

# Factor Analysis for Heidi Dickens

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## Set up:

```
data <- read.csv('~/Documents/heidi_data.csv')

## replace erroneous datapoint
data[127,]$Q1_48 <- 6
## convert column with former missing from factor to numeric
data$Q1_48 <- as.integer(data$Q1_48)

## drop irrelevant columns
CFA_data <- data[, grepl('Q1_', names(data))]

## rename columns to fit lavaan syntax
names(CFA_data) <- gsub('Q1_', 'Q', names(CFA_data))

write.csv(CFA_data, 'Heidi_CFA_data.csv')
write.csv(data, 'Heidi_CFA_data_full.csv')
```

## Option A

Define model:

```
model_A <- '
    managedChange      =~ Q5 + Q6 + Q15 + Q21 + Q26 + Q36 + Q38 + Q22 + Q29
                        + Q31 + Q35 + Q39 + Q46 + Q11 + Q20 + Q23 + Q28 + Q45
    performanceEfficacy =~ Q8 + Q2 + Q25 + Q30 + Q37 + Q47 + Q1 + Q3 + Q12
                        + Q14 + Q33 + Q40 + Q9 + Q13 + Q19 + Q27 + Q43 + Q48
    resources           =~ Q42 + Q4 + Q10 + Q18 + Q34 + Q41 + Q49
    rewards             =~ Q44 + Q7 + Q16 + Q17 + Q24 + Q32'
```

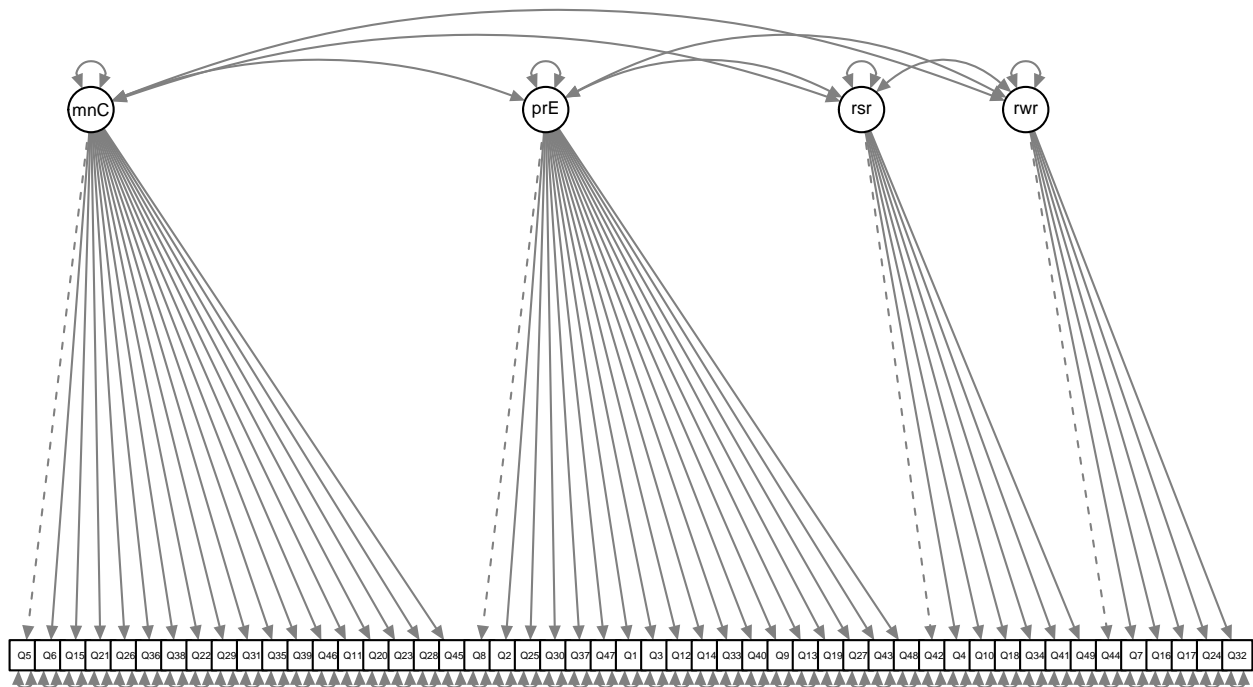
Fit model:

```
fit_A <- cfa(model_A, data = CFA_data)
```

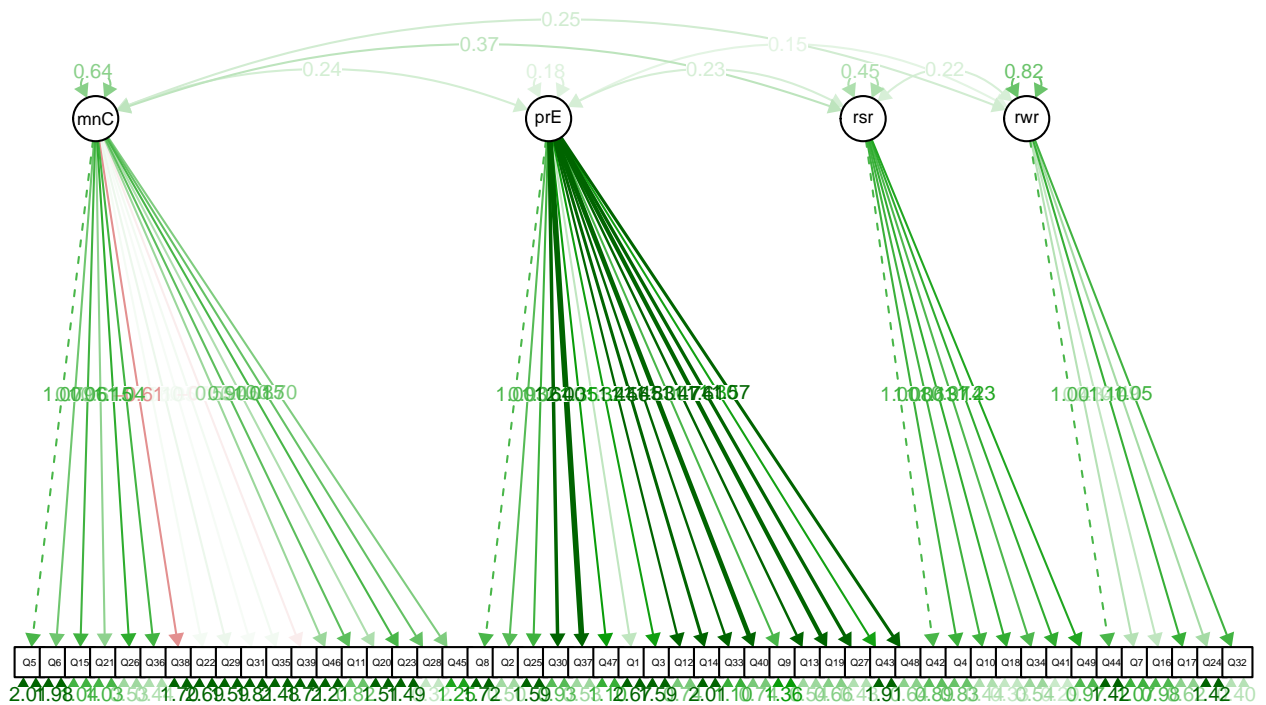
```
## Found more than one class "Model" in cache; using the first, from namespace 'lavaan'
```

Visualize model:

```
semPaths(fit_A, 'path', layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



```
semPaths(fit_A, 'est', layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



Print results:

```
summary(fit_A, fit.measures = TRUE)
```

```
## lavaan (0.5-20) converged normally after 73 iterations
##
```

```

##      Number of observations                252
##
##      Estimator                            ML
##      Minimum Function Test Statistic      2851.362
##      Degrees of freedom                   1121
##      P-value (Chi-square)                 0.000
##
## Model test baseline model:
##
##      Minimum Function Test Statistic      6064.075
##      Degrees of freedom                   1176
##      P-value                             0.000
##
## User model versus baseline model:
##
##      Comparative Fit Index (CFI)          0.646
##      Tucker-Lewis Index (TLI)            0.629
##
## Loglikelihood and Information Criteria:
##
##      Loglikelihood user model (H0)        -18350.875
##      Loglikelihood unrestricted model (H1) -16925.194
##
##      Number of free parameters            104
##      Akaike (AIC)                        36909.749
##      Bayesian (BIC)                      37276.810
##      Sample-size adjusted Bayesian (BIC)  36947.114
##
## Root Mean Square Error of Approximation:
##
##      RMSEA                               0.078
##      90 Percent Confidence Interval        0.075  0.082
##      P-value RMSEA <= 0.05                0.000
##
## Standardized Root Mean Square Residual:
##
##      SRMR                                0.104
##
## Parameter Estimates:
##
##      Information                          Expected
##      Standard Errors                      Standard
##
## Latent Variables:
##      Estimate Std.Err Z-value P(>|z|)
## managedChange =~
##      Q5        1.000
##      Q6        0.791    0.150    5.286    0.000
##      Q15       1.055    0.151    6.981    0.000
##      Q21       0.614    0.111    5.524    0.000
##      Q26       1.149    0.149    7.697    0.000
##      Q36       1.038    0.135    7.684    0.000
##      Q38      -0.612    0.130   -4.696    0.000
##      Q22       0.058    0.136    0.430    0.667

```

|    |                        |          |         |         |         |
|----|------------------------|----------|---------|---------|---------|
| ## | Q29                    | 0.103    | 0.105   | 0.981   | 0.326   |
| ## | Q31                    | 0.050    | 0.112   | 0.448   | 0.654   |
| ## | Q35                    | 0.073    | 0.131   | 0.558   | 0.577   |
| ## | Q39                    | -0.100   | 0.109   | -0.915  | 0.360   |
| ## | Q46                    | 0.552    | 0.140   | 3.953   | 0.000   |
| ## | Q11                    | 0.898    | 0.130   | 6.893   | 0.000   |
| ## | Q20                    | 0.447    | 0.115   | 3.893   | 0.000   |
| ## | Q23                    | 1.010    | 0.157   | 6.440   | 0.000   |
| ## | Q28                    | 0.854    | 0.112   | 7.635   | 0.000   |
| ## | Q45                    | 0.703    | 0.125   | 5.635   | 0.000   |
| ## | performanceEfficacy =~ |          |         |         |         |
| ## | Q8                     | 1.000    |         |         |         |
| ## | Q2                     | 0.931    | 0.219   | 4.244   | 0.000   |
| ## | Q25                    | 1.060    | 0.291   | 3.640   | 0.000   |
| ## | Q30                    | 1.641    | 0.366   | 4.480   | 0.000   |
| ## | Q37                    | 2.002    | 0.423   | 4.730   | 0.000   |
| ## | Q47                    | 1.348    | 0.319   | 4.224   | 0.000   |
| ## | Q1                     | 0.346    | 0.263   | 1.315   | 0.188   |
| ## | Q3                     | 1.315    | 0.332   | 3.964   | 0.000   |
| ## | Q12                    | 1.436    | 0.322   | 4.465   | 0.000   |
| ## | Q14                    | 1.560    | 0.386   | 4.038   | 0.000   |
| ## | Q33                    | 1.455    | 0.338   | 4.306   | 0.000   |
| ## | Q40                    | 1.826    | 0.395   | 4.620   | 0.000   |
| ## | Q9                     | 1.000    | 0.273   | 3.667   | 0.000   |
| ## | Q13                    | 1.467    | 0.320   | 4.588   | 0.000   |
| ## | Q19                    | 1.741    | 0.376   | 4.624   | 0.000   |
| ## | Q27                    | 1.609    | 0.343   | 4.688   | 0.000   |
| ## | Q43                    | 1.298    | 0.340   | 3.812   | 0.000   |
| ## | Q48                    | 1.568    | 0.343   | 4.577   | 0.000   |
| ## | resources =~           |          |         |         |         |
| ## | Q42                    | 1.000    |         |         |         |
| ## | Q4                     | 1.082    | 0.136   | 7.934   | 0.000   |
| ## | Q10                    | 1.059    | 0.120   | 8.828   | 0.000   |
| ## | Q18                    | 1.134    | 0.122   | 9.322   | 0.000   |
| ## | Q34                    | 0.974    | 0.118   | 8.276   | 0.000   |
| ## | Q41                    | 1.141    | 0.121   | 9.445   | 0.000   |
| ## | Q49                    | 1.229    | 0.152   | 8.096   | 0.000   |
| ## | rewards =~             |          |         |         |         |
| ## | Q44                    | 1.000    |         |         |         |
| ## | Q7                     | 0.406    | 0.088   | 4.641   | 0.000   |
| ## | Q16                    | 0.339    | 0.082   | 4.147   | 0.000   |
| ## | Q17                    | 1.103    | 0.123   | 8.959   | 0.000   |
| ## | Q24                    | 0.494    | 0.102   | 4.841   | 0.000   |
| ## | Q32                    | 1.045    | 0.115   | 9.070   | 0.000   |
| ## |                        |          |         |         |         |
| ## | Covariances:           |          |         |         |         |
| ## |                        | Estimate | Std.Err | Z-value | P(> z ) |
| ## | managedChange ~~       |          |         |         |         |
| ## | perfrmncEfficcy        | 0.240    | 0.063   | 3.824   | 0.000   |
| ## | resources              | 0.366    | 0.070   | 5.231   | 0.000   |
| ## | rewards                | 0.255    | 0.067   | 3.797   | 0.000   |
| ## | performanceEfficacy ~~ |          |         |         |         |
| ## | resources              | 0.234    | 0.057   | 4.064   | 0.000   |
| ## | rewards                | 0.154    | 0.045   | 3.406   | 0.001   |

```

## resources ~~
## rewards          0.218    0.054    4.009    0.000
##
## Variances:
##      Estimate Std.Err Z-value P(>|z|)
##      Q5       2.011   0.186  10.812  0.000
##      Q6       1.977   0.180  10.962  0.000
##      Q15      1.042   0.101  10.335  0.000
##      Q21      1.025   0.094  10.920  0.000
##      Q26      0.531   0.058   9.139  0.000
##      Q36      0.443   0.048   9.184  0.000
##      Q38      1.703   0.154  11.043  0.000
##      Q22      2.687   0.239  11.224  0.000
##      Q29      1.591   0.142  11.219  0.000
##      Q31      1.811   0.161  11.224  0.000
##      Q35      2.482   0.221  11.223  0.000
##      Q39      1.712   0.153  11.220  0.000
##      Q46      2.209   0.199  11.111  0.000
##      Q11      0.818   0.079  10.403  0.000
##      Q20      1.511   0.136  11.115  0.000
##      Q23      1.488   0.140  10.655  0.000
##      Q28      0.324   0.035   9.334  0.000
##      Q45      1.252   0.115  10.897  0.000
##      Q8       1.716   0.154  11.112  0.000
##      Q2       0.505   0.046  10.891  0.000
##      Q25      1.587   0.143  11.087  0.000
##      Q30      0.933   0.087  10.662  0.000
##      Q37      0.531   0.055   9.747  0.000
##      Q47      1.100   0.101  10.903  0.000
##      Q1       2.669   0.238  11.216  0.000
##      Q3       1.591   0.144  11.013  0.000
##      Q12      0.742   0.069  10.684  0.000
##      Q14      2.007   0.183  10.989  0.000
##      Q33      1.095   0.101  10.849  0.000
##      Q40      0.741   0.072  10.347  0.000
##      Q9       1.364   0.123  11.082  0.000
##      Q13      0.538   0.052  10.444  0.000
##      Q19      0.664   0.064  10.333  0.000
##      Q27      0.430   0.043  10.048  0.000
##      Q43      1.911   0.173  11.054  0.000
##      Q48      0.638   0.061  10.474  0.000
##      Q42      0.888   0.084  10.613  0.000
##      Q4       0.826   0.079  10.454  0.000
##      Q10      0.441   0.045   9.836  0.000
##      Q18      0.330   0.036   9.086  0.000
##      Q34      0.545   0.053  10.277  0.000
##      Q41      0.294   0.033   8.788  0.000
##      Q49      0.969   0.093  10.377  0.000
##      Q44      1.417   0.144   9.855  0.000
##      Q7       1.066   0.098  10.935  0.000
##      Q16      0.977   0.089  11.005  0.000
##      Q17      0.624   0.089   7.010  0.000
##      Q24      1.418   0.130  10.902  0.000
##      Q32      0.403   0.071   5.677  0.000

```

|    |                |       |       |       |       |
|----|----------------|-------|-------|-------|-------|
| ## | managedChange  | 0.643 | 0.162 | 3.964 | 0.000 |
| ## | perfrmncEffccy | 0.181 | 0.075 | 2.401 | 0.016 |
| ## | resources      | 0.447 | 0.093 | 4.812 | 0.000 |
| ## | rewards        | 0.822 | 0.169 | 4.861 | 0.000 |

Print parameter estimates

```
kable(inspect(fit_A, what = 'est')$lambda)
```

|     | managedChange | performanceEfficacy | resources | rewards |
|-----|---------------|---------------------|-----------|---------|
| Q5  | 1.000         | 0.000               | 0.000     | 0.000   |
| Q6  | 0.791         | 0.000               | 0.000     | 0.000   |
| Q15 | 1.055         | 0.000               | 0.000     | 0.000   |
| Q21 | 0.614         | 0.000               | 0.000     | 0.000   |
| Q26 | 1.149         | 0.000               | 0.000     | 0.000   |
| Q36 | 1.038         | 0.000               | 0.000     | 0.000   |
| Q38 | -0.612        | 0.000               | 0.000     | 0.000   |
| Q22 | 0.058         | 0.000               | 0.000     | 0.000   |
| Q29 | 0.103         | 0.000               | 0.000     | 0.000   |
| Q31 | 0.050         | 0.000               | 0.000     | 0.000   |
| Q35 | 0.073         | 0.000               | 0.000     | 0.000   |
| Q39 | -0.100        | 0.000               | 0.000     | 0.000   |
| Q46 | 0.552         | 0.000               | 0.000     | 0.000   |
| Q11 | 0.898         | 0.000               | 0.000     | 0.000   |
| Q20 | 0.447         | 0.000               | 0.000     | 0.000   |
| Q23 | 1.010         | 0.000               | 0.000     | 0.000   |
| Q28 | 0.854         | 0.000               | 0.000     | 0.000   |
| Q45 | 0.703         | 0.000               | 0.000     | 0.000   |
| Q8  | 0.000         | 1.000               | 0.000     | 0.000   |
| Q2  | 0.000         | 0.931               | 0.000     | 0.000   |
| Q25 | 0.000         | 1.060               | 0.000     | 0.000   |
| Q30 | 0.000         | 1.641               | 0.000     | 0.000   |
| Q37 | 0.000         | 2.002               | 0.000     | 0.000   |
| Q47 | 0.000         | 1.348               | 0.000     | 0.000   |
| Q1  | 0.000         | 0.346               | 0.000     | 0.000   |
| Q3  | 0.000         | 1.315               | 0.000     | 0.000   |
| Q12 | 0.000         | 1.436               | 0.000     | 0.000   |
| Q14 | 0.000         | 1.560               | 0.000     | 0.000   |
| Q33 | 0.000         | 1.455               | 0.000     | 0.000   |
| Q40 | 0.000         | 1.826               | 0.000     | 0.000   |
| Q9  | 0.000         | 1.000               | 0.000     | 0.000   |
| Q13 | 0.000         | 1.467               | 0.000     | 0.000   |
| Q19 | 0.000         | 1.741               | 0.000     | 0.000   |
| Q27 | 0.000         | 1.609               | 0.000     | 0.000   |
| Q43 | 0.000         | 1.298               | 0.000     | 0.000   |
| Q48 | 0.000         | 1.568               | 0.000     | 0.000   |
| Q42 | 0.000         | 0.000               | 1.000     | 0.000   |
| Q4  | 0.000         | 0.000               | 1.082     | 0.000   |
| Q10 | 0.000         | 0.000               | 1.059     | 0.000   |
| Q18 | 0.000         | 0.000               | 1.134     | 0.000   |
| Q34 | 0.000         | 0.000               | 0.974     | 0.000   |
| Q41 | 0.000         | 0.000               | 1.141     | 0.000   |
| Q49 | 0.000         | 0.000               | 1.229     | 0.000   |
| Q44 | 0.000         | 0.000               | 0.000     | 1.000   |
| Q7  | 0.000         | 0.000               | 0.000     | 0.406   |
| Q16 | 0.000         | 0.000               | 0.000     | 0.339   |
| Q17 | 0.000         | 0.000               | 0.000     | 1.103   |
| Q24 | 0.000         | 0.000               | 0.000     | 0.494   |
| Q32 | 0.000         | 0.000               | 0.000     | 1.045   |

Variance standardized estimates.

```
kable(inspect(fit_A, what = 'std')$lambda)
```

|     | managedChange | performanceEfficacy | resources | rewards |
|-----|---------------|---------------------|-----------|---------|
| Q5  | 0.492         | 0.000               | 0.000     | 0.000   |
| Q6  | 0.411         | 0.000               | 0.000     | 0.000   |
| Q15 | 0.638         | 0.000               | 0.000     | 0.000   |
| Q21 | 0.437         | 0.000               | 0.000     | 0.000   |
| Q26 | 0.784         | 0.000               | 0.000     | 0.000   |
| Q36 | 0.781         | 0.000               | 0.000     | 0.000   |
| Q38 | -0.352        | 0.000               | 0.000     | 0.000   |
| Q22 | 0.029         | 0.000               | 0.000     | 0.000   |
| Q29 | 0.066         | 0.000               | 0.000     | 0.000   |
| Q31 | 0.030         | 0.000               | 0.000     | 0.000   |
| Q35 | 0.037         | 0.000               | 0.000     | 0.000   |
| Q39 | -0.061        | 0.000               | 0.000     | 0.000   |
| Q46 | 0.285         | 0.000               | 0.000     | 0.000   |
| Q11 | 0.623         | 0.000               | 0.000     | 0.000   |
| Q20 | 0.280         | 0.000               | 0.000     | 0.000   |
| Q23 | 0.553         | 0.000               | 0.000     | 0.000   |
| Q28 | 0.769         | 0.000               | 0.000     | 0.000   |
| Q45 | 0.450         | 0.000               | 0.000     | 0.000   |
| Q8  | 0.000         | 0.309               | 0.000     | 0.000   |
| Q2  | 0.000         | 0.486               | 0.000     | 0.000   |
| Q25 | 0.000         | 0.337               | 0.000     | 0.000   |
| Q30 | 0.000         | 0.585               | 0.000     | 0.000   |
| Q37 | 0.000         | 0.759               | 0.000     | 0.000   |
| Q47 | 0.000         | 0.479               | 0.000     | 0.000   |
| Q1  | 0.000         | 0.090               | 0.000     | 0.000   |
| Q3  | 0.000         | 0.405               | 0.000     | 0.000   |
| Q12 | 0.000         | 0.578               | 0.000     | 0.000   |
| Q14 | 0.000         | 0.424               | 0.000     | 0.000   |
| Q33 | 0.000         | 0.509               | 0.000     | 0.000   |
| Q40 | 0.000         | 0.669               | 0.000     | 0.000   |
| Q9  | 0.000         | 0.342               | 0.000     | 0.000   |
| Q13 | 0.000         | 0.648               | 0.000     | 0.000   |
| Q19 | 0.000         | 0.672               | 0.000     | 0.000   |
| Q27 | 0.000         | 0.722               | 0.000     | 0.000   |
| Q43 | 0.000         | 0.371               | 0.000     | 0.000   |
| Q48 | 0.000         | 0.640               | 0.000     | 0.000   |
| Q42 | 0.000         | 0.000               | 0.579     | 0.000   |
| Q4  | 0.000         | 0.000               | 0.623     | 0.000   |
| Q10 | 0.000         | 0.000               | 0.729     | 0.000   |
| Q18 | 0.000         | 0.000               | 0.797     | 0.000   |
| Q34 | 0.000         | 0.000               | 0.661     | 0.000   |
| Q41 | 0.000         | 0.000               | 0.815     | 0.000   |
| Q49 | 0.000         | 0.000               | 0.641     | 0.000   |
| Q44 | 0.000         | 0.000               | 0.000     | 0.606   |
| Q7  | 0.000         | 0.000               | 0.000     | 0.336   |
| Q16 | 0.000         | 0.000               | 0.000     | 0.297   |
| Q17 | 0.000         | 0.000               | 0.000     | 0.785   |
| Q24 | 0.000         | 0.000               | 0.000     | 0.352   |
| Q32 | 0.000         | 0.000               | 0.000     | 0.831   |



## OPTION B

Define model:

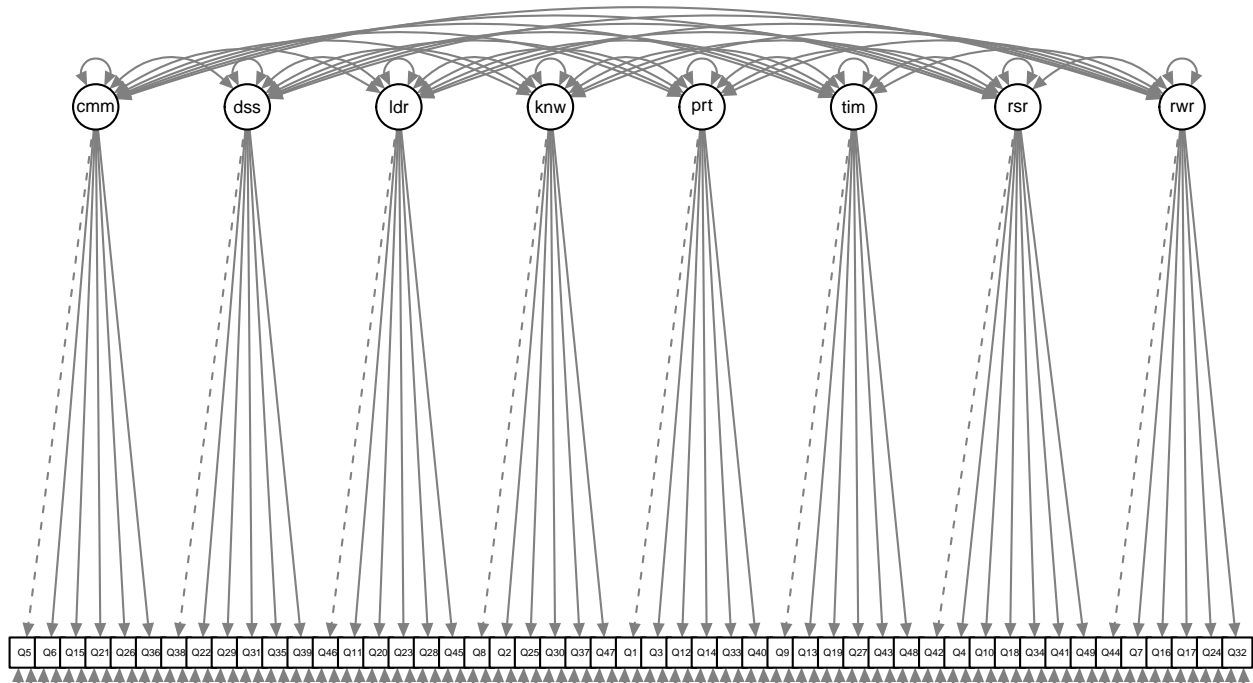
```
model_B <- '
    comment      =~ Q5 + Q6 + Q15 + Q21 + Q26 + Q36
    dissatisfaction =~ Q38 + Q22 + Q29 + Q31 + Q35 + Q39
    leadership    =~ Q46 + Q11 + Q20 + Q23 + Q28 + Q45
    knowledge      =~ Q8 + Q2 + Q25 + Q30 + Q37 + Q47
    participation  =~ Q1 + Q3 + Q12 + Q14 + Q33 + Q40
    time           =~ Q9 + Q13 + Q19 + Q27 + Q43 + Q48
    resources      =~ Q42 + Q4 + Q10 + Q18 + Q34 + Q41 + Q49
    rewards       =~ Q44 + Q7 + Q16 + Q17 + Q24 + Q32'
```

Fit model:

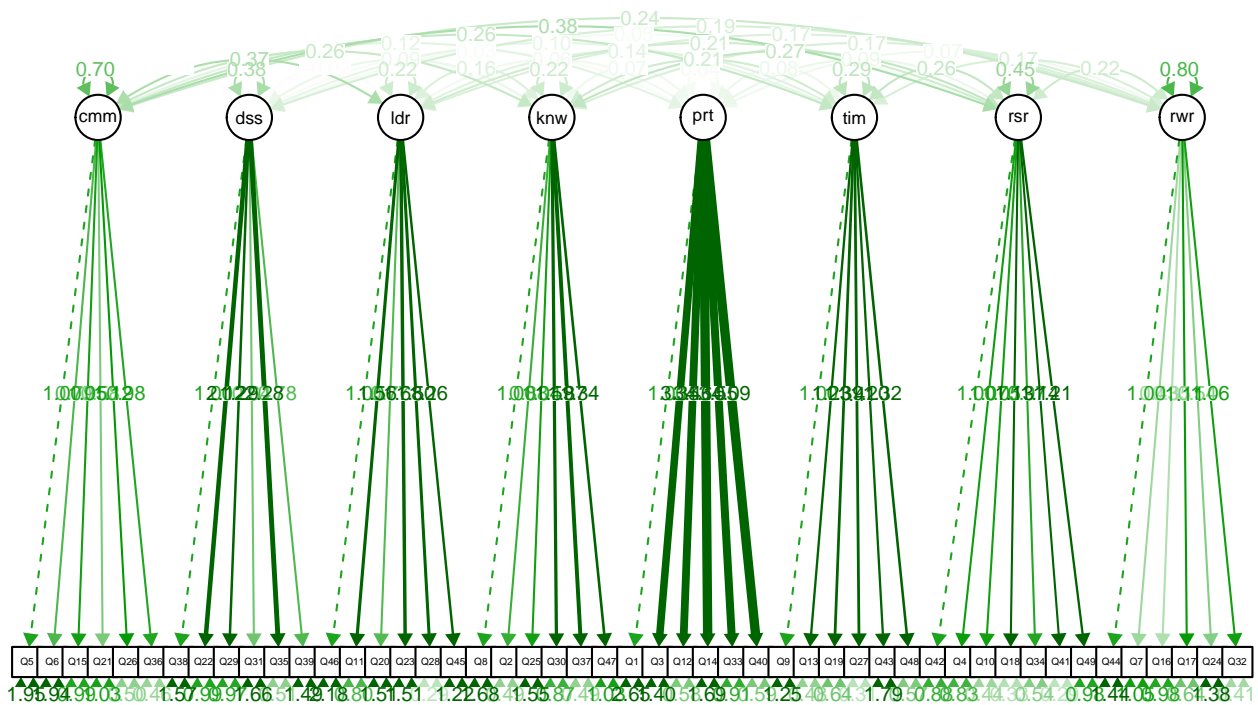
```
fit_B <- cfa(model_B, data = CFA_data)
```

Visualize model:

```
semPaths(fit_B, 'path', layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



```
semPaths(fit_B, 'est', layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



Print results:

```
summary(fit_B, fit.measures = TRUE)
```

```
## lavaan (0.5-20) converged normally after 154 iterations
##
##   Number of observations              252
##
##   Estimator                          ML
##   Minimum Function Test Statistic    2289.612
##   Degrees of freedom                 1099
##   P-value (Chi-square)               0.000
##
## Model test baseline model:
##
##   Minimum Function Test Statistic    6064.075
##   Degrees of freedom                 1176
##   P-value                           0.000
##
## User model versus baseline model:
##
##   Comparative Fit Index (CFI)        0.756
##   Tucker-Lewis Index (TLI)          0.739
##
## Loglikelihood and Information Criteria:
##
##   Loglikelihood user model (H0)      -18070.000
##   Loglikelihood unrestricted model (H1) -16925.194
##
##   Number of free parameters          126
##   Akaike (AIC)                      36392.000
##   Bayesian (BIC)                    36836.708
```

```

## Sample-size adjusted Bayesian (BIC)          36437.269
##
## Root Mean Square Error of Approximation:
##
## RMSEA                                          0.066
## 90 Percent Confidence Interval              0.062 0.069
## P-value RMSEA <= 0.05                      0.000
##
## Standardized Root Mean Square Residual:
##
## SRMR                                          0.092
##
## Parameter Estimates:
##
## Information                                Expected
## Standard Errors                          Standard
##
## Latent Variables:
##           Estimate Std.Err Z-value P(>|z|)
## comment =~
##   Q5          1.000
##   Q6          0.789    0.142    5.551    0.000
##   Q15         1.046    0.142    7.374    0.000
##   Q21         0.582    0.104    5.595    0.000
##   Q26         1.115    0.138    8.084    0.000
##   Q36         0.982    0.123    7.975    0.000
## dissatisfaction =~
##   Q38          1.000
##   Q22         2.119    0.313    6.766    0.000
##   Q29         1.287    0.208    6.191    0.000
##   Q31         0.640    0.166    3.852    0.000
##   Q35         2.280    0.331    6.893    0.000
##   Q39         0.777    0.171    4.539    0.000
## leadership =~
##   Q46          1.000
##   Q11         1.559    0.353    4.421    0.000
##   Q20         0.765    0.238    3.215    0.001
##   Q23         1.683    0.396    4.251    0.000
##   Q28         1.504    0.327    4.601    0.000
##   Q45         1.264    0.309    4.085    0.000
## knowledge =~
##   Q8           1.000
##   Q2           0.880    0.192    4.592    0.000
##   Q25          1.044    0.263    3.969    0.000
##   Q30          1.589    0.324    4.910    0.000
##   Q37          1.873    0.362    5.172    0.000
##   Q47          1.342    0.288    4.654    0.000
## participation =~
##   Q1           1.000
##   Q3           3.350    1.817    1.844    0.065
##   Q12          3.462    1.852    1.869    0.062
##   Q14          4.100    2.214    1.852    0.064
##   Q33          3.545    1.905    1.861    0.063
##   Q40          4.088    2.182    1.874    0.061

```

```

## time =~
## Q9 1.000
## Q13 1.232 0.194 6.345 0.000
## Q19 1.393 0.220 6.320 0.000
## Q27 1.412 0.212 6.676 0.000
## Q43 1.202 0.238 5.056 0.000
## Q48 1.319 0.209 6.323 0.000
## resources =~
## Q42 1.000
## Q4 1.067 0.134 7.947 0.000
## Q10 1.051 0.118 8.893 0.000
## Q18 1.128 0.120 9.411 0.000
## Q34 0.968 0.116 8.340 0.000
## Q41 1.138 0.119 9.551 0.000
## Q49 1.213 0.149 8.116 0.000
## rewards =~
## Q44 1.000
## Q7 0.431 0.090 4.805 0.000
## Q16 0.347 0.083 4.166 0.000
## Q17 1.110 0.126 8.804 0.000
## Q24 0.545 0.105 5.185 0.000
## Q32 1.057 0.118 8.962 0.000
##
## Covariances:
## Estimate Std.Err Z-value P(>|z|)
## comment ~~
## dissatisfactin 0.007 0.038 0.174 0.862
## leadership 0.369 0.095 3.897 0.000
## knowledge 0.255 0.064 3.969 0.000
## participation 0.123 0.068 1.803 0.071
## time 0.262 0.059 4.398 0.000
## resources 0.377 0.071 5.283 0.000
## rewards 0.238 0.068 3.507 0.000
## dissatisfaction ~~
## leadership -0.019 0.023 -0.836 0.403
## knowledge 0.087 0.030 2.878 0.004
## participation 0.029 0.019 1.548 0.122
## time 0.101 0.032 3.148 0.002
## resources 0.049 0.031 1.594 0.111
## rewards 0.186 0.052 3.562 0.000
## leadership ~~
## knowledge 0.158 0.048 3.276 0.001
## participation 0.062 0.036 1.706 0.088
## time 0.139 0.041 3.395 0.001
## resources 0.211 0.055 3.826 0.000
## rewards 0.165 0.051 3.227 0.001
## knowledge ~~
## participation 0.071 0.041 1.743 0.081
## time 0.210 0.053 3.927 0.000
## resources 0.271 0.062 4.343 0.000
## rewards 0.174 0.050 3.499 0.000
## participation ~~
## time 0.078 0.044 1.781 0.075
## resources 0.091 0.051 1.810 0.070

```

|    |              |       |       |       |       |
|----|--------------|-------|-------|-------|-------|
| ## | rewards      | 0.066 | 0.039 | 1.710 | 0.087 |
| ## | time ~~      |       |       |       |       |
| ## | resources    | 0.263 | 0.053 | 4.927 | 0.000 |
| ## | rewards      | 0.174 | 0.048 | 3.645 | 0.000 |
| ## | resources ~~ |       |       |       |       |
| ## | rewards      | 0.219 | 0.054 | 4.033 | 0.000 |

##

## Variances:

| ## |     | Estimate | Std.Err | Z-value | P(> z ) |
|----|-----|----------|---------|---------|---------|
| ## | Q5  | 1.949    | 0.182   | 10.702  | 0.000   |
| ## | Q6  | 1.941    | 0.178   | 10.900  | 0.000   |
| ## | Q15 | 0.986    | 0.098   | 10.079  | 0.000   |
| ## | Q21 | 1.029    | 0.094   | 10.891  | 0.000   |
| ## | Q26 | 0.503    | 0.059   | 8.581   | 0.000   |
| ## | Q36 | 0.457    | 0.051   | 8.993   | 0.000   |
| ## | Q38 | 1.565    | 0.145   | 10.828  | 0.000   |
| ## | Q22 | 0.986    | 0.127   | 7.782   | 0.000   |
| ## | Q29 | 0.970    | 0.096   | 10.112  | 0.000   |
| ## | Q31 | 1.658    | 0.150   | 11.074  | 0.000   |
| ## | Q35 | 0.514    | 0.111   | 4.634   | 0.000   |
| ## | Q39 | 1.489    | 0.136   | 10.975  | 0.000   |
| ## | Q46 | 2.182    | 0.197   | 11.070  | 0.000   |
| ## | Q11 | 0.797    | 0.079   | 10.121  | 0.000   |
| ## | Q20 | 1.510    | 0.136   | 11.094  | 0.000   |
| ## | Q23 | 1.514    | 0.143   | 10.569  | 0.000   |
| ## | Q28 | 0.290    | 0.036   | 7.966   | 0.000   |
| ## | Q45 | 1.215    | 0.113   | 10.770  | 0.000   |
| ## | Q8  | 1.677    | 0.152   | 11.034  | 0.000   |
| ## | Q2  | 0.492    | 0.046   | 10.706  | 0.000   |
| ## | Q25 | 1.550    | 0.141   | 10.999  | 0.000   |
| ## | Q30 | 0.865    | 0.085   | 10.223  | 0.000   |
| ## | Q37 | 0.485    | 0.058   | 8.350   | 0.000   |
| ## | Q47 | 1.033    | 0.097   | 10.647  | 0.000   |
| ## | Q1  | 2.645    | 0.236   | 11.187  | 0.000   |
| ## | Q3  | 1.398    | 0.134   | 10.407  | 0.000   |
| ## | Q12 | 0.576    | 0.063   | 9.066   | 0.000   |
| ## | Q14 | 1.691    | 0.166   | 10.209  | 0.000   |
| ## | Q33 | 0.912    | 0.093   | 9.810   | 0.000   |
| ## | Q40 | 0.592    | 0.072   | 8.282   | 0.000   |
| ## | Q9  | 1.252    | 0.116   | 10.835  | 0.000   |
| ## | Q13 | 0.483    | 0.050   | 9.666   | 0.000   |
| ## | Q19 | 0.643    | 0.066   | 9.728   | 0.000   |
| ## | Q27 | 0.313    | 0.039   | 8.023   | 0.000   |
| ## | Q43 | 1.792    | 0.165   | 10.831  | 0.000   |
| ## | Q48 | 0.573    | 0.059   | 9.721   | 0.000   |
| ## | Q42 | 0.882    | 0.083   | 10.617  | 0.000   |
| ## | Q4  | 0.833    | 0.079   | 10.491  | 0.000   |
| ## | Q10 | 0.443    | 0.045   | 9.877   | 0.000   |
| ## | Q18 | 0.329    | 0.036   | 9.127   | 0.000   |
| ## | Q34 | 0.544    | 0.053   | 10.298  | 0.000   |
| ## | Q41 | 0.290    | 0.033   | 8.796   | 0.000   |
| ## | Q49 | 0.977    | 0.094   | 10.415  | 0.000   |
| ## | Q44 | 1.442    | 0.145   | 9.937   | 0.000   |
| ## | Q7  | 1.054    | 0.097   | 10.908  | 0.000   |

|    |                |       |       |        |       |
|----|----------------|-------|-------|--------|-------|
| ## | Q16            | 0.976 | 0.089 | 11.002 | 0.000 |
| ## | Q17            | 0.642 | 0.088 | 7.327  | 0.000 |
| ## | Q24            | 1.383 | 0.128 | 10.837 | 0.000 |
| ## | Q32            | 0.410 | 0.069 | 5.942  | 0.000 |
| ## | comment        | 0.705 | 0.170 | 4.156  | 0.000 |
| ## | dissatisfactin | 0.379 | 0.110 | 3.459  | 0.001 |
| ## | leadership     | 0.222 | 0.096 | 2.322  | 0.020 |
| ## | knowledge      | 0.219 | 0.084 | 2.622  | 0.009 |
| ## | participation  | 0.045 | 0.048 | 0.941  | 0.347 |
| ## | time           | 0.293 | 0.086 | 3.402  | 0.001 |
| ## | resources      | 0.452 | 0.093 | 4.855  | 0.000 |
| ## | rewards        | 0.797 | 0.167 | 4.776  | 0.000 |

Print parameter estimates

```
kable(inspect(fit_B, what = 'est')$lambda)
```

|     | comment | dissatisfaction | leadership | knowledge | participation | time | resources | rewards |
|-----|---------|-----------------|------------|-----------|---------------|------|-----------|---------|
| Q5  | 1.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q6  | 0.789   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q15 | 1.046   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q21 | 0.582   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q26 | 1.115   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q36 | 0.982   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q38 | 0.000   | 1.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q22 | 0.000   | 2.119           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q29 | 0.000   | 1.287           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q31 | 0.000   | 0.640           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q35 | 0.000   | 2.280           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q39 | 0.000   | 0.777           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q46 | 0.000   | 0.000           | 1.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q11 | 0.000   | 0.000           | 1.559      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q20 | 0.000   | 0.000           | 0.765      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q23 | 0.000   | 0.000           | 1.683      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q28 | 0.000   | 0.000           | 1.504      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q45 | 0.000   | 0.000           | 1.264      | 0.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q8  | 0.000   | 0.000           | 0.000      | 1.00      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q2  | 0.000   | 0.000           | 0.000      | 0.88      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q25 | 0.000   | 0.000           | 0.000      | 1.04      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q30 | 0.000   | 0.000           | 0.000      | 1.59      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q37 | 0.000   | 0.000           | 0.000      | 1.87      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q47 | 0.000   | 0.000           | 0.000      | 1.34      | 0.00          | 0.00 | 0.000     | 0.000   |
| Q1  | 0.000   | 0.000           | 0.000      | 0.00      | 1.00          | 0.00 | 0.000     | 0.000   |
| Q3  | 0.000   | 0.000           | 0.000      | 0.00      | 3.35          | 0.00 | 0.000     | 0.000   |
| Q12 | 0.000   | 0.000           | 0.000      | 0.00      | 3.46          | 0.00 | 0.000     | 0.000   |
| Q14 | 0.000   | 0.000           | 0.000      | 0.00      | 4.10          | 0.00 | 0.000     | 0.000   |
| Q33 | 0.000   | 0.000           | 0.000      | 0.00      | 3.54          | 0.00 | 0.000     | 0.000   |
| Q40 | 0.000   | 0.000           | 0.000      | 0.00      | 4.09          | 0.00 | 0.000     | 0.000   |
| Q9  | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.00 | 0.000     | 0.000   |
| Q13 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.23 | 0.000     | 0.000   |
| Q19 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.39 | 0.000     | 0.000   |
| Q27 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.41 | 0.000     | 0.000   |
| Q43 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.20 | 0.000     | 0.000   |
| Q48 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 1.32 | 0.000     | 0.000   |
| Q42 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.000     | 0.000   |
| Q4  | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.067     | 0.000   |
| Q10 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.051     | 0.000   |
| Q18 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.128     | 0.000   |
| Q34 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.968     | 0.000   |
| Q41 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.138     | 0.000   |
| Q49 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 1.213     | 0.000   |
| Q44 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 1.000   |
| Q7  | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.431   |
| Q16 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.347   |
| Q17 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 1.110   |
| Q24 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 0.545   |
| Q32 | 0.000   | 0.000           | 0.000      | 0.00      | 0.00          | 0.00 | 0.000     | 1.057   |

Variance standardized estimates.

```
kable(inspect(fit_B, what = 'std')$lambda)
```

|     | comment | dissatisfaction | leadership | knowledge | participation | time  | resources | rewards |
|-----|---------|-----------------|------------|-----------|---------------|-------|-----------|---------|
| Q5  | 0.515   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q6  | 0.429   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q15 | 0.663   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q21 | 0.434   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q26 | 0.797   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q36 | 0.773   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q38 | 0.000   | 0.442           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q22 | 0.000   | 0.796           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q29 | 0.000   | 0.627           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q31 | 0.000   | 0.293           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q35 | 0.000   | 0.891           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q39 | 0.000   | 0.365           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q46 | 0.000   | 0.000           | 0.304      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q11 | 0.000   | 0.000           | 0.636      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q20 | 0.000   | 0.000           | 0.282      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q23 | 0.000   | 0.000           | 0.542      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q28 | 0.000   | 0.000           | 0.796      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q45 | 0.000   | 0.000           | 0.475      | 0.000     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q8  | 0.000   | 0.000           | 0.000      | 0.340     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q2  | 0.000   | 0.000           | 0.000      | 0.507     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q25 | 0.000   | 0.000           | 0.000      | 0.366     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q30 | 0.000   | 0.000           | 0.000      | 0.625     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q37 | 0.000   | 0.000           | 0.000      | 0.783     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q47 | 0.000   | 0.000           | 0.000      | 0.526     | 0.000         | 0.000 | 0.000     | 0.000   |
| Q1  | 0.000   | 0.000           | 0.000      | 0.000     | 0.129         | 0.000 | 0.000     | 0.000   |
| Q3  | 0.000   | 0.000           | 0.000      | 0.000     | 0.515         | 0.000 | 0.000     | 0.000   |
| Q12 | 0.000   | 0.000           | 0.000      | 0.000     | 0.695         | 0.000 | 0.000     | 0.000   |
| Q14 | 0.000   | 0.000           | 0.000      | 0.000     | 0.556         | 0.000 | 0.000     | 0.000   |
| Q33 | 0.000   | 0.000           | 0.000      | 0.000     | 0.618         | 0.000 | 0.000     | 0.000   |
| Q40 | 0.000   | 0.000           | 0.000      | 0.000     | 0.748         | 0.000 | 0.000     | 0.000   |
| Q9  | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.435 | 0.000     | 0.000   |
| Q13 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.692 | 0.000     | 0.000   |
| Q19 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.685 | 0.000     | 0.000   |
| Q27 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.807 | 0.000     | 0.000   |
| Q43 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.437 | 0.000     | 0.000   |
| Q48 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.686 | 0.000     | 0.000   |
| Q42 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.582     | 0.000   |
| Q4  | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.618     | 0.000   |
| Q10 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.728     | 0.000   |
| Q18 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.797     | 0.000   |
| Q34 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.662     | 0.000   |
| Q41 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.818     | 0.000   |
| Q49 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.637     | 0.000   |
| Q44 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.597   |
| Q7  | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.351   |
| Q16 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.300   |
| Q17 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.778   |
| Q24 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.382   |
| Q32 | 0.000   | 0.000           | 0.000      | 0.000     | 0.000         | 0.000 | 0.000     | 0.828   |



## OPTION C

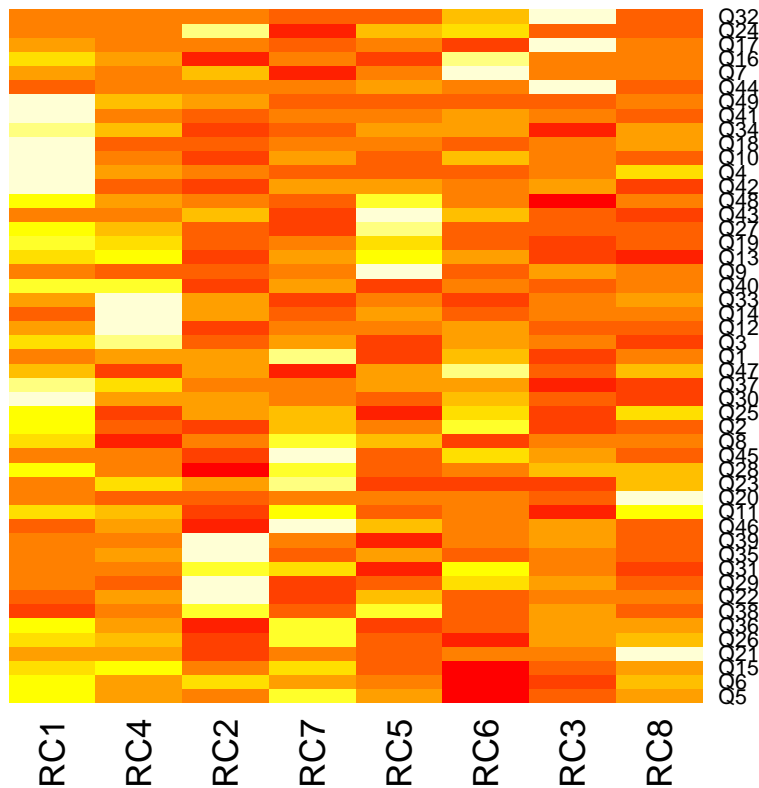
As originally requested

```
fit_49_to_8_varimax <- principal(CFA_data, 8, rotate = 'varimax')
ordered_cols <- gsub('\\n', '', sapply(str_split(model_B, ' '), function(x) grep('Q', x, value = T)))
reordered_varimax <- fit_49_to_8_varimax$loadings[match(ordered_cols, rownames(fit_49_to_8_varimax$loadings))]
```

```
kable(reordered_varimax[rev(rownames(reordered_varimax)),])
```

|     | RC1    | RC4    | RC2    | RC7    | RC5    | RC6    | RC3    | RC8    |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| Q32 | 0.123  | 0.086  | 0.158  | 0.031  | 0.009  | 0.274  | 0.808  | 0.063  |
| Q24 | 0.173  | 0.161  | 0.537  | -0.080 | 0.252  | 0.343  | 0.094  | 0.106  |
| Q17 | 0.199  | 0.090  | 0.156  | 0.069  | 0.090  | -0.024 | 0.782  | 0.086  |
| Q16 | 0.281  | 0.150  | -0.056 | 0.114  | 0.004  | 0.462  | 0.104  | 0.127  |
| Q7  | 0.172  | 0.116  | 0.231  | -0.007 | 0.157  | 0.515  | 0.125  | 0.129  |
| Q44 | -0.024 | 0.034  | 0.054  | 0.065  | 0.116  | 0.022  | 0.788  | -0.080 |
| Q49 | 0.619  | 0.267  | 0.208  | -0.002 | 0.019  | 0.017  | 0.043  | 0.107  |
| Q41 | 0.812  | 0.090  | -0.010 | 0.070  | 0.071  | 0.211  | 0.074  | -0.018 |
| Q34 | 0.575  | 0.291  | -0.011 | 0.067  | 0.192  | 0.228  | -0.056 | 0.173  |
| Q18 | 0.781  | 0.036  | 0.048  | 0.100  | 0.106  | 0.008  | 0.121  | 0.195  |
| Q10 | 0.711  | 0.062  | -0.067 | 0.140  | 0.015  | 0.223  | 0.090  | 0.021  |
| Q4  | 0.659  | 0.138  | 0.089  | -0.039 | -0.013 | -0.043 | 0.055  | 0.294  |
| Q42 | 0.623  | -0.015 | -0.128 | 0.166  | 0.124  | 0.046  | 0.148  | -0.094 |
| Q48 | 0.431  | 0.238  | 0.139  | 0.059  | 0.455  | 0.126  | -0.084 | 0.172  |
| Q43 | 0.112  | 0.093  | 0.225  | -0.012 | 0.584  | 0.248  | 0.073  | -0.014 |
| Q27 | 0.460  | 0.281  | 0.091  | 0.065  | 0.551  | 0.125  | 0.078  | 0.134  |
| Q19 | 0.495  | 0.355  | 0.076  | 0.111  | 0.335  | 0.034  | -0.031 | 0.055  |
| Q13 | 0.373  | 0.388  | -0.040 | 0.185  | 0.430  | 0.193  | -0.079 | -0.088 |
| Q9  | 0.109  | 0.008  | -0.069 | 0.081  | 0.753  | -0.040 | 0.204  | 0.033  |
| Q40 | 0.476  | 0.530  | -0.028 | 0.190  | 0.011  | 0.121  | 0.017  | 0.158  |
| Q33 | 0.204  | 0.607  | 0.214  | -0.015 | 0.130  | -0.017 | 0.097  | 0.191  |
| Q14 | -0.013 | 0.769  | 0.138  | 0.000  | 0.172  | 0.002  | 0.098  | 0.053  |
| Q12 | 0.222  | 0.619  | -0.020 | 0.172  | 0.119  | 0.223  | 0.072  | 0.095  |
| Q3  | 0.277  | 0.613  | -0.057 | 0.139  | -0.212 | 0.119  | 0.017  | -0.188 |
| Q1  | -0.035 | 0.062  | 0.047  | 0.434  | -0.165 | 0.161  | -0.131 | -0.038 |
| Q47 | 0.285  | 0.067  | 0.236  | -0.033 | 0.194  | 0.512  | 0.122  | 0.270  |
| Q37 | 0.555  | 0.363  | 0.150  | 0.180  | 0.210  | 0.261  | -0.079 | 0.034  |
| Q30 | 0.544  | 0.160  | 0.166  | 0.117  | 0.057  | 0.215  | 0.047  | 0.026  |
| Q25 | 0.274  | -0.014 | 0.140  | 0.201  | -0.058 | 0.245  | 0.008  | 0.259  |
| Q2  | 0.400  | 0.056  | -0.007 | 0.233  | 0.094  | 0.464  | -0.057 | 0.040  |
| Q8  | 0.333  | -0.229 | 0.077  | 0.495  | 0.221  | -0.101 | 0.016  | 0.066  |
| Q45 | 0.086  | 0.063  | -0.075 | 0.565  | -0.019 | 0.270  | 0.159  | 0.011  |
| Q28 | 0.427  | 0.112  | -0.177 | 0.516  | 0.034  | 0.145  | 0.263  | 0.266  |
| Q23 | 0.143  | 0.341  | 0.216  | 0.471  | 0.045  | 0.031  | 0.030  | 0.249  |
| Q20 | 0.063  | 0.008  | -0.037 | 0.092  | 0.049  | 0.102  | -0.006 | 0.698  |
| Q11 | 0.327  | 0.268  | 0.000  | 0.401  | 0.051  | 0.125  | -0.066 | 0.368  |
| Q46 | -0.082 | 0.035  | -0.260 | 0.641  | 0.161  | -0.058 | 0.029  | -0.068 |
| Q39 | 0.001  | -0.043 | 0.561  | 0.002  | -0.236 | -0.021 | 0.071  | -0.074 |
| Q35 | 0.070  | 0.165  | 0.829  | -0.067 | 0.151  | -0.016 | 0.057  | -0.026 |
| Q31 | -0.011 | -0.006 | 0.464  | 0.228  | -0.310 | 0.327  | -0.033 | -0.148 |
| Q29 | 0.099  | -0.016 | 0.647  | -0.036 | 0.003  | 0.336  | 0.175  | 0.007  |
| Q22 | -0.007 | 0.186  | 0.747  | -0.115 | 0.277  | -0.027 | 0.072  | 0.085  |
| Q38 | -0.241 | -0.131 | 0.485  | -0.229 | 0.413  | -0.185 | -0.027 | -0.149 |
| Q36 | 0.432  | 0.209  | -0.104 | 0.548  | -0.017 | 0.012  | 0.208  | 0.189  |
| Q26 | 0.404  | 0.281  | -0.063 | 0.531  | 0.019  | -0.141 | 0.171  | 0.248  |
| Q21 | 0.182  | 0.158  | -0.065 | 0.070  | 0.023  | 0.107  | 0.053  | 0.737  |
| Q15 | 0.353  | 0.445  | 0.160  | 0.371  | 0.020  | -0.190 | 0.051  | 0.232  |
| Q6  | 0.377  | 0.187  | 0.316  | 0.138  | 0.090  | -0.239 | -0.039 | 0.261  |
| Q5  | 0.336  | 0.069  | -0.008 | 0.473  | 0.068  | -0.367 | -0.044 | 0.129  |

```
heatmap(reordered_varimax, Rowv = NA, Colv = NA)
```



Using mapping:

RC1 - Resources are Available

RC4 - Participation is expected and encouraged

RC2 - Dissatisfaction with Status Quo

RC7 - Leadership is Evident

RC5 - Time is Available

RC6 - Rewards or Incentives exist for Participants

RC3 - Rewards or Incentives exist for Participants

RC8 - Commitment by those involved AND Leadership is Evident (so, these items appear to load on two different conditions)

NOTE: no “knowledge and skills exist” factor given, selecting the 1st “rewards and incentives” factor to be knowledge and skills

```
model_C <- '
MC =~ RC2 + RC8 + RC7
PE =~ RC4 + RC5 + RC6
Re =~ RC3
Rs =~ RC1
'
```

```
fit_C <- cfa(model_C, data = reordered_varimax)
```

```
## Warning in lavData(data = data, group = group, group.label = group.label, :
```

```
## lavaan WARNING: data argument has been coerced to a data.frame
## Warning in lav_model_vcov(lavmodel = lavmodel, lavsamplestats = lavsamplestats, : lavaan WARNING: co
##   lavaan NOTE: this may be a symptom that the model is not identified.
## Warning in lav_object_post_check(lavobject): lavaan WARNING: some estimated
## variances are negative
## Warning in lav_object_post_check(lavobject): lavaan WARNING: observed
## variable error term matrix (theta) is not positive definite; use
## inspect(fit,"theta") to investigate.
```

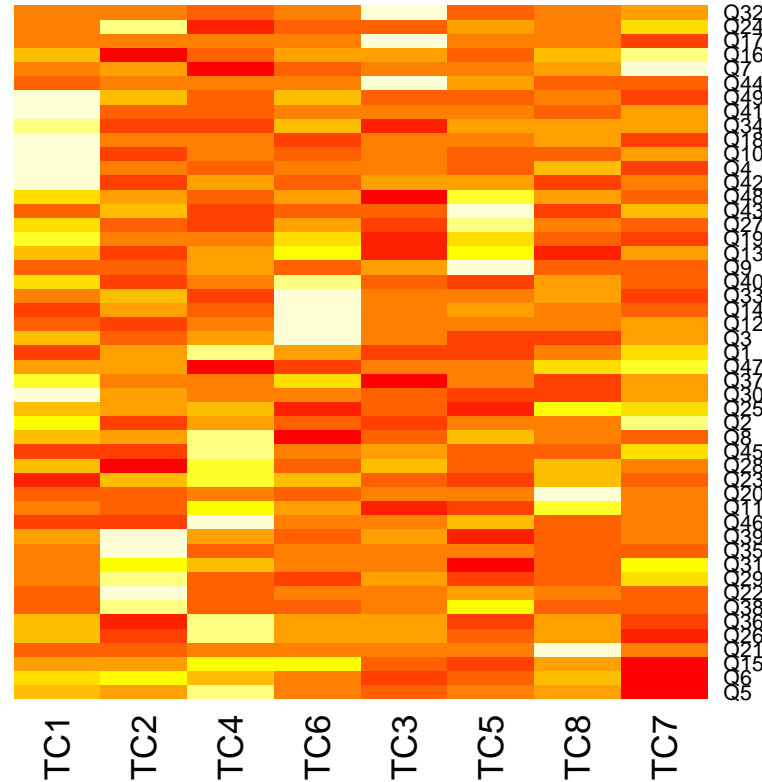
Doing an oblique rotation to possibly improve identifiability

```
fit_49_to_8_oblimin <- principal(CFA_data, 8, rotate = 'oblimin')
reordered_oblimin <- fit_49_to_8_oblimin$loadings[match(ordered_cols, rownames(fit_49_to_8_oblimin$load
```

```
kable(reordered_oblimin[rev(rownames(reordered_oblimin)),])
```

|     | TC1    | TC2    | TC4    | TC6    | TC3    | TC5    | TC8    | TC7    |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|
| Q32 | 0.031  | 0.042  | -0.052 | 0.034  | 0.832  | -0.044 | 0.049  | 0.156  |
| Q24 | 0.091  | 0.509  | -0.109 | 0.080  | 0.083  | 0.151  | 0.121  | 0.294  |
| Q17 | 0.104  | 0.082  | 0.034  | 0.016  | 0.789  | 0.028  | 0.029  | -0.141 |
| Q16 | 0.194  | -0.122 | 0.008  | 0.120  | 0.103  | -0.008 | 0.163  | 0.404  |
| Q7  | 0.084  | 0.171  | -0.088 | 0.063  | 0.124  | 0.107  | 0.174  | 0.464  |
| Q44 | -0.094 | -0.020 | 0.041  | 0.011  | 0.809  | 0.091  | -0.122 | -0.052 |
| Q49 | 0.585  | 0.189  | -0.046 | 0.191  | 0.016  | -0.055 | 0.057  | -0.085 |
| Q41 | 0.830  | -0.049 | -0.008 | 0.019  | 0.049  | 0.039  | -0.065 | 0.117  |
| Q34 | 0.483  | -0.030 | -0.013 | 0.224  | -0.088 | 0.158  | 0.164  | 0.143  |
| Q18 | 0.753  | 0.035  | 0.053  | -0.082 | 0.084  | 0.051  | 0.138  | -0.098 |
| Q10 | 0.706  | -0.107 | 0.062  | -0.003 | 0.069  | -0.009 | -0.013 | 0.143  |
| Q4  | 0.633  | 0.071  | -0.093 | 0.036  | 0.023  | -0.073 | 0.255  | -0.165 |
| Q42 | 0.637  | -0.142 | 0.130  | -0.068 | 0.126  | 0.118  | -0.154 | -0.008 |
| Q48 | 0.312  | 0.162  | 0.035  | 0.148  | -0.127 | 0.404  | 0.157  | 0.076  |
| Q43 | 0.022  | 0.235  | -0.015 | 0.036  | 0.051  | 0.546  | -0.011 | 0.240  |
| Q27 | 0.323  | 0.101  | 0.031  | 0.191  | 0.037  | 0.504  | 0.105  | 0.055  |
| Q19 | 0.387  | 0.091  | 0.083  | 0.292  | -0.069 | 0.288  | 0.011  | -0.025 |
| Q13 | 0.248  | -0.028 | 0.148  | 0.365  | -0.111 | 0.415  | -0.113 | 0.174  |
| Q9  | -0.006 | -0.026 | 0.108  | -0.060 | 0.171  | 0.757  | 0.003  | -0.048 |
| Q40 | 0.322  | -0.057 | 0.108  | 0.491  | -0.007 | -0.032 | 0.134  | 0.032  |
| Q33 | 0.036  | 0.197  | -0.058 | 0.570  | 0.078  | 0.056  | 0.168  | -0.112 |
| Q14 | -0.210 | 0.120  | -0.043 | 0.789  | 0.089  | 0.121  | 0.036  | -0.068 |
| Q12 | 0.026  | -0.056 | 0.088  | 0.613  | 0.059  | 0.085  | 0.093  | 0.155  |
| Q3  | 0.203  | -0.105 | 0.062  | 0.671  | 0.021  | -0.230 | -0.221 | 0.065  |
| Q1  | -0.134 | 0.056  | 0.439  | 0.059  | -0.132 | -0.185 | -0.029 | 0.232  |
| Q47 | 0.189  | 0.178  | -0.122 | -0.022 | 0.112  | 0.136  | 0.318  | 0.436  |
| Q37 | 0.442  | 0.140  | 0.122  | 0.301  | -0.110 | 0.150  | 0.010  | 0.208  |
| Q30 | 0.502  | 0.138  | 0.065  | 0.093  | 0.027  | -0.001 | -0.002 | 0.153  |
| Q25 | 0.186  | 0.118  | 0.158  | -0.098 | -0.005 | -0.109 | 0.277  | 0.215  |
| Q2  | 0.329  | -0.039 | 0.156  | 0.008  | -0.071 | 0.075  | 0.062  | 0.448  |
| Q8  | 0.245  | 0.136  | 0.555  | -0.343 | -0.020 | 0.180  | 0.013  | -0.052 |
| Q45 | -0.082 | -0.095 | 0.535  | 0.029  | 0.156  | -0.033 | 0.013  | 0.306  |
| Q28 | 0.232  | -0.204 | 0.455  | 0.017  | 0.240  | 0.009  | 0.244  | 0.096  |
| Q23 | -0.101 | 0.232  | 0.470  | 0.258  | 0.004  | -0.038 | 0.231  | 0.028  |
| Q20 | -0.117 | -0.042 | 0.040  | -0.106 | -0.031 | 0.019  | 0.759  | 0.038  |
| Q11 | 0.112  | 0.007  | 0.357  | 0.176  | -0.100 | 0.001  | 0.371  | 0.092  |
| Q46 | -0.255 | -0.211 | 0.682  | 0.025  | 0.014  | 0.186  | -0.094 | 0.037  |
| Q39 | 0.036  | 0.551  | 0.044  | -0.079 | 0.081  | -0.332 | -0.099 | -0.013 |
| Q35 | 0.025  | 0.846  | -0.006 | 0.084  | 0.045  | 0.004  | -0.064 | -0.028 |
| Q31 | -0.024 | 0.432  | 0.227  | -0.018 | -0.016 | -0.389 | -0.135 | 0.375  |
| Q29 | 0.077  | 0.603  | -0.046 | -0.088 | 0.182  | -0.110 | 0.016  | 0.310  |
| Q22 | -0.087 | 0.769  | -0.060 | 0.100  | 0.055  | 0.144  | 0.061  | -0.049 |
| Q38 | -0.195 | 0.547  | -0.119 | -0.158 | -0.036 | 0.360  | -0.173 | -0.136 |
| Q36 | 0.239  | -0.113 | 0.512  | 0.125  | 0.182  | -0.057 | 0.143  | -0.026 |
| Q26 | 0.189  | -0.050 | 0.518  | 0.188  | 0.137  | -0.033 | 0.188  | -0.182 |
| Q21 | -0.021 | -0.088 | -0.010 | 0.043  | 0.026  | -0.014 | 0.789  | 0.003  |
| Q15 | 0.148  | 0.183  | 0.372  | 0.362  | 0.016  | -0.064 | 0.172  | -0.239 |
| Q6  | 0.275  | 0.356  | 0.169  | 0.077  | -0.078 | -0.004 | 0.206  | -0.286 |
| Q5  | 0.214  | 0.063  | 0.534  | -0.017 | -0.085 | 0.026  | 0.050  | -0.349 |

```
heatmap(reordered_oblimin, Rowv = NA, Colv = NA)
```



Using mapping:

RC1 - Rewards

## RC7 - Leadership is Evident

RC4 - Participation is expected and encouraged

RC2 - Dissatisfaction with Status Quo

RC6 - Participantion encouraged

RC5 - Time is Available

RC8 - Commitment by those involved

RC3 - Rewards or Incentives exist for Participants

```
model_C <- '
MC =~ TC2 + TC8 + TC4
PE =~ TC5 + TC6 + TC7
Re =~ TC1
Rs =~ TC3
'
```

```
fit_C <- cfa(model_C, data = data.frame(reordered_oblimin), estimator = 'MLR')
```

```
## Warning in lav_object_post_check(lavobject): lavaan WARNING: some estimated
## variances are negative
```

```
## Warning in lav_object_post_check(lavobject): lavaan WARNING:
## covariance matrix of latent variables is not positive definite; use
```

```
## inspect(fit,"cov.lv") to investigate.
```

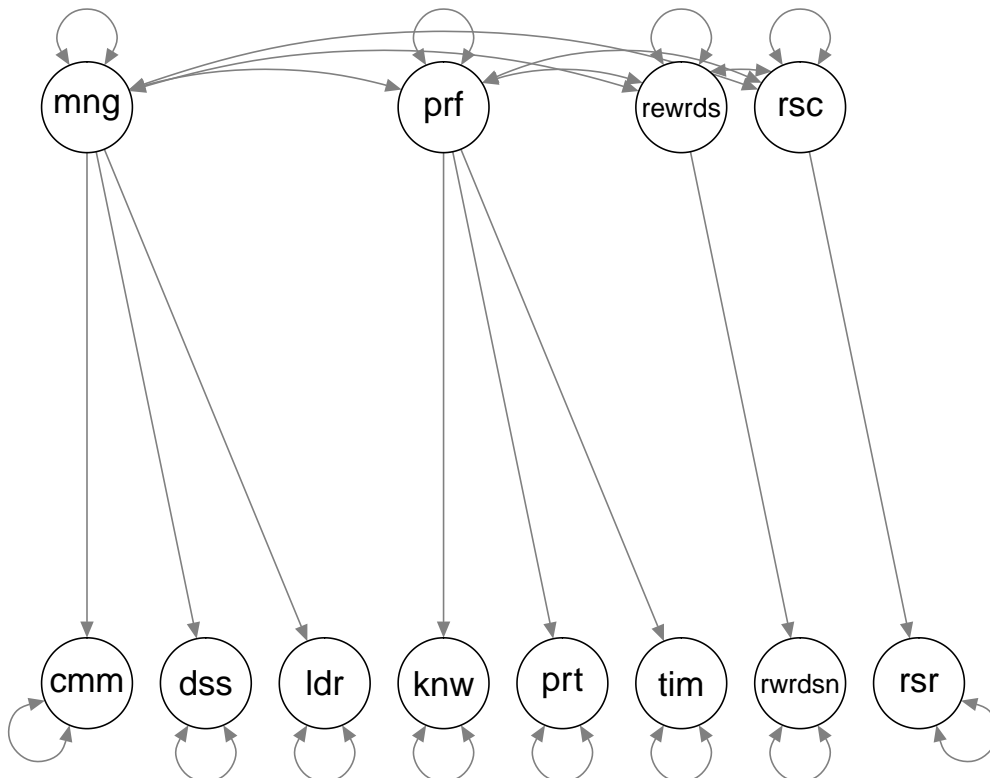
## As a SEM

Doing option C as an SEM:

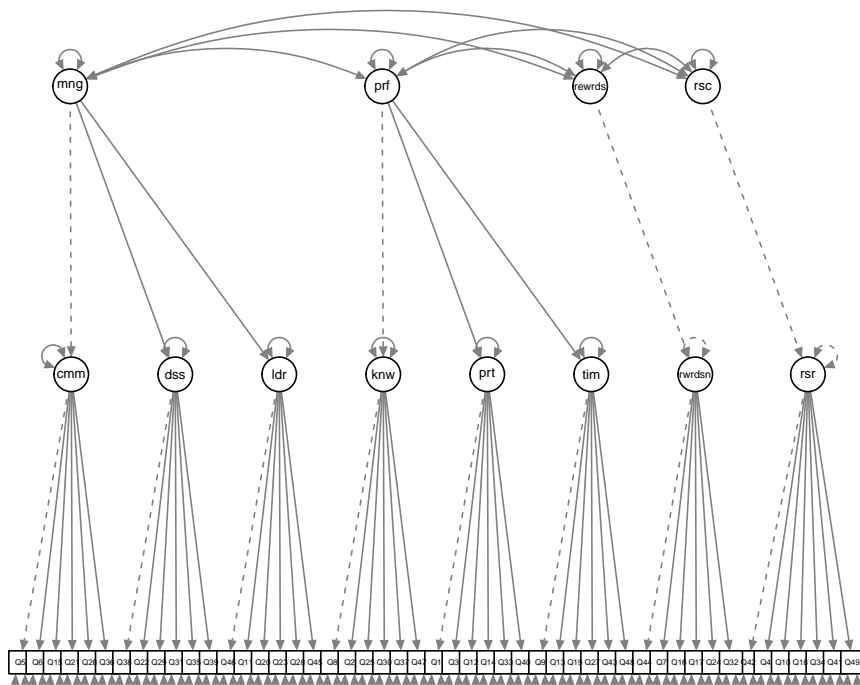
```
SEM_model <- '
  comment =~ Q5 + Q6 + Q15 + Q21 + Q26 + Q36
  dissatisfaction =~ Q38 + Q22 + Q29 + Q31 + Q35 + Q39
  leadership =~ Q46 + Q11 + Q20 + Q23 + Q28 + Q45
  knowledge =~ Q8 + Q2 + Q25 + Q30 + Q37 + Q47
  participation =~ Q1 + Q3 + Q12 + Q14 + Q33 + Q40
  time =~ Q9 + Q13 + Q19 + Q27 + Q43 + Q48
  resourcesareavailable =~ Q42 + Q4 + Q10 + Q18 + Q34 + Q41 + Q49
  rewardsandincentives =~ Q44 + Q7 + Q16 + Q17 + Q24 + Q32
  managedchange =~ comment + dissatisfaction + leadership
  performanceefficacy =~ knowledge + participation + time
  rewards =~ rewardsandincentives
  resouces =~ resourcesareavailable
'
```

```
fit_SEM <- sem(SEM_model, CFA_data)
```

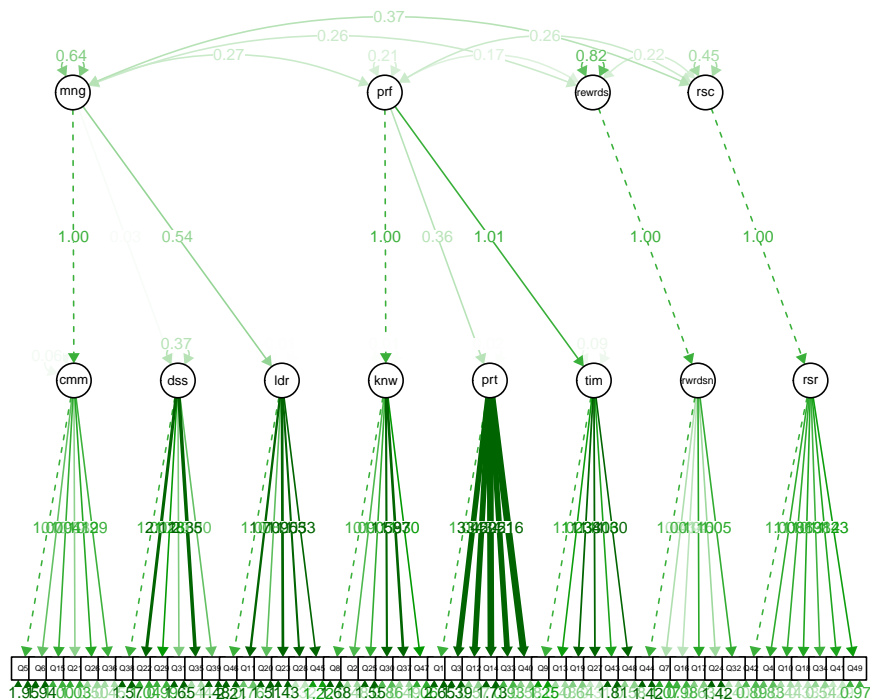
```
semPaths(fit_SEM, layout = 'tree2', structural = T, fixedStyle = '-')
```



```
semPaths(fit_SEM, layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



```
semPaths(fit_SEM, 'est', layout = 'tree2', sizeMan = 2, sizeLat = 3)
```



```
summary(fit_SEM, fit.measures = T)
```

```
## lavaan (0.5-20) converged normally after 121 iterations
##
##   Number of observations              252
##
##   Estimator                          ML
##   Minimum Function Test Statistic    2371.162
```



```

## Degrees of freedom                1115
## P-value (Chi-square)              0.000
##
## Model test baseline model:
##
## Minimum Function Test Statistic    6064.075
## Degrees of freedom                1176
## P-value                          0.000
##
## User model versus baseline model:
##
## Comparative Fit Index (CFI)        0.743
## Tucker-Lewis Index (TLI)          0.729
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0)      -18110.775
## Loglikelihood unrestricted model (H1) -16925.194
##
## Number of free parameters          110
## Akaike (AIC)                      36441.549
## Bayesian (BIC)                    36829.786
## Sample-size adjusted Bayesian (BIC) 36481.070
##
## Root Mean Square Error of Approximation:
##
## RMSEA                            0.067
## 90 Percent Confidence Interval      0.063 0.071
## P-value RMSEA <= 0.05              0.000
##
## Standardized Root Mean Square Residual:
##
## SRMR                             0.099
##
## Parameter Estimates:
##
## Information                      Expected
## Standard Errors                  Standard
##
## Latent Variables:
##
##               Estimate Std.Err Z-value P(>|z|)
## comment =~
##   Q5              1.000
##   Q6              0.793    0.144   5.524   0.000
##   Q15             1.042    0.143   7.282   0.000
##   Q21             0.580    0.105   5.532   0.000
##   Q26             1.120    0.140   8.009   0.000
##   Q36             0.992    0.125   7.924   0.000
## dissatisfaction =~
##   Q38             1.000
##   Q22             2.110    0.316   6.674   0.000
##   Q29             1.279    0.210   6.100   0.000
##   Q31             0.655    0.169   3.883   0.000
##   Q35             2.350    0.347   6.772   0.000

```

|    |                          |       |       |       |       |
|----|--------------------------|-------|-------|-------|-------|
| ## | Q39                      | 0.795 | 0.174 | 4.565 | 0.000 |
| ## | leadership =~            |       |       |       |       |
| ## | Q46                      | 1.000 |       |       |       |
| ## | Q11                      | 1.704 | 0.410 | 4.159 | 0.000 |
| ## | Q20                      | 0.822 | 0.264 | 3.110 | 0.002 |
| ## | Q23                      | 1.897 | 0.468 | 4.051 | 0.000 |
| ## | Q28                      | 1.549 | 0.363 | 4.268 | 0.000 |
| ## | Q45                      | 1.331 | 0.346 | 3.845 | 0.000 |
| ## | knowledge =~             |       |       |       |       |
| ## | Q8                       | 1.000 |       |       |       |
| ## | Q2                       | 0.905 | 0.197 | 4.604 | 0.000 |
| ## | Q25                      | 1.050 | 0.266 | 3.953 | 0.000 |
| ## | Q30                      | 1.593 | 0.327 | 4.876 | 0.000 |
| ## | Q37                      | 1.872 | 0.365 | 5.130 | 0.000 |
| ## | Q47                      | 1.296 | 0.284 | 4.562 | 0.000 |
| ## | participation =~         |       |       |       |       |
| ## | Q1                       | 1.000 |       |       |       |
| ## | Q3                       | 3.417 | 1.873 | 1.825 | 0.068 |
| ## | Q12                      | 3.519 | 1.904 | 1.849 | 0.065 |
| ## | Q14                      | 4.023 | 2.200 | 1.828 | 0.067 |
| ## | Q33                      | 3.505 | 1.906 | 1.839 | 0.066 |
| ## | Q40                      | 4.156 | 2.243 | 1.852 | 0.064 |
| ## | time =~                  |       |       |       |       |
| ## | Q9                       | 1.000 |       |       |       |
| ## | Q13                      | 1.229 | 0.192 | 6.417 | 0.000 |
| ## | Q19                      | 1.380 | 0.216 | 6.373 | 0.000 |
| ## | Q27                      | 1.396 | 0.207 | 6.734 | 0.000 |
| ## | Q43                      | 1.164 | 0.232 | 5.011 | 0.000 |
| ## | Q48                      | 1.299 | 0.204 | 6.363 | 0.000 |
| ## | resourcesareavailable =~ |       |       |       |       |
| ## | Q42                      | 1.000 |       |       |       |
| ## | Q4                       | 1.079 | 0.136 | 7.907 | 0.000 |
| ## | Q10                      | 1.060 | 0.120 | 8.816 | 0.000 |
| ## | Q18                      | 1.135 | 0.122 | 9.310 | 0.000 |
| ## | Q34                      | 0.979 | 0.118 | 8.291 | 0.000 |
| ## | Q41                      | 1.144 | 0.121 | 9.442 | 0.000 |
| ## | Q49                      | 1.230 | 0.152 | 8.088 | 0.000 |
| ## | rewardsandincentives =~  |       |       |       |       |
| ## | Q44                      | 1.000 |       |       |       |
| ## | Q7                       | 0.409 | 0.088 | 4.656 | 0.000 |
| ## | Q16                      | 0.342 | 0.082 | 4.163 | 0.000 |
| ## | Q17                      | 1.102 | 0.123 | 8.938 | 0.000 |
| ## | Q24                      | 0.497 | 0.102 | 4.855 | 0.000 |
| ## | Q32                      | 1.049 | 0.116 | 9.057 | 0.000 |
| ## | managedchange =~         |       |       |       |       |
| ## | comment                  | 1.000 |       |       |       |
| ## | dissatisfactin           | 0.034 | 0.055 | 0.618 | 0.537 |
| ## | leadership               | 0.543 | 0.141 | 3.854 | 0.000 |
| ## | performanceefficacy =~   |       |       |       |       |
| ## | knowledge                | 1.000 |       |       |       |
| ## | participation            | 0.361 | 0.206 | 1.750 | 0.080 |
| ## | time                     | 1.012 | 0.242 | 4.176 | 0.000 |
| ## | rewards =~               |       |       |       |       |
| ## | rewrdsndncntvs           | 1.000 |       |       |       |

```

##   resouces =~
##   resourcesrvlbl           1.000
##
## Covariances:
##           Estimate Std.Err Z-value P(>|z|)
## managedchange ~~
##   performncffccy           0.273   0.068   4.039   0.000
##   rewards                   0.262   0.068   3.843   0.000
##   resouces                   0.369   0.070   5.252   0.000
## performanceefficacy ~~
##   rewards                   0.174   0.049   3.569   0.000
##   resouces                   0.263   0.061   4.307   0.000
## rewards ~~
##   resouces                   0.217   0.054   4.006   0.000
##
## Variances:
##           Estimate Std.Err Z-value P(>|z|)
##   Q5             1.954   0.183  10.677   0.000
##   Q6             1.939   0.178  10.879   0.000
##   Q15            0.999   0.099  10.047   0.000
##   Q21            1.032   0.095  10.877   0.000
##   Q26            0.502   0.059   8.442   0.000
##   Q36            0.448   0.051   8.792   0.000
##   Q38            1.574   0.145  10.845   0.000
##   Q22            1.040   0.135   7.719   0.000
##   Q29            0.993   0.098  10.148   0.000
##   Q31            1.654   0.149  11.075   0.000
##   Q35            0.439   0.124   3.546   0.000
##   Q39            1.484   0.135  10.975   0.000
##   Q46            2.207   0.199  11.069   0.000
##   Q11            0.764   0.078   9.837   0.000
##   Q20            1.506   0.136  11.071   0.000
##   Q23            1.434   0.139  10.331   0.000
##   Q28            0.320   0.039   8.251   0.000
##   Q45            1.221   0.114  10.717   0.000
##   Q8             1.677   0.152  11.011   0.000
##   Q2             0.482   0.045  10.599   0.000
##   Q25            1.547   0.141  10.968   0.000
##   Q30            0.862   0.085  10.109   0.000
##   Q37            0.485   0.060   8.150   0.000
##   Q47            1.059   0.100  10.643   0.000
##   Q1             2.646   0.237  11.186   0.000
##   Q3             1.386   0.134  10.343   0.000
##   Q12            0.566   0.064   8.892   0.000
##   Q14            1.730   0.169  10.244   0.000
##   Q33            0.933   0.095   9.837   0.000
##   Q40            0.579   0.072   8.038   0.000
##   Q9             1.245   0.115  10.814   0.000
##   Q13            0.475   0.050   9.571   0.000
##   Q19            0.641   0.066   9.683   0.000
##   Q27            0.314   0.039   7.965   0.000
##   Q43            1.810   0.167  10.842   0.000
##   Q48            0.577   0.059   9.707   0.000
##   Q42            0.889   0.084  10.624   0.000

```

|    |                |       |       |        |       |
|----|----------------|-------|-------|--------|-------|
| ## | Q4             | 0.830 | 0.079 | 10.473 | 0.000 |
| ## | Q10            | 0.442 | 0.045 | 9.857  | 0.000 |
| ## | Q18            | 0.331 | 0.036 | 9.118  | 0.000 |
| ## | Q34            | 0.542 | 0.053 | 10.276 | 0.000 |
| ## | Q41            | 0.292 | 0.033 | 8.797  | 0.000 |
| ## | Q49            | 0.969 | 0.093 | 10.389 | 0.000 |
| ## | Q44            | 1.420 | 0.144 | 9.865  | 0.000 |
| ## | Q7             | 1.065 | 0.097 | 10.933 | 0.000 |
| ## | Q16            | 0.976 | 0.089 | 11.003 | 0.000 |
| ## | Q17            | 0.629 | 0.089 | 7.062  | 0.000 |
| ## | Q24            | 1.417 | 0.130 | 10.900 | 0.000 |
| ## | Q32            | 0.400 | 0.071 | 5.643  | 0.000 |
| ## | comment        | 0.063 | 0.043 | 1.472  | 0.141 |
| ## | dissatisfactin | 0.370 | 0.108 | 3.418  | 0.001 |
| ## | leadership     | 0.010 | 0.013 | 0.711  | 0.477 |
| ## | knowledge      | 0.014 | 0.013 | 1.042  | 0.297 |
| ## | participation  | 0.017 | 0.019 | 0.923  | 0.356 |
| ## | time           | 0.088 | 0.029 | 3.043  | 0.002 |
| ## | resourcesrvlbl | 0.000 |       |        |       |
| ## | rewrdsndncntvs | 0.000 |       |        |       |
| ## | managedchange  | 0.637 | 0.161 | 3.966  | 0.000 |
| ## | performncffccy | 0.206 | 0.080 | 2.582  | 0.010 |
| ## | rewards        | 0.819 | 0.169 | 4.851  | 0.000 |
| ## | resouces       | 0.445 | 0.093 | 4.805  | 0.000 |

Print 1st layer parameter estimates

|     | comm  | diss  | lead  | know  | part | time | reso  | rewa  | mana | perf | rewa | reso |
|-----|-------|-------|-------|-------|------|------|-------|-------|------|------|------|------|
| Q5  | 1.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q6  | 0.793 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q15 | 1.042 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q21 | 0.580 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q26 | 1.120 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q36 | 0.992 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q38 | 0.000 | 1.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q22 | 0.000 | 2.110 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q29 | 0.000 | 1.279 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q31 | 0.000 | 0.655 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q35 | 0.000 | 2.350 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q39 | 0.000 | 0.795 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q46 | 0.000 | 0.000 | 1.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q11 | 0.000 | 0.000 | 1.704 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q20 | 0.000 | 0.000 | 0.822 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q23 | 0.000 | 0.000 | 1.897 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q28 | 0.000 | 0.000 | 1.549 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q45 | 0.000 | 0.000 | 1.331 | 0.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q8  | 0.000 | 0.000 | 0.000 | 1.000 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q2  | 0.000 | 0.000 | 0.000 | 0.905 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q25 | 0.000 | 0.000 | 0.000 | 1.050 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q30 | 0.000 | 0.000 | 0.000 | 1.593 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q37 | 0.000 | 0.000 | 0.000 | 1.872 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q47 | 0.000 | 0.000 | 0.000 | 1.296 | 0.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q1  | 0.000 | 0.000 | 0.000 | 0.000 | 1.00 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q3  | 0.000 | 0.000 | 0.000 | 0.000 | 3.42 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q12 | 0.000 | 0.000 | 0.000 | 0.000 | 3.52 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q14 | 0.000 | 0.000 | 0.000 | 0.000 | 4.02 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q33 | 0.000 | 0.000 | 0.000 | 0.000 | 3.50 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q40 | 0.000 | 0.000 | 0.000 | 0.000 | 4.16 | 0.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q9  | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.00 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q13 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.23 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q19 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.38 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q27 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.40 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q43 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.16 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q48 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 1.30 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q42 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q4  | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.079 | 0.000 | 0    | 0    | 0    | 0    |
| Q10 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.060 | 0.000 | 0    | 0    | 0    | 0    |
| Q18 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.135 | 0.000 | 0    | 0    | 0    | 0    |
| Q34 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.979 | 0.000 | 0    | 0    | 0    | 0    |
| Q41 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.144 | 0.000 | 0    | 0    | 0    | 0    |
| Q49 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 1.230 | 0.000 | 0    | 0    | 0    | 0    |
| Q44 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 1.000 | 0    | 0    | 0    | 0    |
| Q7  | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.409 | 0    | 0    | 0    | 0    |
| Q16 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.342 | 0    | 0    | 0    | 0    |
| Q17 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 1.102 | 0    | 0    | 0    | 0    |
| Q24 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 0.497 | 0    | 0    | 0    | 0    |
| Q32 | 0.000 | 0.000 | 0.000 | 0.000 | 0.00 | 0.00 | 0.000 | 1.049 | 0    | 0    | 0    | 0    |

Variance standardized 1st layer estimates.

|     | comm  | diss  | lead  | know  | part  | time  | reso  | rewa  | mana | perf | rewa | reso |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|
| Q5  | 0.513 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q6  | 0.430 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q15 | 0.657 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q21 | 0.431 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q26 | 0.797 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q36 | 0.778 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q38 | 0.000 | 0.437 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q22 | 0.000 | 0.783 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q29 | 0.000 | 0.616 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q31 | 0.000 | 0.296 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q35 | 0.000 | 0.907 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q39 | 0.000 | 0.369 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q46 | 0.000 | 0.000 | 0.286 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q11 | 0.000 | 0.000 | 0.655 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q20 | 0.000 | 0.000 | 0.285 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q23 | 0.000 | 0.000 | 0.575 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q28 | 0.000 | 0.000 | 0.772 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q45 | 0.000 | 0.000 | 0.472 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q8  | 0.000 | 0.000 | 0.000 | 0.340 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q2  | 0.000 | 0.000 | 0.000 | 0.521 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q25 | 0.000 | 0.000 | 0.000 | 0.368 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q30 | 0.000 | 0.000 | 0.000 | 0.627 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q37 | 0.000 | 0.000 | 0.000 | 0.783 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q47 | 0.000 | 0.000 | 0.000 | 0.508 | 0.000 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q1  | 0.000 | 0.000 | 0.000 | 0.000 | 0.128 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q3  | 0.000 | 0.000 | 0.000 | 0.000 | 0.521 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q12 | 0.000 | 0.000 | 0.000 | 0.000 | 0.701 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q14 | 0.000 | 0.000 | 0.000 | 0.000 | 0.541 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q33 | 0.000 | 0.000 | 0.000 | 0.000 | 0.607 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q40 | 0.000 | 0.000 | 0.000 | 0.000 | 0.754 | 0.000 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q9  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.440 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q13 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.698 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q19 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.686 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q27 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.806 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q43 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.428 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q48 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.683 | 0.000 | 0.000 | 0    | 0    | 0    | 0    |
| Q42 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.578 | 0.000 | 0    | 0    | 0    | 0    |
| Q4  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.620 | 0.000 | 0    | 0    | 0    | 0    |
| Q10 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.728 | 0.000 | 0    | 0    | 0    | 0    |
| Q18 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.796 | 0.000 | 0    | 0    | 0    | 0    |
| Q34 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.664 | 0.000 | 0    | 0    | 0    | 0    |
| Q41 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.816 | 0.000 | 0    | 0    | 0    | 0    |
| Q49 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.640 | 0.000 | 0    | 0    | 0    | 0    |
| Q44 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.605 | 0    | 0    | 0    | 0    |
| Q7  | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.337 | 0    | 0    | 0    | 0    |
| Q16 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.299 | 0    | 0    | 0    | 0    |
| Q17 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.783 | 0    | 0    | 0    | 0    |
| Q24 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.353 | 0    | 0    | 0    | 0    |
| Q32 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.832 | 0    | 0    | 0    | 0    |

Print 2nd layer parameter estimates

|                       | comm | diss | lead | know | part | time | reso | rewa | mana  | perf  | rewa | reso |
|-----------------------|------|------|------|------|------|------|------|------|-------|-------|------|------|
| comment               | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 1.000 | 0.000 | 0    | 0    |
| dissatisfaction       | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.034 | 0.000 | 0    | 0    |
| leadership            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.543 | 0.000 | 0    | 0    |
| knowledge             | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 1.000 | 0    | 0    |
| participation         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.361 | 0    | 0    |
| time                  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 1.012 | 0    | 0    |
| resourcesareavailable | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.000 | 0    | 1    |
| rewardsandincentives  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.000 | 1    | 0    |

Variance standardized 2nd layer estimates.

|                       | comm | diss | lead | know | part | time | reso | rewa | mana  | perf  | rewa | reso |
|-----------------------|------|------|------|------|------|------|------|------|-------|-------|------|------|
| comment               | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.954 | 0.000 | 0    | 0    |
| dissatisfaction       | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.045 | 0.000 | 0    | 0    |
| leadership            | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.975 | 0.000 | 0    | 0    |
| knowledge             | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.969 | 0    | 0    |
| participation         | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.779 | 0    | 0    |
| time                  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.840 | 0    | 0    |
| resourcesareavailable | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.000 | 0    | 1    |
| rewardsandincentives  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0.000 | 0.000 | 1    | 0    |

## Summary tables for demographic questions

## [1] "Q6"

## [1] "Raw:"

| #NULL! | 2 | 3  | 4  | 5  | 6  | 7  | 8 |
|--------|---|----|----|----|----|----|---|
| 3      | 0 | 0  | 1  | 0  | 0  | 1  | 0 |
| 0      | 3 | 17 | 28 | 33 | 30 | 6  | 0 |
| 0      | 1 | 12 | 29 | 23 | 47 | 10 | 8 |

## [1] "Percentage:"

| #NULL! | 2     | 3     | 4     | 5     | 6     | 7     | 8     |
|--------|-------|-------|-------|-------|-------|-------|-------|
| 0.6    | 0.000 | 0.000 | 0.200 | 0.000 | 0.000 | 0.200 | 0.000 |
| 0.0    | 0.026 | 0.145 | 0.239 | 0.282 | 0.256 | 0.051 | 0.000 |
| 0.0    | 0.008 | 0.092 | 0.223 | 0.177 | 0.362 | 0.077 | 0.062 |

## [1] "Q7"

## [1] "Raw:"

| #NULL! | 1  | 2  | 3 | 5 | 6 |
|--------|----|----|---|---|---|
| 3      | 2  | 0  | 0 | 0 | 0 |
| 0      | 54 | 60 | 1 | 0 | 2 |

| #NULL! | 1 | 2  | 3  | 5 | 6 |
|--------|---|----|----|---|---|
|        | 2 | 54 | 72 | 1 | 1 |
|        |   |    |    | 0 |   |

## [1] "Percentage:"

| #NULL! | 1     | 2     | 3     | 5     | 6     |
|--------|-------|-------|-------|-------|-------|
| 0.600  | 0.400 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.000  | 0.462 | 0.513 | 0.009 | 0.000 | 0.017 |
| 0.015  | 0.415 | 0.554 | 0.008 | 0.008 | 0.000 |

## [1] "Q8"

## [1] "Raw:"

| #NULL! | 1  | 2  | 3 | 4  | 5  |
|--------|----|----|---|----|----|
| 3      | 1  | 1  | 0 | 0  | 0  |
| 0      | 73 | 21 | 3 | 11 | 9  |
| 0      | 82 | 26 | 3 | 6  | 13 |

## [1] "Percentage:"

| #NULL! | 1     | 2     | 3     | 4     | 5     |
|--------|-------|-------|-------|-------|-------|
| 0.6    | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 |
| 0.0    | 0.624 | 0.179 | 0.026 | 0.094 | 0.077 |
| 0.0    | 0.631 | 0.200 | 0.023 | 0.046 | 0.100 |

## [1] "Q9"

## [1] "Raw:"

|                         |  |  |   |   |   |
|-------------------------|--|--|---|---|---|
|                         |  |  | 3 | 2 | 5 |
| 0                       |  |  | 0 | 2 | 5 |
| 1                       |  |  | 0 | 6 | 1 |
| 10                      |  |  | 0 | 7 | 1 |
| 11                      |  |  | 0 | 3 | 1 |
| 12                      |  |  | 0 | 1 | 3 |
| 13                      |  |  | 0 | 0 | 1 |
| 14                      |  |  | 0 | 2 | 3 |
| 15                      |  |  | 0 | 8 | 6 |
| 15 (K-12)               |  |  | 0 | 1 | 0 |
| 16                      |  |  | 0 | 5 | 3 |
| 16 years as a clinician |  |  | 0 | 0 | 1 |
| 17                      |  |  | 1 | 2 | 4 |
| 18                      |  |  | 0 | 3 | 3 |
| 19                      |  |  | 0 | 0 | 1 |
| 2                       |  |  | 0 | 8 | 7 |
| 20                      |  |  | 0 | 6 | 7 |
| 22                      |  |  | 0 | 2 | 0 |
| 23                      |  |  | 0 | 3 | 2 |
| 24                      |  |  | 0 | 2 | 1 |
| 25                      |  |  | 0 | 3 | 2 |



|                                      |   |   |   |
|--------------------------------------|---|---|---|
| 26                                   | 0 | 0 | 2 |
| 27                                   | 0 | 0 | 5 |
| 28                                   | 0 | 1 | 2 |
| 29                                   | 0 | 0 | 3 |
| 29 years in Extension                | 0 | 0 | 1 |
| 3                                    | 0 | 5 | 9 |
| 30                                   | 0 | 4 | 5 |
| 31                                   | 0 | 2 | 2 |
| 32                                   | 0 | 1 | 1 |
| 33                                   | 0 | 0 | 2 |
| 338                                  | 0 | 0 | 1 |
| 34                                   | 0 | 2 | 3 |
| 35                                   | 1 | 2 | 6 |
| 36                                   | 0 | 1 | 0 |
| 37                                   | 0 | 2 | 3 |
| 39                                   | 0 | 1 | 0 |
| 4                                    | 0 | 5 | 3 |
| 40                                   | 0 | 1 | 3 |
| 41                                   | 0 | 1 | 0 |
| 42                                   | 0 | 1 | 0 |
| 44                                   | 0 | 0 | 1 |
| 45                                   | 0 | 1 | 2 |
| 46                                   | 0 | 0 | 1 |
| 49                                   | 0 | 0 | 1 |
| 5                                    | 0 | 5 | 3 |
| 50                                   | 0 | 0 | 1 |
| 55                                   | 0 | 0 | 1 |
| 6                                    | 0 | 8 | 3 |
| 7                                    | 0 | 2 | 6 |
| 7 years                              | 0 | 1 | 0 |
| 8                                    | 0 | 3 | 2 |
| 9                                    | 0 | 1 | 0 |
| 9 years                              | 0 | 1 | 0 |
| Not career teacher but AP faculty 28 | 0 | 0 | 1 |

## [1] "Percentage:"

|                         |     |       |       |
|-------------------------|-----|-------|-------|
|                         | 0.6 | 0.017 | 0.038 |
| 0                       | 0.0 | 0.017 | 0.038 |
| 1                       | 0.0 | 0.051 | 0.008 |
| 10                      | 0.0 | 0.060 | 0.008 |
| 11                      | 0.0 | 0.026 | 0.008 |
| 12                      | 0.0 | 0.009 | 0.023 |
| 13                      | 0.0 | 0.000 | 0.008 |
| 14                      | 0.0 | 0.017 | 0.023 |
| 15                      | 0.0 | 0.068 | 0.046 |
| 15 (K-12)               | 0.0 | 0.009 | 0.000 |
| 16                      | 0.0 | 0.043 | 0.023 |
| 16 years as a clinician | 0.0 | 0.000 | 0.008 |
| 17                      | 0.2 | 0.017 | 0.031 |
| 18                      | 0.0 | 0.026 | 0.023 |
| 19                      | 0.0 | 0.000 | 0.008 |
| 2                       | 0.0 | 0.068 | 0.054 |
| 20                      | 0.0 | 0.051 | 0.054 |

|                                      |     |       |       |
|--------------------------------------|-----|-------|-------|
| 22                                   | 0.0 | 0.017 | 0.000 |
| 23                                   | 0.0 | 0.026 | 0.015 |
| 24                                   | 0.0 | 0.017 | 0.008 |
| 25                                   | 0.0 | 0.026 | 0.015 |
| 26                                   | 0.0 | 0.000 | 0.015 |
| 27                                   | 0.0 | 0.000 | 0.038 |
| 28                                   | 0.0 | 0.009 | 0.015 |
| 29                                   | 0.0 | 0.000 | 0.023 |
| 29 years in Extension                | 0.0 | 0.000 | 0.008 |
| 3                                    | 0.0 | 0.043 | 0.069 |
| 30                                   | 0.0 | 0.034 | 0.038 |
| 31                                   | 0.0 | 0.017 | 0.015 |
| 32                                   | 0.0 | 0.009 | 0.008 |
| 33                                   | 0.0 | 0.000 | 0.015 |
| 338                                  | 0.0 | 0.000 | 0.008 |
| 34                                   | 0.0 | 0.017 | 0.023 |
| 35                                   | 0.2 | 0.017 | 0.046 |
| 36                                   | 0.0 | 0.009 | 0.000 |
| 37                                   | 0.0 | 0.017 | 0.023 |
| 39                                   | 0.0 | 0.009 | 0.000 |
| 4                                    | 0.0 | 0.043 | 0.023 |
| 40                                   | 0.0 | 0.009 | 0.023 |
| 41                                   | 0.0 | 0.009 | 0.000 |
| 42                                   | 0.0 | 0.009 | 0.000 |
| 44                                   | 0.0 | 0.000 | 0.008 |
| 45                                   | 0.0 | 0.009 | 0.015 |
| 46                                   | 0.0 | 0.000 | 0.008 |
| 49                                   | 0.0 | 0.000 | 0.008 |
| 5                                    | 0.0 | 0.043 | 0.023 |
| 50                                   | 0.0 | 0.000 | 0.008 |
| 55                                   | 0.0 | 0.000 | 0.008 |
| 6                                    | 0.0 | 0.068 | 0.023 |
| 7                                    | 0.0 | 0.017 | 0.046 |
| 7 years                              | 0.0 | 0.009 | 0.000 |
| 8                                    | 0.0 | 0.026 | 0.015 |
| 9                                    | 0.0 | 0.009 | 0.000 |
| 9 years                              | 0.0 | 0.009 | 0.000 |
| Not career teacher but AP faculty 28 | 0.0 | 0.000 | 0.008 |

## [1] "Q10"

## [1] "Raw:"

|                                  |   |    |   |
|----------------------------------|---|----|---|
|                                  | 3 | 2  | 7 |
| 0                                | 0 | 7  | 8 |
| 1                                | 0 | 9  | 7 |
| 1 1/2 years - course facilitator | 0 | 1  | 0 |
| 10                               | 0 | 11 | 3 |
| 11                               | 0 | 5  | 4 |
| 12                               | 0 | 3  | 4 |
| 13                               | 0 | 2  | 0 |
| 14                               | 0 | 0  | 2 |
| 15                               | 0 | 4  | 8 |
| 16                               | 0 | 1  | 4 |

|                        |   |    |   |
|------------------------|---|----|---|
| 17                     | 1 | 1  | 1 |
| 19                     | 0 | 0  | 1 |
| 2                      | 0 | 13 | 9 |
| 20                     | 0 | 0  | 4 |
| 20 years               | 0 | 0  | 1 |
| 21                     | 0 | 0  | 3 |
| 22                     | 0 | 3  | 1 |
| 23                     | 0 | 4  | 2 |
| 24                     | 0 | 0  | 2 |
| 25                     | 0 | 4  | 0 |
| 26                     | 0 | 1  | 2 |
| 27                     | 0 | 0  | 4 |
| 28                     | 0 | 1  | 1 |
| 29                     | 0 | 0  | 2 |
| 3                      | 0 | 8  | 9 |
| 3 years                | 0 | 1  | 0 |
| 3 years as a clinician | 0 | 0  | 1 |
| 30                     | 0 | 1  | 3 |
| 31                     | 0 | 1  | 3 |
| 32                     | 0 | 1  | 2 |
| 33                     | 0 | 2  | 1 |
| 34                     | 0 | 0  | 1 |
| 35                     | 1 | 1  | 4 |
| 36                     | 0 | 1  | 1 |
| 37                     | 0 | 2  | 2 |
| 4                      | 0 | 8  | 4 |
| 40                     | 0 | 1  | 0 |
| 41                     | 0 | 0  | 1 |
| 45                     | 0 | 0  | 2 |
| 5                      | 0 | 11 | 4 |
| 6                      | 0 | 2  | 3 |
| 7                      | 0 | 0  | 3 |
| 8                      | 0 | 2  | 3 |
| 9                      | 0 | 3  | 2 |
| na                     | 0 | 0  | 1 |

## [1] "Percentage:"

|                                  |     |       |       |
|----------------------------------|-----|-------|-------|
|                                  | 0.6 | 0.017 | 0.054 |
| 0                                | 0.0 | 0.060 | 0.062 |
| 1                                | 0.0 | 0.077 | 0.054 |
| 1 1/2 years - course facilitator | 0.0 | 0.009 | 0.000 |
| 10                               | 0.0 | 0.094 | 0.023 |
| 11                               | 0.0 | 0.043 | 0.031 |
| 12                               | 0.0 | 0.026 | 0.031 |
| 13                               | 0.0 | 0.017 | 0.000 |
| 14                               | 0.0 | 0.000 | 0.015 |
| 15                               | 0.0 | 0.034 | 0.062 |
| 16                               | 0.0 | 0.009 | 0.031 |
| 17                               | 0.2 | 0.009 | 0.008 |
| 19                               | 0.0 | 0.000 | 0.008 |
| 2                                | 0.0 | 0.111 | 0.069 |
| 20                               | 0.0 | 0.000 | 0.031 |
| 20 years                         | 0.0 | 0.000 | 0.008 |

|                        |     |       |       |
|------------------------|-----|-------|-------|
| 21                     | 0.0 | 0.000 | 0.023 |
| 22                     | 0.0 | 0.026 | 0.008 |
| 23                     | 0.0 | 0.034 | 0.015 |
| 24                     | 0.0 | 0.000 | 0.015 |
| 25                     | 0.0 | 0.034 | 0.000 |
| 26                     | 0.0 | 0.009 | 0.015 |
| 27                     | 0.0 | 0.000 | 0.031 |
| 28                     | 0.0 | 0.009 | 0.008 |
| 29                     | 0.0 | 0.000 | 0.015 |
| 3                      | 0.0 | 0.068 | 0.069 |
| 3 years                | 0.0 | 0.009 | 0.000 |
| 3 years as a clinician | 0.0 | 0.000 | 0.008 |
| 30                     | 0.0 | 0.009 | 0.023 |
| 31                     | 0.0 | 0.009 | 0.023 |
| 32                     | 0.0 | 0.009 | 0.015 |
| 33                     | 0.0 | 0.017 | 0.008 |
| 34                     | 0.0 | 0.000 | 0.008 |
| 35                     | 0.2 | 0.009 | 0.031 |
| 36                     | 0.0 | 0.009 | 0.008 |
| 37                     | 0.0 | 0.017 | 0.015 |
| 4                      | 0.0 | 0.068 | 0.031 |
| 40                     | 0.0 | 0.009 | 0.000 |
| 41                     | 0.0 | 0.000 | 0.008 |
| 45                     | 0.0 | 0.000 | 0.015 |
| 5                      | 0.0 | 0.094 | 0.031 |
| 6                      | 0.0 | 0.017 | 0.023 |
| 7                      | 0.0 | 0.000 | 0.023 |
| 8                      | 0.0 | 0.017 | 0.023 |
| 9                      | 0.0 | 0.026 | 0.015 |
| na                     | 0.0 | 0.000 | 0.008 |

## [1] "Q11"

## [1] "Raw:"

| #NULL! | 1  | 10 | 11 | 2 | 3  | 4  | 5 | 6  | 7  | 8 |
|--------|----|----|----|---|----|----|---|----|----|---|
| 3      | 1  | 0  | 0  | 0 | 0  | 1  | 0 | 0  | 0  | 0 |
| 2      | 16 | 4  | 9  | 7 | 22 | 23 | 5 | 11 | 18 | 0 |
| 1      | 20 | 0  | 22 | 6 | 16 | 30 | 6 | 12 | 12 | 5 |

## [1] "Percentage:"

| #NULL! | 1     | 10    | 11    | 2     | 3     | 4     | 5     | 6     | 7     | 8     |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.600  | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.017  | 0.137 | 0.034 | 0.077 | 0.060 | 0.188 | 0.197 | 0.043 | 0.094 | 0.154 | 0.000 |
| 0.008  | 0.154 | 0.000 | 0.169 | 0.046 | 0.123 | 0.231 | 0.046 | 0.092 | 0.092 | 0.038 |

## [1] "Q12"

## [1] "Raw:"

|      |   |    |    |
|------|---|----|----|
| AAEC | 3 | 17 | 12 |
|      | 0 | 1  | 1  |

|   |   |   |   |
|---|---|---|---|
| ACIS  | 0 | 3 | 1 |
| Aerospace & Ocean Engineering                     | 0 | 0 | 1 |
| Aerospace and Ocean Engineering                   | 0 | 0 | 1 |
| Agricultural and Applied Economics                | 0 | 1 | 0 |
| Agricultural Leadership and Community Education   | 0 | 0 | 1 |
| Agricultural, Leadership, and Community Education | 0 | 1 | 0 |
| ALCE  | 0 | 1 | 0 |
| Apparel, Housing & Resource Management            | 0 | 0 | 1 |
| Apparel, Housing, & Resource Management           | 0 | 1 | 0 |
| Architecture                                      | 0 | 0 | 1 |
| Architecture & Design                             | 0 | 1 | 0 |
| ASPECT  | 0 | 0 | 1 |
| AT  | 0 | 0 | 1 |
| Biochemistry                                      | 0 | 1 | 0 |
| Biological Sciences                               | 0 | 4 | 0 |
| BIT   | 0 | 1 | 1 |
| BSE   | 0 | 0 | 1 |
| Building Construction                             | 0 | 2 | 0 |
| Business Information Technology                   | 0 | 2 | 0 |
| CALS Finance                                      | 0 | 1 | 0 |
| CALS-IT   | 0 | 0 | 1 |
| CEE   | 0 | 1 | 1 |
| Center for Leadership in Global Sustainability    | 0 | 1 | 1 |
| chemistry   | 0 | 2 | 0 |
| Chemistry   | 0 | 5 | 6 |
| CITSIE / Instructional Design and Technology      | 0 | 0 | 1 |
| Civil and Environmental Engineering               | 0 | 1 | 2 |
| Civil Engineering                                 | 0 | 0 | 1 |
| Communication                                     | 0 | 1 | 1 |
| Computer Science                                  | 0 | 2 | 0 |
| Cook Counseling Center                            | 0 | 0 | 1 |
| Corps of Cadets                                   | 0 | 0 | 1 |
| Counseling Education                              | 0 | 0 | 1 |
| CPAP  | 0 | 1 | 1 |
| CSES  | 0 | 1 | 0 |
| CTE   | 0 | 1 | 0 |
| Dairy Science                                     | 0 | 0 | 2 |
| Department of Learning Sciences                   | 0 | 1 | 0 |
| Dept of Marketing                                 | 0 | 0 | 1 |
| dept of nunna yer bidniss                         | 0 | 0 | 1 |
| ECE   | 0 | 4 | 1 |
| Economics   | 0 | 0 | 2 |
| Education   | 0 | 0 | 1 |
| Electrical and Computer Engineering               | 0 | 1 | 1 |
| Engineering education                             | 0 | 0 | 1 |
| Engineering Education                             | 0 | 6 | 0 |
| English   | 1 | 4 | 4 |
| entomology  | 0 | 0 | 1 |
| Entomology  | 0 | 1 | 1 |
| Environmental Health and Safety                   | 0 | 0 | 1 |
| Faculty of Leadership, Counseling, and Research   | 0 | 0 | 1 |
| Finance   | 0 | 1 | 1 |
| Fish & Wildlife Conservation                      | 0 | 0 | 1 |
| Fish and wildlife conservation                    | 0 | 1 | 0 |

|  |   |   |   |
|--|---|---|---|
| Fish and Wildlife Conservation   | 0 | 0 | 1 |
| Food Science and Technology  | 0 | 1 | 0 |
| Foreign Languages and Literatures  | 0 | 0 | 1 |
| forest resources   | 0 | 0 | 1 |
| Forest Resources and Environmental Conservation                              | 0 | 0 | 1 |
| FREC   | 0 | 1 | 0 |
| FST  | 0 | 0 | 1 |
| Geoscience   | 0 | 1 | 0 |
| Geosciences  | 0 | 1 | 0 |
| H  | 0 | 1 | 0 |
| History  | 0 | 0 | 2 |
| HNFE   | 0 | 0 | 1 |
| hokie wellness   | 0 | 0 | 1 |
| horticulture   | 0 | 1 | 0 |
| Horticulture   | 0 | 1 | 1 |
| Hospitality and Tourism Management   | 0 | 1 | 0 |
| HTM  | 0 | 0 | 3 |
| Human Development  | 0 | 3 | 3 |
| Human Nutrition, Foods, and Exercise   | 0 | 1 | 1 |
| Hume Center for National Security and Technology                             | 0 | 0 | 1 |
| ICTAS  | 0 | 0 | 2 |
| IEC  | 0 | 1 | 0 |
| Institute for Critical Technology and Applied Science                        | 0 | 0 | 1 |
| Intensive English Program  | 0 | 0 | 1 |
| Language and Culture Institute   | 0 | 0 | 1 |
| LCI intensive English program  | 0 | 0 | 1 |
| Leadership Education Collaborative   | 0 | 1 | 0 |
| Learning   | 0 | 1 | 0 |
| Learning Sciences and Technology   | 0 | 0 | 1 |
| Learning Services  | 0 | 1 | 0 |
| LED  | 0 | 1 | 0 |
| Management   | 0 | 2 | 3 |
| Management Department  | 0 | 0 | 1 |
| Marketing  | 0 | 1 | 0 |
| Materials Science and Engineering  | 0 | 1 | 1 |
| Mathematics  | 0 | 0 | 2 |
| Mechanical Engineering   | 0 | 1 | 0 |
| MNR  | 0 | 1 | 0 |
| MPH  | 0 | 0 | 1 |
| MSE  | 0 | 0 | 1 |
| Myers-Lawson School of Construction  | 0 | 1 | 0 |
| N/A  | 0 | 1 | 0 |
| na   | 0 | 0 | 1 |
| Network Dynamics and Simulation Science Laboratory                           | 0 | 0 | 1 |
| Neuromotor Research Clinic -VTCRI  | 0 | 0 | 1 |
| OERO   | 0 | 0 | 2 |
| Office of Academic Programs  | 0 | 1 | 0 |
| Office of the Dean - College of Liberal Arts and Human Sciences              | 0 | 0 | 1 |
| Office of the Executive Vice President and Provost                           | 0 | 0 | 1 |
| Office of the President  | 0 | 0 | 1 |
| Office of the Vice President for Student Affairs/Division of Student Affairs | 0 | 0 | 1 |
| Office of Undergraduate Admissions   | 0 | 0 | 1 |
| Philosophy   | 0 | 1 | 1 |
| Physics  | 0 | 0 | 1 |

|  |   |   |   |
|--|---|---|---|
| Population Health Sciences                                   | 0 | 0 | 2 |
| PPWS   | 0 | 0 | 1 |
| Psci   | 0 | 1 | 0 |
| PSCI   | 0 | 1 | 0 |
| Psychology   | 0 | 1 | 0 |
| Public Administration  | 0 | 0 | 1 |
| public administration and policy; also political science     | 0 | 1 | 0 |
| Religion and Culture   | 0 | 1 | 0 |
| Research and Informatics                                     | 0 | 1 | 0 |
| SBIO   | 0 | 0 | 1 |
| School of Art and Architecture                               | 0 | 1 | 0 |
| School of Education  | 0 | 1 | 3 |
| School of Public and International Affairs                   | 0 | 0 | 1 |
| Science and Technology in Society                            | 0 | 2 | 0 |
| Secure Information Systems                                   | 0 | 0 | 1 |
| Small Animal Clinical Sciences                               | 0 | 0 | 1 |
| Social and Decision Analytics Lab                            | 0 | 0 | 1 |
| sociology  | 0 | 1 | 0 |
| Sociology  | 0 | 1 | 1 |
| SOE  | 0 | 0 | 1 |
| tbmh   | 0 | 1 | 0 |
| Teaching and Learning  | 0 | 0 | 1 |
| TLOS   | 0 | 1 | 0 |
| TLOS (I teach in English.)                                   | 0 | 1 | 0 |
| Translational Biology, Medicine, and Health Graduate Program | 0 | 1 | 0 |
| University Studies   | 0 | 2 | 0 |
| UOPD   | 0 | 0 | 1 |
| Virginia Cooperative Extension                               | 1 | 0 | 3 |
| Virginia Cooperative Extension - Warren County               | 0 | 0 | 1 |
| Virginia Seafood AREC  | 0 | 0 | 1 |
| VTTI   | 0 | 0 | 1 |
| Washington Alexandria Architecture Center                    | 0 | 0 | 1 |

## [1] "Percentage:"

|   |     |       |       |
|---|-----|-------|-------|
|   | 0.6 | 0.145 | 0.092 |
| AAEC  | 0.0 | 0.009 | 0.008 |
| ACIS  | 0.0 | 0.026 | 0.008 |
| Aerospace & Ocean Engineering                     | 0.0 | 0.000 | 0.008 |
| Aerospace and Ocean Engineering                   | 0.0 | 0.000 | 0.008 |
| Agricultural and Applied Economics                | 0.0 | 0.009 | 0.000 |
| Agricultural Leadership and Community Education   | 0.0 | 0.000 | 0.008 |
| Agricultural, Leadership, and Community Education | 0.0 | 0.009 | 0.000 |
| ALCE  | 0.0 | 0.009 | 0.000 |
| Apparel, Housing & Resource Management            | 0.0 | 0.000 | 0.008 |
| Apparel, Housing, & Resource Management           | 0.0 | 0.009 | 0.000 |
| Architecture                                      | 0.0 | 0.000 | 0.008 |
| Architecture & Design                             | 0.0 | 0.009 | 0.000 |
| ASPECT  | 0.0 | 0.000 | 0.008 |
| AT  | 0.0 | 0.000 | 0.008 |
| Biochemistry                                      | 0.0 | 0.009 | 0.000 |
| Biological Sciences                               | 0.0 | 0.034 | 0.000 |
| BIT   | 0.0 | 0.009 | 0.008 |
| BSE   | 0.0 | 0.000 | 0.008 |

|   |     |       |       |
|---|-----|-------|-------|
| Building Construction                           | 0.0 | 0.017 | 0.000 |
| Business Information Technology                 | 0.0 | 0.017 | 0.000 |
| CALS Finance                                    | 0.0 | 0.009 | 0.000 |
| CALS-IT   | 0.0 | 0.000 | 0.008 |
| CEE   | 0.0 | 0.009 | 0.008 |
| Center for Leadership in Global Sustainability  | 0.0 | 0.009 | 0.008 |
| chemistry                                       | 0.0 | 0.017 | 0.000 |
| Chemistry                                       | 0.0 | 0.043 | 0.046 |
| CITSIE / Instructional Design and Technology    | 0.0 | 0.000 | 0.008 |
| Civil and Environmental Engineering             | 0.0 | 0.009 | 0.015 |
| Civil Engineering                               | 0.0 | 0.000 | 0.008 |
| Communication                                   | 0.0 | 0.009 | 0.008 |
| Computer Science                                | 0.0 | 0.017 | 0.000 |
| Cook Counseling Center                          | 0.0 | 0.000 | 0.008 |
| Corps of Cadets                                 | 0.0 | 0.000 | 0.008 |
| Counseling Education                            | 0.0 | 0.000 | 0.008 |
| CPAP  | 0.0 | 0.009 | 0.008 |
| CSES  | 0.0 | 0.009 | 0.000 |
| CTE   | 0.0 | 0.009 | 0.000 |
| Dairy Science                                   | 0.0 | 0.000 | 0.015 |
| Department of Learning Sciences                 | 0.0 | 0.009 | 0.000 |
| Dept of Marketing                               | 0.0 | 0.000 | 0.008 |
| dept of nunna yer bidniss                       | 0.0 | 0.000 | 0.008 |
| ECE   | 0.0 | 0.034 | 0.008 |
| Economics                                       | 0.0 | 0.000 | 0.015 |
| Education                                       | 0.0 | 0.000 | 0.008 |
| Electrical and Computer Engineering             | 0.0 | 0.009 | 0.008 |
| Engineering education                           | 0.0 | 0.000 | 0.008 |
| Engineering Education                           | 0.0 | 0.051 | 0.000 |
| English   | 0.2 | 0.034 | 0.031 |
| entomology                                      | 0.0 | 0.000 | 0.008 |
| Entomology                                      | 0.0 | 0.009 | 0.008 |
| Environmental Health and Safety                 | 0.0 | 0.000 | 0.008 |
| Faculty of Leadership, Counseling, and Research | 0.0 | 0.000 | 0.008 |
| Finance   | 0.0 | 0.009 | 0.008 |
| Fish & Wildlife Conservation                    | 0.0 | 0.000 | 0.008 |
| Fish and wildlife conservation                  | 0.0 | 0.009 | 0.000 |
| Fish and Wildlife Conservation                  | 0.0 | 0.000 | 0.008 |
| Food Science and Technology                     | 0.0 | 0.009 | 0.000 |
| Foreign Languages and Literatures               | 0.0 | 0.000 | 0.008 |
| forest resources                                | 0.0 | 0.000 | 0.008 |
| Forest Resources and Environmental Conservation | 0.0 | 0.000 | 0.008 |
| FREC  | 0.0 | 0.009 | 0.000 |
| FST   | 0.0 | 0.000 | 0.008 |
| Geoscience                                      | 0.0 | 0.009 | 0.000 |
| Geosciences                                     | 0.0 | 0.009 | 0.000 |
| H   | 0.0 | 0.009 | 0.000 |
| History   | 0.0 | 0.000 | 0.015 |
| HNFE  | 0.0 | 0.000 | 0.008 |
| hokie wellness                                  | 0.0 | 0.000 | 0.008 |
| horticulture                                    | 0.0 | 0.009 | 0.000 |
| Horticulture                                    | 0.0 | 0.009 | 0.008 |
| Hospitality and Tourism Management              | 0.0 | 0.009 | 0.000 |
| HTM   | 0.0 | 0.000 | 0.023 |



|  |     |       |       |
|--|-----|-------|-------|
| Human Development  | 0.0 | 0.026 | 0.023 |
| Human Nutrition, Foods, and Exercise   | 0.0 | 0.009 | 0.008 |
| Hume Center for National Security and Technology                             | 0.0 | 0.000 | 0.008 |
| ICTAS  | 0.0 | 0.000 | 0.015 |
| IEC  | 0.0 | 0.009 | 0.000 |
| Institute for Critical Technology and Applied Science                        | 0.0 | 0.000 | 0.008 |
| Intensive English Program  | 0.0 | 0.000 | 0.008 |
| Language and Culture Institute   | 0.0 | 0.000 | 0.008 |
| LCI intensive English program  | 0.0 | 0.000 | 0.008 |
| Leadership Education Collaborative   | 0.0 | 0.009 | 0.000 |
| Learning   | 0.0 | 0.009 | 0.000 |
| Learning Sciences and Technology   | 0.0 | 0.000 | 0.008 |
| Learning Services  | 0.0 | 0.009 | 0.000 |
| LED  | 0.0 | 0.009 | 0.000 |
| Management   | 0.0 | 0.017 | 0.023 |
| Management Department  | 0.0 | 0.000 | 0.008 |
| Marketing  | 0.0 | 0.009 | 0.000 |
| Materials Science and Engineering  | 0.0 | 0.009 | 0.008 |
| Mathematics  | 0.0 | 0.000 | 0.015 |
| Mechanical Engineering   | 0.0 | 0.009 | 0.000 |
| MNR  | 0.0 | 0.009 | 0.000 |
| MPH  | 0.0 | 0.000 | 0.008 |
| MSE  | 0.0 | 0.000 | 0.008 |
| Myers-Lawson School of Construction  | 0.0 | 0.009 | 0.000 |
| N/A  | 0.0 | 0.009 | 0.000 |
| na   | 0.0 | 0.000 | 0.008 |
| Network Dynamics and Simulation Science Laboratory                           | 0.0 | 0.000 | 0.008 |
| Neuromotor Research Clinic -VTCRI  | 0.0 | 0.000 | 0.008 |
| OERO   | 0.0 | 0.000 | 0.015 |
| Office of Academic Programs  | 0.0 | 0.009 | 0.000 |
| Office of the Dean - College of Liberal Arts and Human Sciences              | 0.0 | 0.000 | 0.008 |
| Office of the Executive Vice President and Provost                           | 0.0 | 0.000 | 0.008 |
| Office of the President  | 0.0 | 0.000 | 0.008 |
| Office of the Vice President for Student Affairs/Division of Student Affairs | 0.0 | 0.000 | 0.008 |
| Office of Undergraduate Admissions   | 0.0 | 0.000 | 0.008 |
| Philosophy   | 0.0 | 0.009 | 0.008 |
| Physics  | 0.0 | 0.000 | 0.008 |
| Population Health Sciences   | 0.0 | 0.000 | 0.015 |
| PPWS   | 0.0 | 0.000 | 0.008 |
| Psci   | 0.0 | 0.009 | 0.000 |
| PSCI   | 0.0 | 0.009 | 0.000 |
| Psychology   | 0.0 | 0.009 | 0.000 |
| Public Administration  | 0.0 | 0.000 | 0.008 |
| public administration and policy; also political science                     | 0.0 | 0.009 | 0.000 |
| Religion and Culture   | 0.0 | 0.009 | 0.000 |
| Research and Informatics   | 0.0 | 0.009 | 0.000 |
| SBIO   | 0.0 | 0.000 | 0.008 |
| School of Art and Architecture   | 0.0 | 0.009 | 0.000 |
| School of Education  | 0.0 | 0.009 | 0.023 |
| School of Public and International Affairs                                   | 0.0 | 0.000 | 0.008 |
| Science and Technology in Society  | 0.0 | 0.017 | 0.000 |
| Secure Information Systems   | 0.0 | 0.000 | 0.008 |
| Small Animal Clinical Sciences   | 0.0 | 0.000 | 0.008 |
| Social and Decision Analytics Lab  | 0.0 | 0.000 | 0.008 |

|  |     |       |       |
|--|-----|-------|-------|
| sociology  | 0.0 | 0.009 | 0.000 |
| Sociology  | 0.0 | 0.009 | 0.008 |
| SOE  | 0.0 | 0.000 | 0.008 |
| tbmh   | 0.0 | 0.009 | 0.000 |
| Teaching and Learning  | 0.0 | 0.000 | 0.008 |
| TLOS   | 0.0 | 0.009 | 0.000 |
| TLOS (I teach in English.)                                   | 0.0 | 0.009 | 0.000 |
| Translational Biology, Medicine, and Health Graduate Program | 0.0 | 0.009 | 0.000 |
| University Studies   | 0.0 | 0.017 | 0.000 |
| UOPD   | 0.0 | 0.000 | 0.008 |
| Virginia Cooperative Extension                               | 0.2 | 0.000 | 0.023 |
| Virginia Cooperative Extension - Warren County               | 0.0 | 0.000 | 0.008 |
| Virginia Seafood AREC  | 0.0 | 0.000 | 0.008 |
| VTTI   | 0.0 | 0.000 | 0.008 |
| Washington Alexandria Architecture Center                    | 0.0 | 0.000 | 0.008 |

## [1] "Q13"

## [1] "Raw:"

| #NULL! | 1 | 2  | 3  | 4  |
|--------|---|----|----|----|
| 3      | 0 | 1  | 1  | 0  |
| 0      | 3 | 57 | 45 | 12 |
| 0      | 9 | 73 | 41 | 7  |

## [1] "Percentage:"

| #NULL! | 1     | 2     | 3     | 4     |
|--------|-------|-------|-------|-------|
| 0.6    | 0.000 | 0.200 | 0.200 | 0.000 |
| 0.0    | 0.026 | 0.487 | 0.385 | 0.103 |
| 0.0    | 0.069 | 0.562 | 0.315 | 0.054 |

## [1] "Ranking: Q4\_1"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 0    | 0    | 0    | 1    | 1    | 0    | 1    | 1    |
| 6      | 34   | 8    | 6    | 12   | 12   | 9    | 12   | 18   |
| 4      | 27   | 11   | 13   | 10   | 6    | 8    | 21   | 30   |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.000 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.200 | 0.200 |
| 0.051  | 0.291 | 0.068 | 0.051 | 0.103 | 0.103 | 0.077 | 0.103 | 0.154 |
| 0.031  | 0.208 | 0.085 | 0.100 | 0.077 | 0.046 | 0.062 | 0.162 | 0.231 |

## [1] "Ranking: Q4\_2"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 1    | 0    | 2    | 0    | 0    | 0    | 0    | 1    |
| 6      | 15   | 32   | 23   | 18   | 13   | 6    | 4    | 0    |

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
|        | 4    | 16   | 32   | 35   | 21   | 14   | 1    | 6    |
|        |      |      |      |      |      |      |      | 1    |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.200 | 0.000 | 0.400 | 0.000 | 0.000 | 0.000 | 0.000 | 0.200 |
| 0.051  | 0.128 | 0.274 | 0.197 | 0.154 | 0.111 | 0.051 | 0.034 | 0.000 |
| 0.031  | 0.123 | 0.246 | 0.269 | 0.162 | 0.108 | 0.008 | 0.046 | 0.008 |

## [1] "Ranking: Q4\_3"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 2    | 0    | 1    | 1    | 0    | 0    | 0    | 0    |
| 6      | 12   | 21   | 29   | 21   | 13   | 7    | 8    | 0    |
| 4      | 21   | 22   | 28   | 25   | 18   | 7    | 4    | 1    |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.400 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.051  | 0.103 | 0.179 | 0.248 | 0.179 | 0.111 | 0.060 | 0.068 | 0.000 |
| 0.031  | 0.162 | 0.169 | 0.215 | 0.192 | 0.138 | 0.054 | 0.031 | 0.008 |

## [1] "Ranking: Q4\_4"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 1    | 3    | 0    | 0    | 0    | 0    | 0    | 0    |
| 6      | 21   | 16   | 18   | 21   | 13   | 14   | 5    | 3    |
| 4      | 23   | 20   | 23   | 20   | 15   | 15   | 8    | 2    |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.200 | 0.600 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 0.051  | 0.179 | 0.137 | 0.154 | 0.179 | 0.111 | 0.120 | 0.043 | 0.026 |
| 0.031  | 0.177 | 0.154 | 0.177 | 0.154 | 0.115 | 0.115 | 0.062 | 0.015 |

## [1] "Ranking: Q4\_5"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 0    | 1    | 0    | 0    | 0    | 0    | 2    | 1    |
| 6      | 0    | 6    | 5    | 8    | 19   | 18   | 19   | 36   |
| 4      | 2    | 8    | 2    | 6    | 13   | 15   | 30   | 50   |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.000 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.400 | 0.200 |
| 0.051  | 0.000 | 0.051 | 0.043 | 0.068 | 0.162 | 0.154 | 0.162 | 0.308 |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.031  | 0.015 | 0.062 | 0.015 | 0.046 | 0.100 | 0.115 | 0.231 | 0.385 |

## [1] "Ranking: Q4\_6"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 0    | 0    | 0    | 1    | 0    | 2    | 0    | 1    |
| 6      | 6    | 5    | 8    | 13   | 23   | 29   | 21   | 6    |
| 4      | 2    | 13   | 8    | 23   | 25   | 36   | 12   | 7    |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.000 | 0.000 | 0.000 | 0.200 | 0.000 | 0.400 | 0.000 | 0.200 |
| 0.051  | 0.051 | 0.043 | 0.068 | 0.111 | 0.197 | 0.248 | 0.179 | 0.051 |
| 0.031  | 0.015 | 0.100 | 0.062 | 0.177 | 0.192 | 0.277 | 0.092 | 0.054 |

## [1] "Ranking: Q4\_7"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 0    | 0    | 1    | 0    | 1    | 1    | 1    | 0    |
| 6      | 11   | 11   | 13   | 9    | 13   | 19   | 29   | 6    |
| 4      | 12   | 16   | 7    | 11   | 19   | 30   | 27   | 4    |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.000 | 0.000 | 0.200 | 0.000 | 0.200 | 0.200 | 0.200 | 0.000 |
| 0.051  | 0.094 | 0.094 | 0.111 | 0.077 | 0.111 | 0.162 | 0.248 | 0.051 |
| 0.031  | 0.092 | 0.123 | 0.054 | 0.085 | 0.146 | 0.231 | 0.208 | 0.031 |

## [1] "Ranking: Q4\_8"

| #NULL! | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 |
|--------|------|------|------|------|------|------|------|------|
| 1      | 0    | 0    | 0    | 1    | 2    | 1    | 0    | 0    |
| 6      | 12   | 12   | 9    | 9    | 5    | 9    | 13   | 42   |
| 4      | 23   | 4    | 10   | 10   | 16   | 14   | 18   | 31   |

| #NULL! | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  | 6.00  | 7.00  | 8.00  |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.200  | 0.000 | 0.000 | 0.000 | 0.200 | 0.400 | 0.200 | 0.000 | 0.000 |
| 0.051  | 0.103 | 0.103 | 0.077 | 0.077 | 0.043 | 0.077 | 0.111 | 0.359 |
| 0.031  | 0.177 | 0.031 | 0.077 | 0.077 | 0.123 | 0.108 | 0.138 | 0.238 |

```
## [1] "mean:"
## [1] 17.2
## [1] "sd:"
## [1] 12.9
## [1] "min:"
## [1] 0
## [1] "max:"
## [1] 55
## [1] "mode:"
## [1] 2
## [1] "missing:"
## <NA>
## 10
## [1] "mean:"
## [1] 12.6
## [1] "sd:"
## [1] 11.5
## [1] "min:"
## [1] 0
## [1] "max:"
## [1] 45
## [1] "mode:"
## [1] 2
## [1] "missing:"
## <NA>
## 13
## [1] "age:"
```

|       | N  | Freq  |
|-------|----|-------|
| #NULL | 3  | 0.012 |
| 18-24 | 4  | 0.016 |
| 25-34 | 29 | 0.115 |
| 35-44 | 58 | 0.230 |
| 45-54 | 56 | 0.222 |
| 55-64 | 77 | 0.306 |
| 65-74 | 17 | 0.067 |
| 75+   | 8  | 0.032 |

```
## [1] "sex:"
```

|       | N   | Freq  |
|-------|-----|-------|
| #NULL | 5   | 0.020 |
| Woman | 110 | 0.437 |
| Man   | 132 | 0.524 |
| Trans | 2   | 0.008 |
| PNTS  | 1   | 0.004 |
| Other | 2   | 0.008 |

## [1] "role:"

|       | N   | Freq  |
|-------|-----|-------|
| #NULL | 3   | 0.012 |
| TRF   | 156 | 0.619 |
| APF   | 48  | 0.190 |
| Staff | 6   | 0.024 |
| TA    | 17  | 0.067 |
| Other | 22  | 0.087 |

## [1] "college:"

|        | N  | Freq  |
|--------|----|-------|
| #NULL  | 6  | 0.024 |
| CALS   | 37 | 0.147 |
| UL     | 4  | 0.016 |
| Other  | 31 | 0.123 |
| CAUS   | 13 | 0.052 |
| CoE    | 38 | 0.151 |
| CLAHS  | 54 | 0.214 |
| CNRE   | 11 | 0.044 |
| PCB    | 23 | 0.091 |
| CoS    | 30 | 0.119 |
| VetMed | 5  | 0.020 |

## [1] "proficiency:"

|              | N   | Freq  |
|--------------|-----|-------|
| #NULL        | 3   | 0.012 |
| Novice       | 12  | 0.048 |
| Intermediate | 131 | 0.520 |
| Advanced     | 87  | 0.345 |
| Expert       | 19  | 0.075 |

## [1] "canvas:"

|       | N   | Freq  |
|-------|-----|-------|
| #NULL | 5   | 0.020 |
| yes   | 117 | 0.464 |
| no    | 130 | 0.516 |