Importance of open source

Overview

This script creates bar plots from question 2 on the survey, which is about the perceived importance of open source for different job categories and different tasks.

Import packages and utilities

```r
project_root <- here::here() # requires that you be somewhere in the
# project directory (not above it)
# packages
suppressMessages(source(file.path(project_root, "scripts/packages.R")))
# functions and objects used across scripts
suppressMessages(source(file.path(project_root, "scripts/utils.R")))
```

Define functions

get_percent_more_than_moderate

- Arguments:
  - `df`: A data frame with a column named 'importance_level'. Should contain only rows that you want to count. Extra columns is okay.
- Details:
  - A simple function to count what percent of rows in a data frame have an importance_level of more than 'Moderately important'. Checks that there are no extra rows with an unexpected value in the importance_level column.

- Outputs:
  - A scalar value representing the percentage of respondents who selected an importance_level of more than 'Moderately important', rounded to 2 decimal places.

```r
get_percent_more_than_moderate <- function(df) {
  # check that df has the required column
  if (!"importance_level" %in% names(df)) {
    stop("`df` must have a column named 'importance_level'.")
  }

  high_importance_cats <- c(
    "Very important",
    "Important"
  )
  low_importance_cats <- c(
    "Moderately important",
    "Slightly important",
    "Not at all important"
  )

  n_high_rows <- nrow(df$importance_level %in% high_importance_cats)
  n_low_rows <- nrow(df$importance_level %in% low_importance_cats)
  total <- nrow(df)
  if (n_high_rows + n_low_rows != total) {
    stop("`df` has at least one unexpected value in 'importance_level'.")
  }
  pct <- round(n_high_rows / total, 2)
  return(pct)
}
```

Load data

```r
data <- load_qualtrics_data("deidentified_no_qual.tsv")
```

Wrangle data

Let's extract the columns we care about.

```r
importance_and_job <- data %>%
  select(
    starts_with("importance_opensrc") | starts_with("job_category")
  )
head(importance_and_job)
```

```
  importance_opensrc_1 importance_opensrc_2 importance_opensrc_3
1       Very important       Very important       Very important
2       Very important Moderately important            Important
3       Very important       Very important       Very important
4       Very important   Slightly important            Important
5       Very important            Important       Very important
6       Very important       Non-applicable            Important
  importance_opensrc_4 importance_opensrc_5
1       Very important       Very important
2            Important       Non-applicable
3       Very important       Non-applicable
4            Important       Non-applicable
5       Very important       Non-applicable
6            Important       Non-applicable
                                                                 job_category
1                                                                     Faculty
2                                                                    Post-Doc
3 Other research staff (e.g., research scientist, research software engineer)
4                                                                     Faculty
5                                                                     Faculty
6 Other research staff (e.g., research scientist, research software engineer)
```

Let's reshape the data from wide to long format.

```r
long_data <- importance_and_job %>%
  pivot_longer(
    cols = starts_with("importance_opensrc"),
    names_to = "importance_area",
    values_to = "importance_level"
  )

long_data <- long_data %>%
  mutate(
    importance_area = recode(
      importance_area,
      "importance_opensrc_1" = "Research",
      "importance_opensrc_2" = "Teaching",
      "importance_opensrc_3" = "Learning",
      "importance_opensrc_4" = "Professional Development",
      "importance_opensrc_5" = "Job"
    )
  )
long_data
```

```
# A tibble: 1,660 x 3
   job_category importance_area          importance_level
   <chr>        <chr>                    <chr>
 1 Faculty      Research                 Very important
 2 Faculty      Teaching                 Very important
 3 Faculty      Learning                 Very important
 4 Faculty      Professional Development Very important
 5 Faculty      Job                      Very important
 6 Post-Doc     Research                 Very important
 7 Post-Doc     Teaching                 Moderately important
 8 Post-Doc     Learning                 Important
 9 Post-Doc     Professional Development Important
10 Post-Doc     Job                      Non-applicable
# i 1,650 more rows
```

STOP!!! At this point, I manually compared this data frame to the results table in Qualtrics to make sure the columns (e.g. `importance_opensrc_1`) correspond to the options I expect (e.g. “Research”). I had to use peoples’ email addresses to make sure I was comparing the same rows in each table. I assumed that the variables were ordered by their order on the survey, but you never know. In this case, my assumption was correct. I’ve commented out the code for this because it only needed to be done once.

```
# pii <- load_qualtrics_data("pii.tsv")
# emails <- pii %>%
#   select(starts_with("stay_in_touch_email"))

# t <- cbind(emails, importance_and_job)
# subset(t, startsWith(stay_in_touch_email, "PERSONNAMEHERE"))
```

Back to data wrangling.

Here, I removed all rows that contain an empty string in any column. Since both questions were mandatory, I’m actually only removing people who never saw the demographic questions:

people who are not affiliated with UC (2) + people who are neither past nor future open source contributors (36). (2+36)*5 importance areas = 190 rows removed.

```r
dim(long_data)
```

```
[1] 1660    3
```

```r
long_data <- long_data %>%
  filter(!if_any(everything(), ~ . == ""))

dim(long_data)
```

```
[1] 1470    3
```

Shorten this one long category name. `Other research staff (e.g., research scientist, research software engineer)` becomes simply `Other`.

```r
long_data$job_category <- gsub(
  "^Other.*",
  "Research Staff",
  long_data$job_category
)
```

Reorder factor levels for plotting.

```r
long_data$importance_level <- factor(
  long_data$importance_level,
  levels = c(
    "Very important",
    "Important",
    "Moderately important",
    "Slightly important",
    "Not at all important",
    "Non-applicable"
  ),
  ordered = TRUE
)
long_data
```

```
# A tibble: 1,470 x 3
   job_category importance_area          importance_level
   <chr>        <chr>                    <ord>
 1 Faculty      Research                 Very important
 2 Faculty      Teaching                 Very important
 3 Faculty      Learning                 Very important
 4 Faculty      Professional Development Very important
 5 Faculty      Job                      Very important
 6 Post-Doc     Research                 Very important
 7 Post-Doc     Teaching                 Moderately important
 8 Post-Doc     Learning                 Important
 9 Post-Doc     Professional Development Important
10 Post-Doc     Job                      Non-applicable
# i 1,460 more rows
```

Bar plots

Simple bar plot for teachers

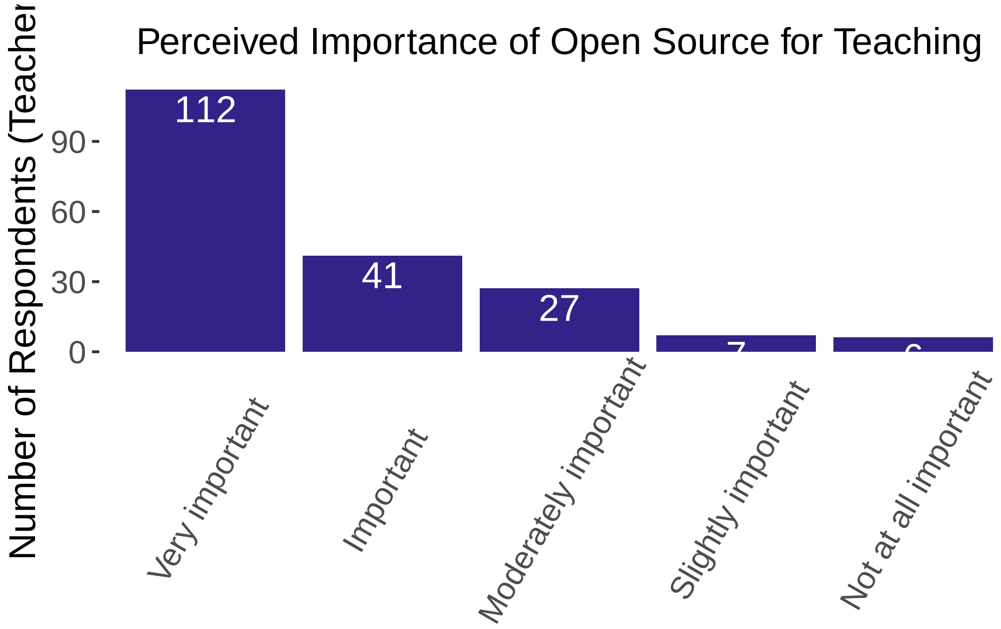
Now let's start making some bar plots. Let's start by making a bar plot showing how teachers rate the importance of open source for their teaching. Since we didn't ask people "Do you teach?", and since there was a "Non-applicable" option, we will simply assume that if they gave an answer for the "Teaching" option, they must be a teacher.

```r
teaching <- long_data %>%
  filter(
    importance_area == "Teaching"
  ) %>%
  filter(
    importance_level != "Non-applicable"
  )

# For our bar plot, we only care about how many times each 'importance level' was selected.
teaching_to_plot <- teaching %>% select(-c(job_category, importance_area))

teaching_to_plot <- teaching_to_plot %>%
  count(importance_level, name = "Counts")

# By sheer luck, the columns are already ordered by response rates.
teaching_to_plot
```

```
# A tibble: 5 x 2
  importance_level     Counts
  <ord>                 <int>
1 Very important          112
2 Important                41
3 Moderately important     27
4 Slightly important        7
5 Not at all important      6
```

Now let's make that bar chart using a function that lives in my utilities script (`scripts/utils.R`).

```r
basic_bar_chart(
  teaching_to_plot,
  x_var = "importance_level",
  y_var = "Counts",
  title = "Perceived Importance of Open Source for Teaching",
  ylabel = "Number of Respondents (Teachers Only)",
  show_bar_labels = TRUE
)
```



Save the plot using a function that lives in my utilities script (`scripts/utils.R`).

```
#save_plot("importance_teachers.tiff", 8, 5)
```

Finally, let's check what percentage of teachers said OS is more than moderately important for their teaching.

```
teaching_high <- teaching %>%
  filter(
    importance_level == "Very important" |
      importance_level == "Important"
  )

teaching_low <- teaching %>%
  filter(
    importance_level == "Moderately important" |
      importance_level == "Slightly important" |
      importance_level == "Not at all important"
  )
nrow(teaching_high)
```

```
[1] 153
```

```
nrow(teaching_low)
```

```
[1] 40
```

```
nrow(teaching)
```

```
[1] 193
```

```
round(nrow(teaching_high) / nrow(teaching) * 100, 2)
```

```
[1] 79.27
```

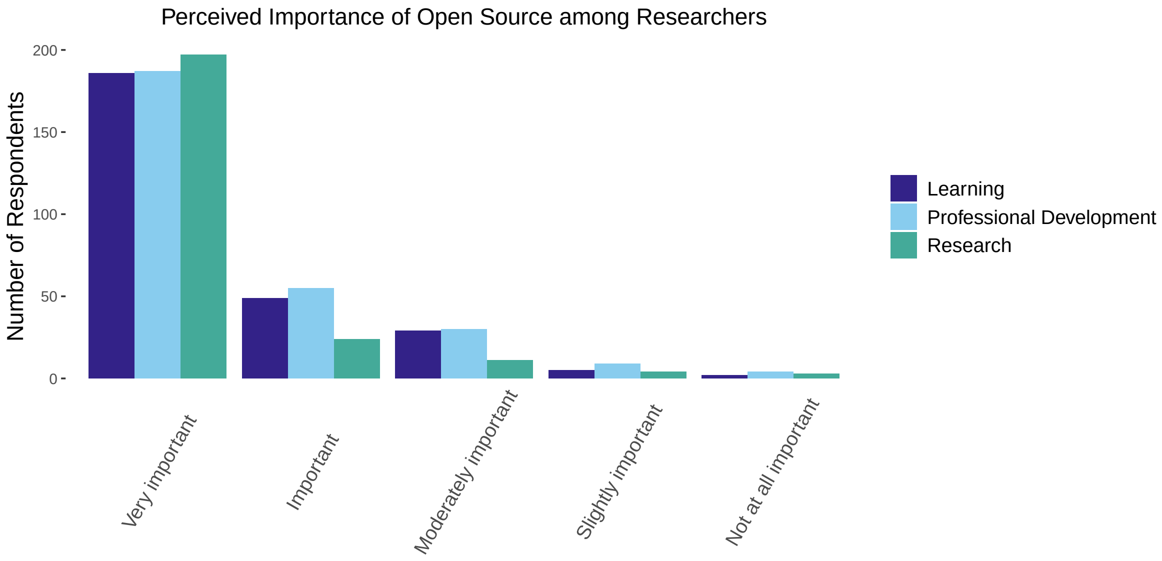
Grouped bar plot for researchers

Now let’s look at researchers, and the importance categories that apply to all researchers. The importance categories again are:
Research
Teaching –> Does not apply
Learning
Professional Development
Job (For non-research staff) –> Does not apply

So we’ll make a bar plot with just those three categories that apply to all researchers. As with teachers above, we will assume that if they didn’t select “Non-applicable”, they must be a researcher.

The `grouped_bar_chart` function, like the `basic_bar_chart` function, lives in my utility script.

```r
research_learning_pd <- long_data %>%
  filter(
    importance_area == "Research" |
      importance_area == "Learning" |
      importance_area == "Professional Development"
  ) %>%
  filter(importance_level != "Non-applicable")

grouped_bar_chart(
  df = research_learning_pd,
  x_var = "importance_level",
  fill_var = "importance_area",
  title = "Perceived Importance of Open Source among Researchers"
)
```



```
#save_plot("importance_researchers.tiff", 10, 5)
```

Finally, let's check what percentage of researchers said OS is more than moderately important for their research.

```
research <- research_learning_pd %>%
  filter(
    importance_area == "Research"
  )
research_high <- research %>%
  filter(
    importance_level == "Very important" |
    importance_level == "Important"
  )

teaching_low <- teaching %>%
  filter(
    importance_level == "Moderately important" |
    importance_level == "Slightly important" |
    importance_level == "Not at all important"
  )
nrow(teaching_high)
```

```
[1] 153
```

```r
nrow(teaching_low)
```

```
[1] 40
```

```r
nrow(teaching)
```

```
[1] 193
```

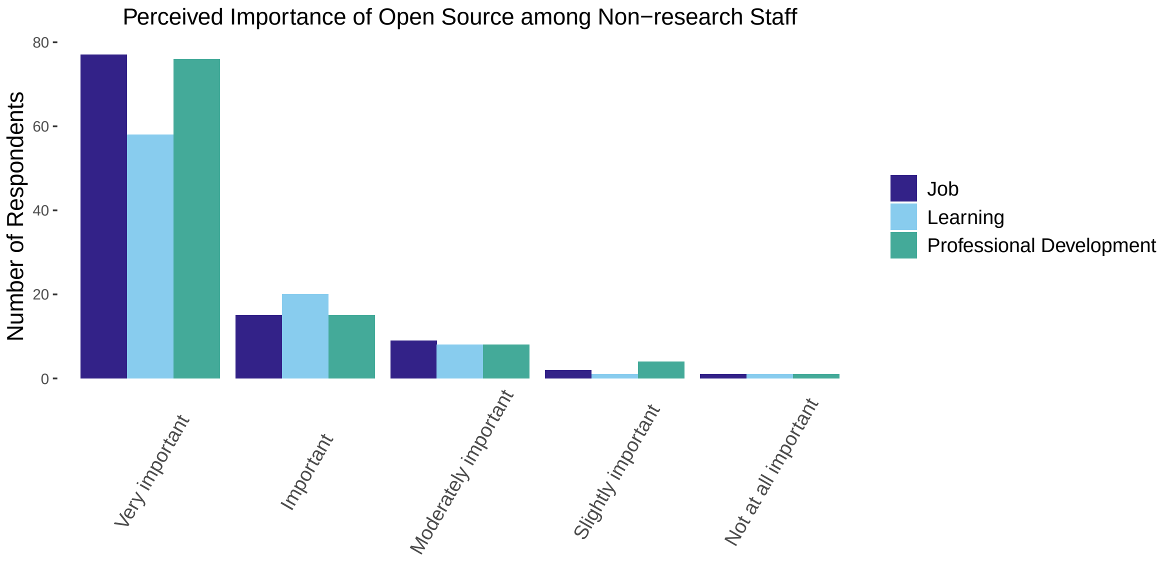
```r
round(nrow(teaching_high)/nrow(teaching)*100, 2)
```

```
[1] 79.27
```

Grouped bar plot for non-research staff

This is very similar to what I did above, except the three applicable categories have changed.

```r
job_learning_pd <- long_data %>%
  filter(
    importance_area == "Job" |
      importance_area == "Learning" |
      importance_area == "Professional Development"
  ) %>%
  filter(job_category == "Non-research Staff") %>%
  filter(importance_level != "Non-applicable")

grouped_bar_chart(
  df = job_learning_pd,
  x_var = "importance_level",
  fill_var = "importance_area",
  title = "Perceived Importance of Open Source among Non-research Staff"
)
```



```
#save_plot("importance_nrstaff.tiff", 10, 5)
```