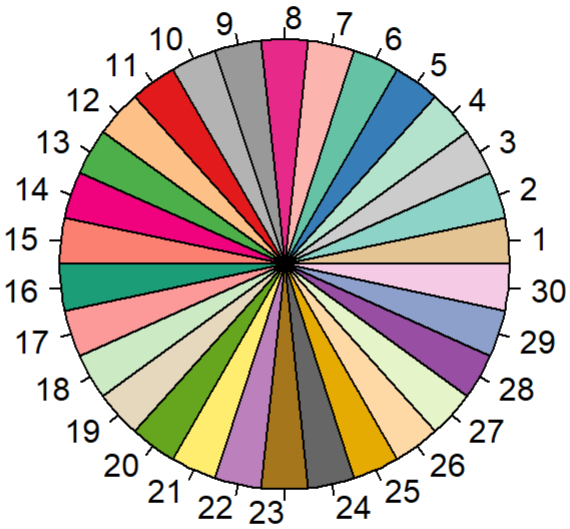

```
# Plot all Section in School B by progress

ggplot(data = AllProgressbySection[which(AllProgressbySection$School=="B"),],aes(x=variable,y=va
lue,fill=factor(Section, levels=c(1:12))
)) +
  geom_bar(stat="identity",position = "fill" )+
  labs (y="School",x="% of Students",title = "All Section in School B by progress (%)",fill="Sch
ool" ) +
  theme(legend.position = "bottom")  +
  coord_flip() + scale_fill_manual(values=c(brewer.pal(12,"Paired")))
```



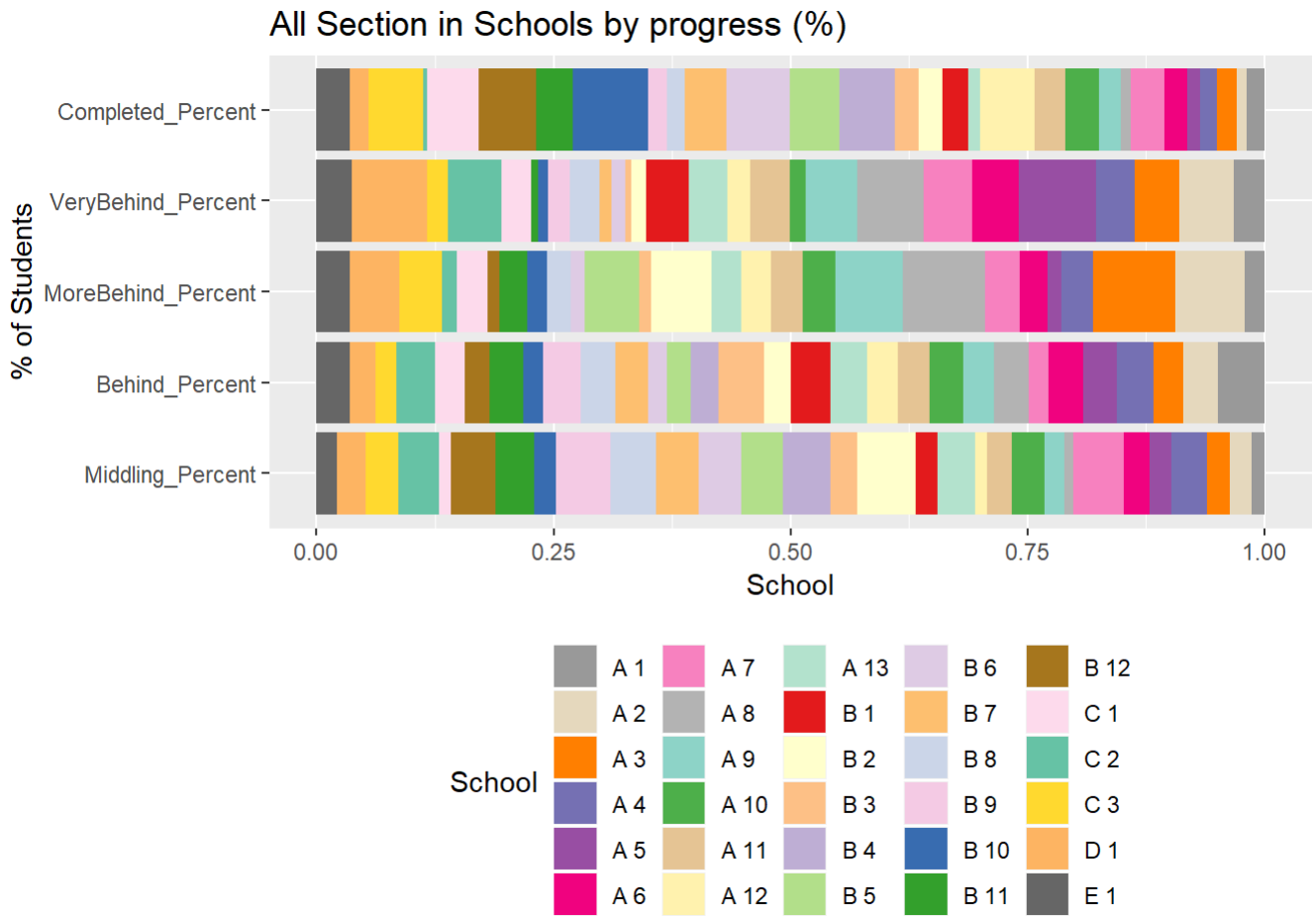

```
# Plot all Section in School C by progress

ggplot(data = AllProgressbySection[which(AllProgressbySection$School=="C"),],aes(x=variable,y=va
lue,fill=factor(Section, levels=c(1:12))
)) +
  geom_bar(stat="identity",position = "fill" )+
  labs (y="School",x="% of Students",title = "All Section in School C by progress (%)",fill="Sch
ool" ) +
  theme(legend.position = "bottom")  +
  coord_flip() + scale_fill_manual(values=c(brewer.pal(3,"Paired")))
```




```
# Plot all Section in School by progress
# Generating 30 distinct colors to represent
n <- 30
qual_col_pals = brewer.pal.info[brewer.pal.info$category == 'qual',]
col_vector = unlist(mapply(brewer.pal, qual_col_pals$maxcolors, rownames(qual_col_pals)))
pie(rep(1,n), col=sample(col_vector, n))
```




```
ggplot(data = AllProgressbySection,aes(x=variable,y=value,fill=factor(SchoolSection, levels=uniq
ue(c(AllProgressbySection$SchoolSection)))
)) +
  geom_bar(stat="identity",position = "fill" )+
  labs (y="School",x="% of Students",title = "All Section in Schools by progress (%)",fill="Scho
ol" ) +
  theme(legend.position = "bottom")  +
  coord_flip() +
  #scale_fill_manual(values=c(brewer.pal(12,"Paired"),brewer.pal(9,"Pastel1"),brewer.pal(9,"Set
1")))
  scale_fill_manual(values=sample(col_vector, n))
```


All Section in Schools by progress (%)
Completed_Percent
VeryBehind_Percent
MoreBehind_Percent
Behind_Percent
Middling_Percent
% of Students
0.00
0.25
0.50
0.75
1.00
School
School
A 1
A 2
A 3
A 4
A 5
A 6
A 7
A 8
A 9
A 10
A 11
A 12
A 13
B 1
B 2
B 3
B 4
B 5
B 6
B 7
B 8
B 9
B 10
B 11
B 12
C 1
C 2
C 3
D 1
E 1