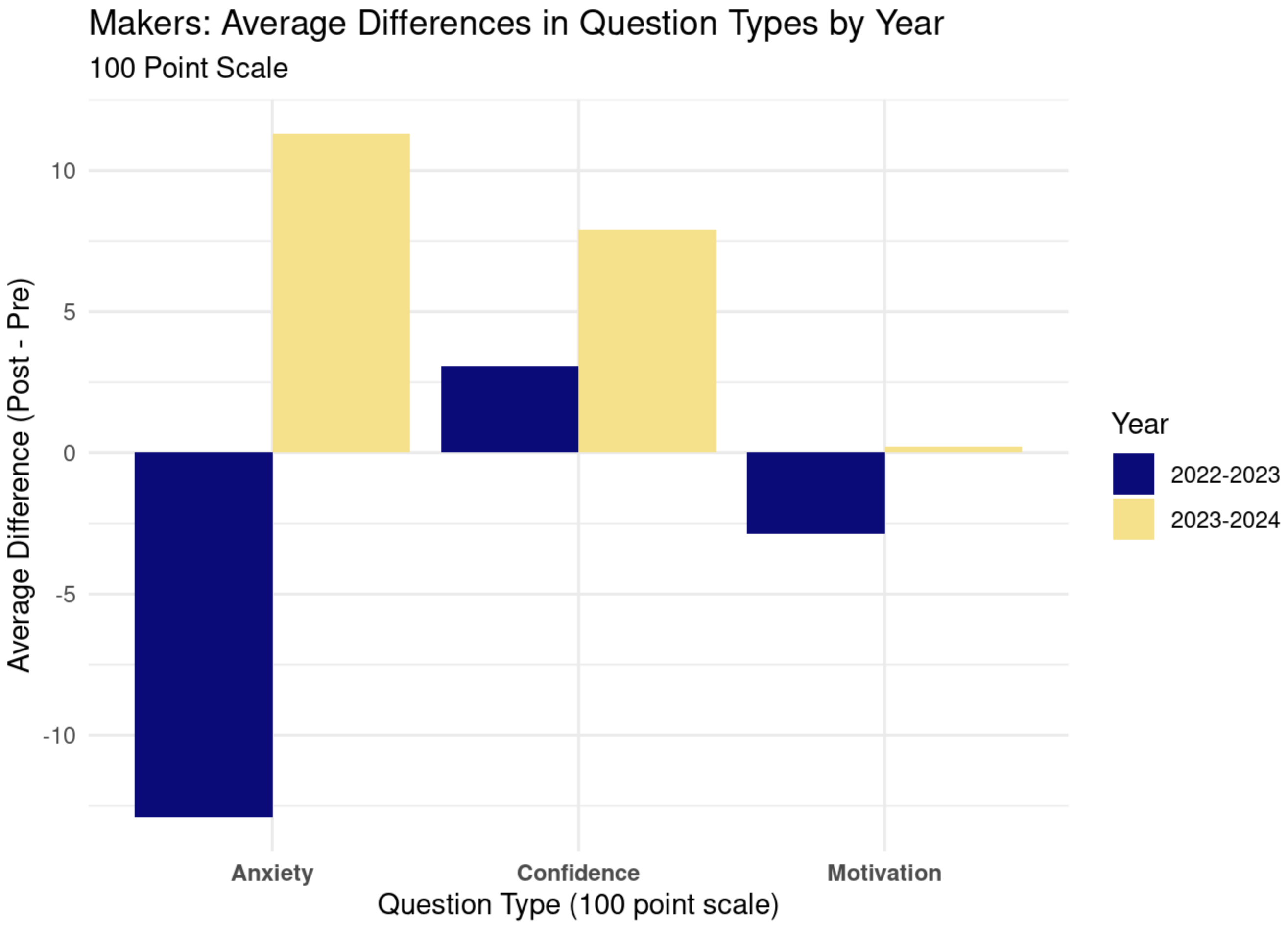
```
── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──
✔ dplyr     1.1.4     ✔ readr     2.1.5
✔ forcats   1.0.0     ✔ stringr   1.5.1
✔ ggplot2   3.5.1     ✔ tibble    3.2.1
✔ lubridate 1.9.3     ✔ tidyr     1.3.1
✔ purrr     1.0.2
── Conflicts ────────────────────────────────────────── tidyverse_conflicts() ──
✖ dplyr::filter() masks stats::filter()
✖ dplyr::lag()    masks stats::lag()
ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to
become errors
New names:
```

```r
scores_makers <- scores_makers[-c(34:37), ]

learners <- learners |>
  mutate(Year = recode(Year,`2022` = "2021-2022", `2023` = "2022-2023", `2024` =
```

```r
# Define the function to calculate attendance or mark as NA
calculate_attendance <- function(row) {
  row_trimmed <- str_trim(row)  # Trim whitespace from each element in the row
  row_lower <- tolower(row_trimmed)
  if (any(row_lower %in% c("dropped", "removed", "absent/dropped", "dropped ")))
    return(NA)
  } else {
    present_weeks <- sum(row_lower == 'x')
    return ((present_weeks / 6) * 100)
  }
}

# Apply the function to each row of the selected weeks and create a new column fo
learners <- learners |>
  rowwise() |>
  mutate(Attendance_Percentage = calculate_attendance(c_across(`Wk 2`:`_Post- Sur
  ungroup() |>
  relocate(Attendance_Percentage)

learners$Attendance_Percentage <- ifelse(is.na(learners$Attendance_Percentage), "
```

```r
scores_makers <- scores_makers |>
  mutate(Year = recode(Year,
                       '2023' = '2022-2023',
                       '2024' = '2023-2024'))

scores_makers <- scores_makers |>
  rowwise() |>
  mutate(pre_confidence_avg = mean(c_across(starts_with("pre_confidence")), na.rm
         pre_motivation_avg = mean(c_across(starts_with("pre_motivation")), na.rm
         pre_anxiety_avg = mean(c_across(starts_with("pre_anxiety")), na.rm = TRU
         post_confidence_avg = mean(c_across(starts_with("post_confidence")), na.
         post_motivation_avg = mean(c_across(starts_with("post_motivation")), na.
         post_anxiety_avg = mean(c_across(starts_with("post_anxiety")), na.rm = T
  ungroup()


scores_makers <- scores_makers |>
  mutate(
    diff_total_confidence = ifelse(is.na(pre_confidence_avg) | is.na(post_confide
    diff_total_motivation = ifelse(is.na(pre_motivation_avg) | is.na(post_motivat
    diff_total_anxiety = ifelse(is.na(pre_anxiety_avg) | is.na(post_anxiety_avg),
  )

scores_makers_graph <- scores_makers |>
  pivot_longer(cols = starts_with("diff"),
               names_to = "QuestionType",
               values_to = "Difference")

average_data <- scores_makers_graph |>
  group_by(Year, QuestionType) |>
  summarize(AverageDifference = mean(Difference, na.rm = TRUE), .groups = 'drop')

custom_colors <- c("2022-2023" = "#0e0c7c", "2023-2024" = "#f8e48c")

question_type_names <- c("diff_total_anxiety" = "Anxiety",
                         "diff_total_confidence" = "Confidence",
                         "diff_total_motivation" = "Motivation")

# Add a new column with custom question type names
average_data <- average_data |>
  mutate(QuestionTypeLabel = question_type_names[QuestionType])

# Filter out NA values before plotting
average_data_filtered <- average_data |>
  filter(!is.na(AverageDifference))

ggplot(average_data_filtered, aes(x = QuestionTypeLabel, y = AverageDifference, f
  geom_bar(stat = "identity", position = "dodge") +
  labs(title = "Makers: Average Differences in Question Types by Year",
       x = "Question Type (100 point scale)",
       y = "Average Difference (Post - Pre)",
       fill = "Year",
       subtitle = "100 Point Scale") +
  scale_fill_manual(values = custom_colors) +
  theme_minimal() +
  theme(axis.text.x = element_text(face = "bold"), margin = margin(t = 10))
```



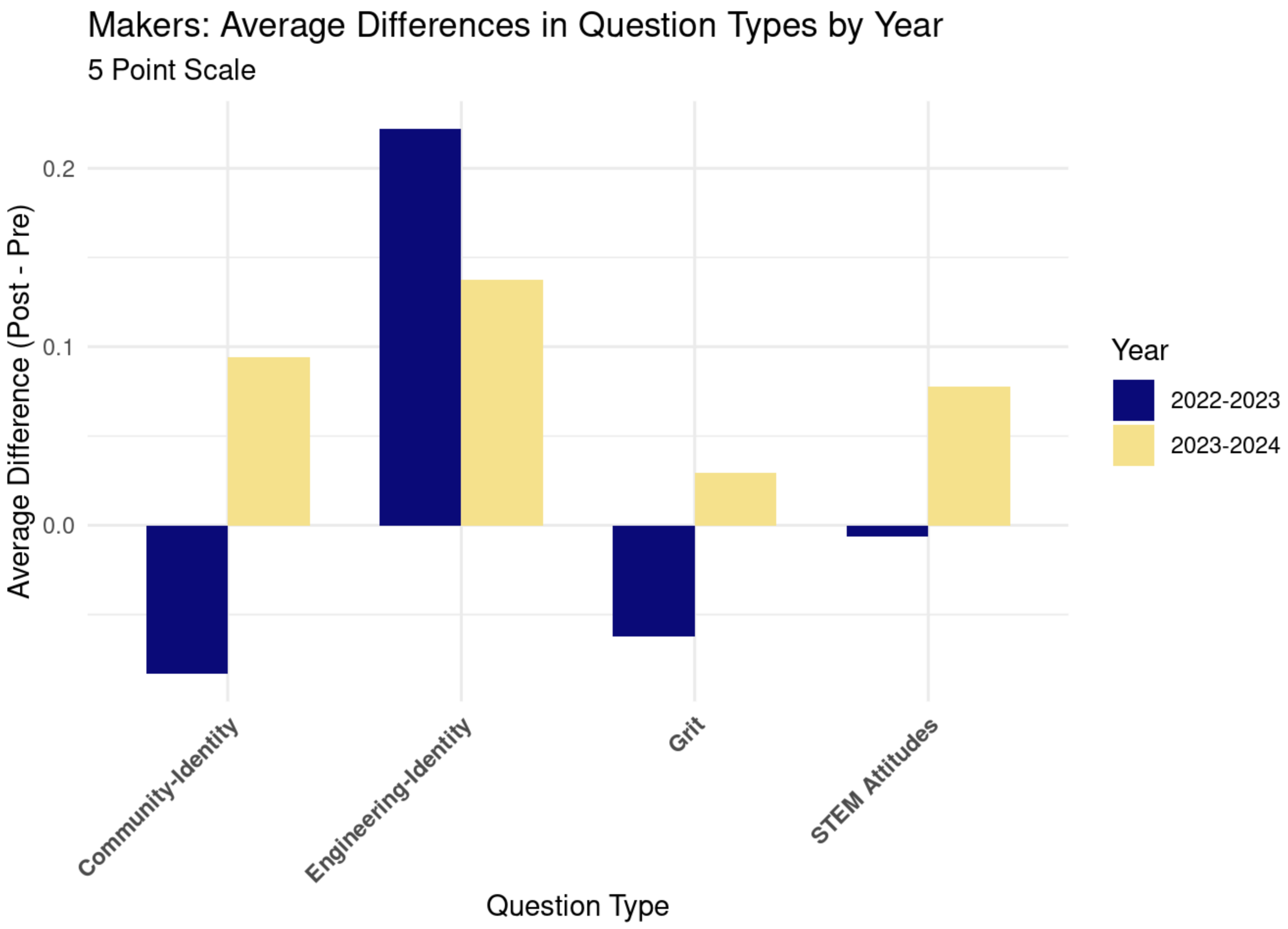
```
    scores_learners <- learners

    calculate_averages_and_differences <- function(data, pre_columns, post_columns) {
      data <- data |>
        rowwise() |>
        mutate(
          pre_community_avg = mean(c_across(all_of(pre_columns$community)), na.rm = T
          pre_stem_avg = mean(c_across(all_of(pre_columns$stem)), na.rm = TRUE),
          pre_engineering_avg = mean(c_across(all_of(pre_columns$engineering)), na.rm
          pre_grit_avg = mean(c_across(all_of(pre_columns$grit)), na.rm = TRUE),
          post_community_avg = mean(c_across(all_of(post_columns$community)), na.rm =
          post_stem_avg = mean(c_across(all_of(post_columns$stem)), na.rm = TRUE),
          post_engineering_avg = mean(c_across(all_of(post_columns$engineering)), na.
          post_grit_avg = mean(c_across(all_of(post_columns$grit)), na.rm = TRUE)
        ) |>
        ungroup() |>
        mutate(
          avg_diff_community = ifelse(is.na(pre_community_avg) | is.na(post_community
          avg_diff_stem = ifelse(is.na(pre_stem_avg) | is.na(post_stem_avg), NA, post
          avg_diff_engineering = ifelse(is.na(pre_engineering_avg) | is.na(post_engir
          avg_diff_grit = ifelse(is.na(pre_grit_avg) | is.na(post_grit_avg), NA, post
        )
```

```
  return(data)
}

# Define the pre and post columns
pre_columns <- list(
  community = c('pre_science_math_community', 'pre_STEM_world', 'pre_capable_buil
  stem = c('pre_confident_math', 'pre_oppurtunity_math', 'pre_career_math', 'pre_
  engineering = c('pre_career_science', 'pre_confident_engineer', 'pre_design_thi
  grit = c('pre_STEM_community', 'pre_STEM_world', 'pre_community_motivation', 'p
)

post_columns <- list(
  community = c('post_science_math_community', 'post_STEM_world', 'post_capable_b
  stem = c('post_confident_math', 'post_oppurtunity_math', 'post_career_math', 'p
  engineering = c('post_career_science', 'post_confident_engineer', 'post_design_
  grit = c('post_STEM_community', 'post_STEM_world', 'post_community_motivation',
)

# Apply the function to scores_learners and scores_makers
scores_learners <- calculate_averages_and_differences(scores_learners, pre_columr
scores_makers <- calculate_averages_and_differences(scores_makers, pre_columns, p
```

```
scores_makers_2 <- scores_makers |>
  pivot_longer(cols = starts_with("avg"),
               names_to = "QType",
               values_to = "Difference")

scores_makers_2 <- scores_makers_2 |>
  group_by(Year, QType) |>
  summarize(AverageDifference = mean(Difference, na.rm = TRUE))
```

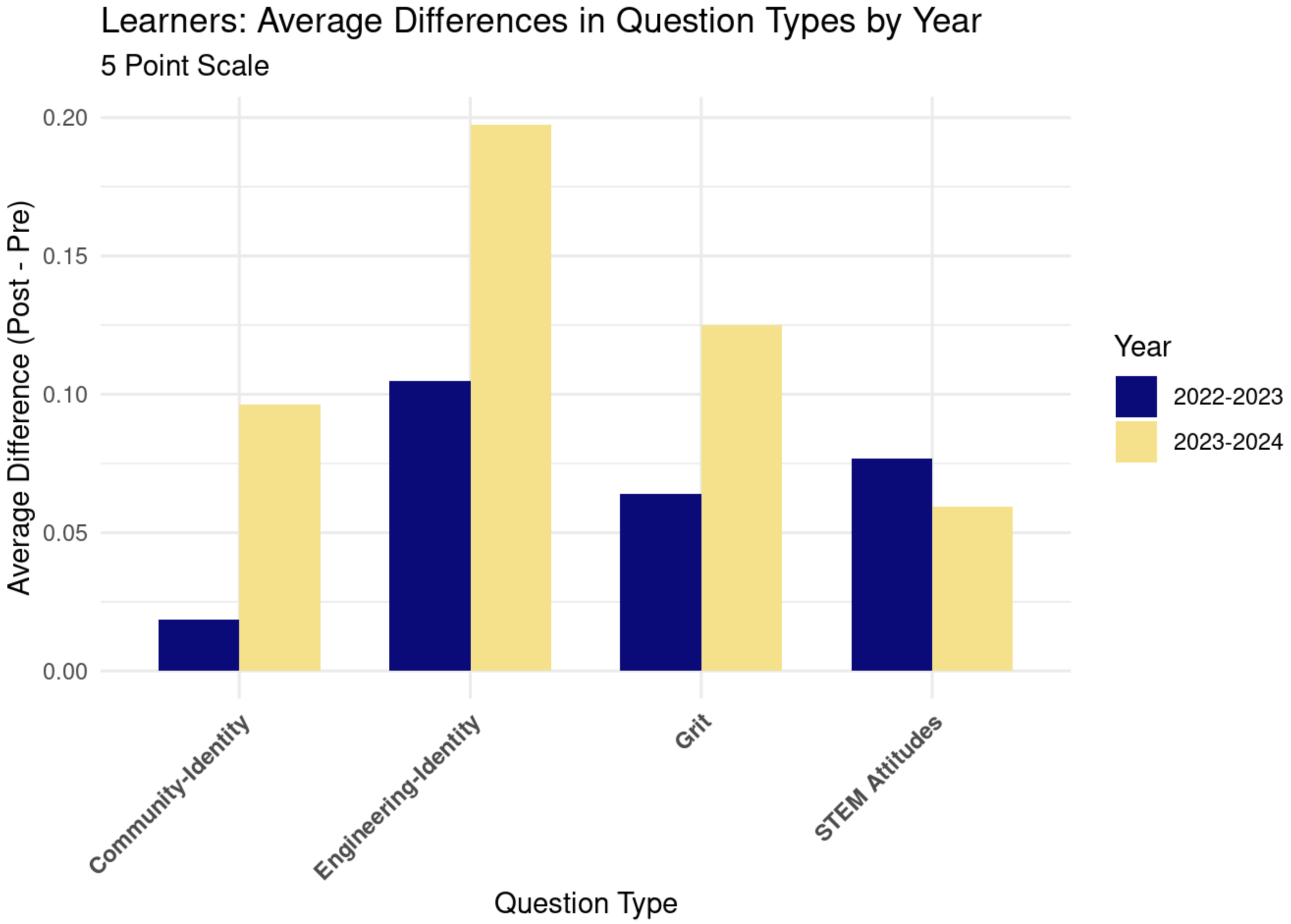
```
`summarise()` has grouped output by 'Year'. You can override using the
`.groups` argument.
```

```
custom_colors <- c("2022-2023" = "#0e0c7c", "2023-2024" = "#f8e48c")

question_type_names <- c("avg_diff_community" = "Community-Identity",
                         "avg_diff_stem" = "STEM Attitudes",
                         "avg_diff_engineering" = "Engineering-Identity",
                         "avg_diff_grit" = "Grit"
                         )

# Add a new column with custom question type names
scores_makers_2 <- scores_makers_2 |>
  mutate(QuestionTypeLabel = question_type_names[QType])

ggplot(scores_makers_2, aes(x = QuestionTypeLabel, y = AverageDifference, fill = 
  geom_bar(stat = "identity", position = position_dodge(width = 0.7), width = 0.7
  labs(title = "Makers: Average Differences in Question Types by Year",
       x = "Question Type",
       y = "Average Difference (Post - Pre)",
       fill = "Year",
       subtitle = "5 Point Scale") +
  scale_fill_manual(values = custom_colors) +
  theme_minimal() +
  theme(axis.text.x = element_text(face = "bold", angle = 45, hjust = 1))
```



```
scores_learners_select <- scores_learners |>
  select(ID, Year, starts_with("avg"), starts_with("pre"), starts_with("post"))

# Pivoting longer
scores_learners_2 <- scores_learners |>
  pivot_longer(cols = starts_with("avg"),
               names_to = "QType",
               values_to = "Difference")

# Summarizing data
scores_learners_2 <- scores_learners_2 |>
  group_by(Year, QType) |>
  summarize(AverageDifference = mean(Difference, na.rm = TRUE), .groups = 'drop')

scores_learners_2 <- scores_learners_2 |>
```

```
  filter(Year %in% c('2022-2023', '2023-2024'))

scores_learners_2 <- scores_learners_2 |>
  complete(Year, QType, fill = list(AverageDifference = 0))

# Define custom colors
custom_colors <- c("2022-2023" = "#0e0c7c", "2023-2024" = "#f8e48c")

# Define custom question type names
question_type_names <- c("avg_diff_community" = "Community-Identity",
                         "avg_diff_stem" = "STEM Attitudes",
                         "avg_diff_engineering" = "Engineering-Identity",
                         "avg_diff_grit" = "Grit")

# Adding new column with custom question type names
scores_learners_2 <- scores_learners_2 |>
  mutate(QuestionTypeLabel = recode(QType, !!!question_type_names))

# Ensure all combinations of Year and QType are present
complete_data <- scores_learners_2 |>
  complete(Year, QType, fill = list(AverageDifference = 0))

# Plotting
ggplot(complete_data, aes(x = QuestionTypeLabel, y = AverageDifference, fill = as
  geom_bar(stat = "identity", position = position_dodge(width = 0.7), width = 0.7
  labs(title = "Learners: Average Differences in Question Types by Year",
       x = "Question Type",
       y = "Average Difference (Post - Pre)",
       fill = "Year",
       subtitle = "5 Point Scale") +
  scale_fill_manual(values = custom_colors) +
  theme_minimal() +
  theme(axis.text.x = element_text(face = "bold", angle = 45, hjust = 1))
```


Learners: Average Differences in Question Types by Year
5 Point Scale
Average Difference (Post - Pre)
0.20
0.15
0.10
0.05
0.00
Community-Identity
Engineering-Identity
Grit
STEM Attitudes
Question Type
Year
2022-2023
2023-2024