

ULL Preliminary Analysis

January 13, 2025

1 Imports

```
[66]: import os
import copy
import math
import json
import collections

from IPython.display import display, HTML

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.preprocessing import OrdinalEncoder
from sklearn.ensemble import RandomForestClassifier
from sklearn.model_selection import train_test_split, cross_validate, StratifiedKFold
from sklearn.metrics import get_scoring
from sklearn.preprocessing import KBinsDiscretizer

from aif360.algorithms.inprocessing import MetaFairClassifier, PrejudiceRemover, GerryFairClassifier
from fairlearn import metrics
```

2 General Settings

```
[67]: data_path = os.path.join("/", "home", "data")
ull_path = os.path.join(data_path, "ull")
ull_intermediate_path = os.path.join(ull_path, "intermediate")
ull_final_path = os.path.join(ull_path, "final")
```

3 Data Collection

```
[68]: df = pd.read_csv(os.path.join(ull_path, "original.csv"), low_memory=False)
df = df.set_index("id_questionnaire")
print(df.shape)
df
```

(80174, 159)

```
[68]:      id_student_original  id_year  id_grade  id_class_group  \
id_questionnaire
1                  33613.0    2016        3            A
2                  19294.0    2016        3            A
3                  19587.0    2016        3        NaN
4                  29985.0    2016        3            A
5                  6982.0     2016        3            A
...
83853                 ...     ...       ...       ...
83854                 2500.0    2019        6            B
83854                 5784.0    2019        6            A
83855                 7708.0    2019        6            X
83856                 18965.0   2019        6            B
83857                 7652.0    2019        6            A

      id_school  id_student_16_19  id_school_16_19  score_MAT  \
id_questionnaire
1              2415.0        14374.0        569.0    564.8700
2              1842.0        8001.0        273.0    388.3400
3              1432.0        8142.0        82.0     386.5900
4              2280.0        12800.0        505.0    487.7600
5              2040.0        2606.0        390.0    709.7900
...
83853                 ...       ...       ...
83854                 1278.0       NaN        271.0    400.8625
83854                 1079.0       NaN        78.0     597.0243
83855                 1486.0        3036.0        459.0    707.9254
83856                 1036.0        9913.0        36.0     522.8511
83857                 1173.0        5539.0        169.0    519.1200

      level_MAT  score_LEN  ...
id_questionnaire
1             3.0  535.1500  ...
2             1.0  293.7000  ...
3             1.0  514.8100  ...
4             2.0  449.2500  ...
5             4.0  598.7200  ...
...
83853                 ...       ...
83854                 2.0  446.6522  ...
83854                 3.0  632.6043  ...
83855                 4.0  400.2761  ...
```

| | | | |
|------------------|-----|----------|---|
| 83856 | 3.0 | 656.1601 | ... |
| 83857 | 3.0 | 426.1871 | ... |
| | | | t_extent_of_student_involvement_during_class \ |
| id_questionnaire | | | |
| 1 | | | NaN |
| 2 | | | NaN |
| 3 | | | NaN |
| 4 | | | 0.555556 |
| 5 | | | 0.666667 |
| ... | | | ... |
| 83853 | | | 0.555556 |
| 83854 | | | 0.666667 |
| 83855 | | | NaN |
| 83856 | | | 0.666667 |
| 83857 | | | 0.666667 |
| | | | t_extent_of_teaching_methods_variety \ |
| id_questionnaire | | | |
| 1 | | | NaN |
| 2 | | | NaN |
| 3 | | | NaN |
| 4 | | | 0.666667 |
| 5 | | | 0.733333 |
| ... | | | ... |
| 83853 | | | 0.800000 |
| 83854 | | | 0.733333 |
| 83855 | | | NaN |
| 83856 | | | 0.666667 |
| 83857 | | | 0.666667 |
| | | | t_extent_of_opinion_on_school t_extent_of_class_behaviour \ |
| id_questionnaire | | | |
| 1 | | NaN | NaN |
| 2 | | NaN | NaN |
| 3 | | NaN | NaN |
| 4 | | 1.000000 | 0.500000 |
| 5 | | 1.000000 | 0.833333 |
| ... | | ... | ... |
| 83853 | | 1.000000 | 0.500000 |
| 83854 | | 0.666667 | 0.666667 |
| 83855 | | NaN | NaN |
| 83856 | | 0.666667 | 0.666667 |
| 83857 | | 0.666667 | 0.666667 |
| | | | t_extent_of_resource_variety \ |
| id_questionnaire | | | |

| | |
|-------|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | 0.458333 |
| 5 | 0.625000 |
| ... | ... |
| 83853 | 0.416667 |
| 83854 | 0.500000 |
| 83855 | NaN |
| 83856 | 0.458333 |
| 83857 | 0.375000 |
| | t_extent_of_good_work_by_non_teachers \ |
| | id_questionnaire |
| 1 | NaN |
| 2 | NaN |
| 3 | NaN |
| 4 | 0.555556 |
| 5 | 0.888889 |
| ... | ... |
| 83853 | 1.000000 |
| 83854 | 1.000000 |
| 83855 | NaN |
| 83856 | 0.625000 |
| 83857 | 0.937500 |
| | t_number_of_individual_training_topics \ |
| | id_questionnaire |
| 1 | NaN |
| 2 | NaN |
| 3 | NaN |
| 4 | NaN |
| 5 | 1.0 |
| ... | ... |
| 83853 | 1.0 |
| 83854 | 1.0 |
| 83855 | NaN |
| 83856 | 3.0 |
| 83857 | 2.0 |
| | t_number_of_subjects_taught \ |
| | id_questionnaire |
| 1 | NaN |
| 2 | NaN |
| 3 | NaN |
| 4 | NaN |
| 5 | NaN |

```

...
83853           ...
83854           NaN
83855           NaN
83856           NaN
83857           NaN

          t_extent_of_satisfaction_job_and_school \
id_questionnaire
1                   NaN
2                   NaN
3                   NaN
4                   NaN
5                   NaN
...
83853           ...
83854           1.000000
83855           0.722222
83856           0.611111
83857           0.666667

          t_extent_of_results_satisfaction
id_questionnaire
1                   NaN
2                   NaN
3                   NaN
4                   0.666667
5                   1.000000
...
83853           ...
83854           0.166667
83855           0.500000
83856           NaN
83857           0.500000
83858           0.500000

```

[80174 rows x 159 columns]

4 Data Selection

```
[69]: df.groupby(by=["id_year", "id_grade"])[["id_year", "id_grade"]].count()
# df.groupby(by=["id_year", "id_grade"])[["id_year", "id_grade"]].count().plot.
    barh()
```

```
[69]:      id_year  id_grade
id_year id_grade
2016     3          19466    19466
```

```
       6          19928      19928
2017   3          3056       3056
       4          2931       2931
       6          3110       3110
2018   3          3238       3238
       4          3106       3106
       6          3277       3277
2019   4          3199       3199
       6         18863      18863
```

```
[70]: df[["id_year", "id_grade", "s_gender"]].groupby(by=["id_year", "id_grade"])["s_gender"].count()
```

```
[70]: id_year  id_grade
2016      3          18582
          6          18550
2017      3          2991
          4          2930
          6          2973
2018      3          3133
          4          3106
          6          3110
2019      4          3191
          6         18658
Name: s_gender, dtype: int64
```

```
[71]: df[["id_year", "id_grade", "f_ESCS"]].groupby(by=["id_year", "id_grade"])["f_ESCS"].count()
```

```
[71]: id_year  id_grade
2016      3          13964
          6          14702
2017      3          1549
          4          2889
          6          1872
2018      3          2929
          4          3030
          6          2922
2019      4          3116
          6         11784
Name: f_ESCS, dtype: int64
```

```
[72]: df[["id_year", "id_grade", "level_MAT"]].groupby(by=["id_year", "id_grade"])["level_MAT"].count()
```

```
[72]: id_year  id_grade
2016      3          17806
```

```

6          17916
2017     3          2995
        4          2362
        6          3031
2018     3          3102
        4          2397
        6          3186
2019     4          2385
        6         18019
Name: level_MAT, dtype: int64

```

```
[73]: df_sel = df[(df["id_year"] == 2016) & (df["id_grade"] == 3)]
df_sel = df_sel[df_sel['level_MAT'].notna()]
print(df_sel.shape)
print(df_sel["s_gender"].isna().sum())
print(df_sel["f_ESCS"].isna().sum())
```

```
(17806, 159)
1
4903
```

```
[74]: df_sel["f_ESCS"].describe()
```

```
[74]: count    12903.000000
mean      0.018232
std       0.994479
min      -2.706281
25%      -0.735529
50%      0.016366
75%      0.638482
max      3.151773
Name: f_ESCS, dtype: float64
```

5 Feature Selection

5.1 Utils

```
[75]: def filter_columns_starting_with(temp_df, pattern):
    df = copy.deepcopy(temp_df)
    if pattern is not None:
        return df[[col for col in df.columns if col.startswith(pattern)] + ↵
        [col for col in df.columns if col.startswith("level_")]]
    else:
        return df
```

```
[76]: def get_missing_values(temp_df):
    df = copy.deepcopy(temp_df)
    return df.isna().sum()/df.shape[0]
```

```
[77]: def discretize_columns(temp_df):
    df = copy.deepcopy(temp_df)
    categorical_features = df.select_dtypes(include=['object', 'category']).columns
    ↪columns

    # Apply Ordinal Encoding
    encoder = OrdinalEncoder()
    df[categorical_features] = encoder.fit_transform(df[categorical_features])
    return df
```

```
[78]: def compute_correlation_matrix(temp_df, annot=True):
    df = copy.deepcopy(temp_df)
    correlation_matrix = df.corr()
    ax = sns.heatmap(correlation_matrix, annot=annot, cmap='coolwarm', fmt=".2f")
    ax.collections[0].set_clim(-1, 1)
    plt.title("Correlation Matrix Heatmap")
    plt.show()
    return correlation_matrix
```

```
[79]: def compute_exploratory_analysis(df, column_pattern, missing_threshold=0.09, ↪
    ↪annot=True):
    df_filtered = filter_columns_starting_with(df, column_pattern)
    missings = get_missing_values(df_filtered)
    good_missings = missings[missings < missing_threshold]
    print(f"GOOD FEATURES: {good_missings.shape[0]}")
    print(good_missings)
    print()
    print("BAD FEATURES")
    bad_missings = missings[missings > missing_threshold]
    print(bad_missings)
    print()
    df_without_bad_cols = df_filtered.drop(bad_missings.index, axis=1)
    df_discretized = discretize_columns(df_without_bad_cols)
    correlation_matrix = compute_correlation_matrix(df_discretized, annot)
    display(df_without_bad_cols)
    display(correlation_matrix)
    file_names = {
        "id_": "general",
        "s_": "students",
        "t_": "teachers",
        "f_": "families",
        "p_": "principals"
    }
    if column_pattern is not None:
        df_without_bad_cols.to_csv(os.path.join(ull_intermediate_path, ↪
        ↪f"{file_names[column_pattern]}.csv"))
```

```
    return df_without_bad_cols, correlation_matrix
```

5.2 All Students

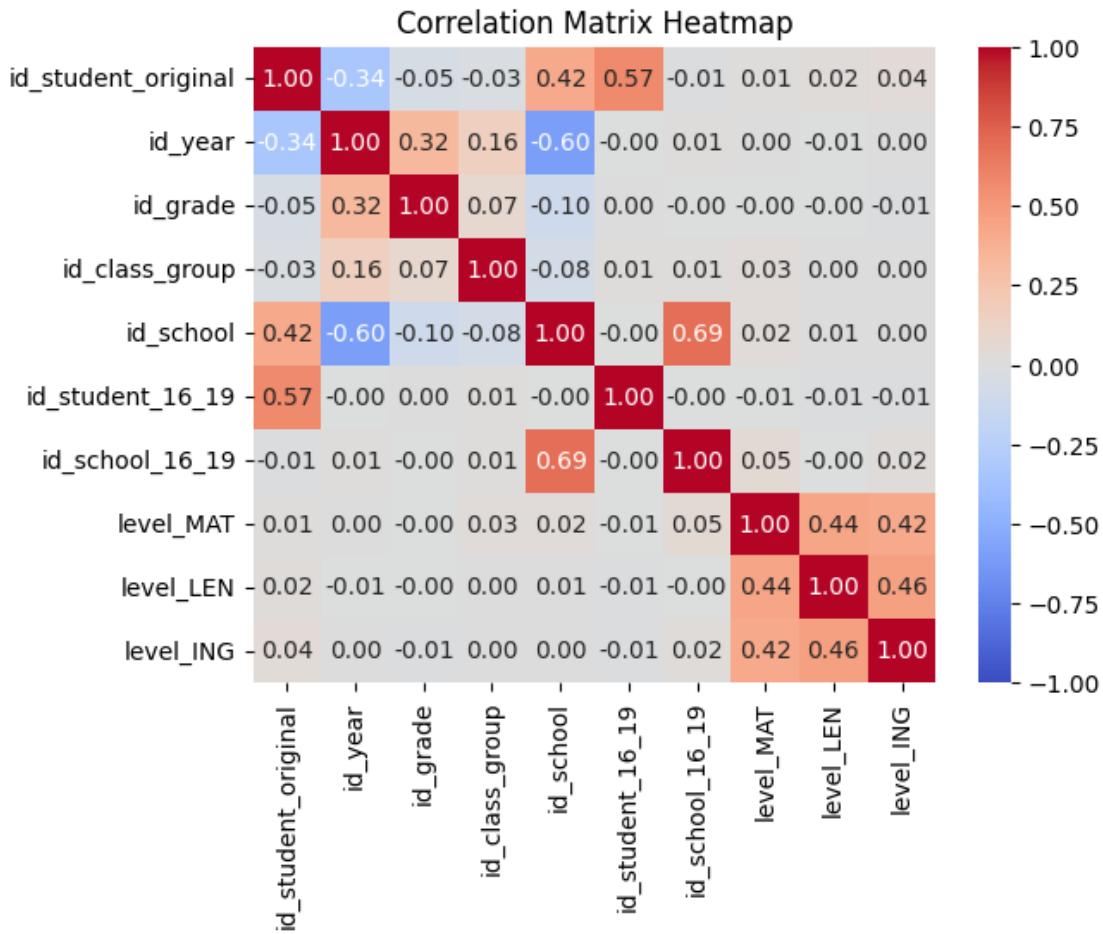
```
[80]: df_general, correlation_matrix_general = compute_exploratory_analysis(df=df,  
                           ↪column_pattern="id_", missing_threshold=1.0, annot=True)
```

GOOD FEATURES: 10

```
id_student_original      0.010053  
id_year                  0.000000  
id_grade                 0.000000  
id_class_group           0.113329  
id_school                0.001110  
id_student_16_19          0.582308  
id_school_16_19           0.305286  
level_MAT                 0.086998  
level_LEN                 0.067491  
level_ING                 0.370681  
dtype: float64
```

BAD FEATURES

```
Series([], dtype: float64)
```



| | id_student_original | id_year | id_grade | id_class_group | \ |
|------------------|---------------------|------------------|-----------------|----------------|-----|
| id_questionnaire | | | | | |
| 1 | 33613.0 | 2016 | 3 | | A |
| 2 | 19294.0 | 2016 | 3 | | A |
| 3 | 19587.0 | 2016 | 3 | | NaN |
| 4 | 29985.0 | 2016 | 3 | | A |
| 5 | 6982.0 | 2016 | 3 | | A |
| ... | ... | ... | ... | | ... |
| 83853 | 2500.0 | 2019 | 6 | | B |
| 83854 | 5784.0 | 2019 | 6 | | A |
| 83855 | 7708.0 | 2019 | 6 | | X |
| 83856 | 18965.0 | 2019 | 6 | | B |
| 83857 | 7652.0 | 2019 | 6 | | A |
| | id_school | id_student_16_19 | id_school_16_19 | level_MAT | \ |
| id_questionnaire | | | | | |
| 1 | 2415.0 | 14374.0 | | 569.0 | 3.0 |
| 2 | 1842.0 | 8001.0 | | 273.0 | 1.0 |

| | | | | |
|-------|--------|---------|-------|-----|
| 3 | 1432.0 | 8142.0 | 82.0 | 1.0 |
| 4 | 2280.0 | 12800.0 | 505.0 | 2.0 |
| 5 | 2040.0 | 2606.0 | 390.0 | 4.0 |
| ... | ... | ... | ... | ... |
| 83853 | 1278.0 | NaN | 271.0 | 2.0 |
| 83854 | 1079.0 | NaN | 78.0 | 3.0 |
| 83855 | 1486.0 | 3036.0 | 459.0 | 4.0 |
| 83856 | 1036.0 | 9913.0 | 36.0 | 3.0 |
| 83857 | 1173.0 | 5539.0 | 169.0 | 3.0 |

| | level_LEN | level_ING |
|------------------|-----------|-----------|
| id_questionnaire | | |
| 1 | 3.0 | NaN |
| 2 | 1.0 | NaN |
| 3 | 3.0 | NaN |
| 4 | 2.0 | NaN |
| 5 | 3.0 | NaN |
| ... | ... | ... |
| 83853 | 2.0 | 1.0 |
| 83854 | 4.0 | 4.0 |
| 83855 | 2.0 | 2.0 |
| 83856 | 4.0 | 3.0 |
| 83857 | 2.0 | 2.0 |

[80174 rows x 10 columns]

| | id_student_original | id_year | id_grade | id_class_group | \ |
|---------------------|---------------------|-----------|-----------|----------------|---|
| id_student_original | 1.000000 | -0.336732 | -0.052204 | -0.031246 | |
| id_year | -0.336732 | 1.000000 | 0.324603 | 0.160981 | |
| id_grade | -0.052204 | 0.324603 | 1.000000 | 0.073813 | |
| id_class_group | -0.031246 | 0.160981 | 0.073813 | 1.000000 | |
| id_school | 0.417052 | -0.595819 | -0.103873 | -0.077164 | |
| id_student_16_19 | 0.574448 | -0.000049 | 0.000538 | 0.010418 | |
| id_school_16_19 | -0.007898 | 0.010441 | -0.002465 | 0.007873 | |
| level_MAT | 0.014170 | 0.000758 | -0.003471 | 0.027510 | |
| level_LEN | 0.020464 | -0.006925 | -0.002249 | 0.004177 | |
| level_ING | 0.038553 | 0.002740 | -0.014849 | 0.001292 | |

| | id_school | id_student_16_19 | id_school_16_19 | level_MAT | \ |
|---------------------|-----------|------------------|-----------------|-----------|---|
| id_student_original | 0.417052 | 0.574448 | -0.007898 | 0.014170 | |
| id_year | -0.595819 | -0.000049 | 0.010441 | 0.000758 | |
| id_grade | -0.103873 | 0.000538 | -0.002465 | -0.003471 | |
| id_class_group | -0.077164 | 0.010418 | 0.007873 | 0.027510 | |
| id_school | 1.000000 | -0.003389 | 0.688965 | 0.023545 | |
| id_student_16_19 | -0.003389 | 1.000000 | -0.004426 | -0.006985 | |
| id_school_16_19 | 0.688965 | -0.004426 | 1.000000 | 0.053949 | |
| level_MAT | 0.023545 | -0.006985 | 0.053949 | 1.000000 | |
| level_LEN | 0.005499 | -0.013151 | -0.004213 | 0.438571 | |

| | | | | |
|---------------------|-----------|-----------|----------|----------|
| level_ING | 0.003349 | -0.011873 | 0.015791 | 0.415471 |
| | level_LEN | level_ING | | |
| id_student_original | 0.020464 | 0.038553 | | |
| id_year | -0.006925 | 0.002740 | | |
| id_grade | -0.002249 | -0.014849 | | |
| id_class_group | 0.004177 | 0.001292 | | |
| id_school | 0.005499 | 0.003349 | | |
| id_student_16_19 | -0.013151 | -0.011873 | | |
| id_school_16_19 | -0.004213 | 0.015791 | | |
| level_MAT | 0.438571 | 0.415471 | | |
| level_LEN | 1.000000 | 0.462179 | | |
| level_ING | 0.462179 | 1.000000 | | |

5.3 General Info

```
[81]: df_sel_gen, correlation_matrix_sel_gen = 
    compute_exploratory_analysis(df=df_sel, column_pattern="id_",
    missing_threshold=1.0, annot=True)
```

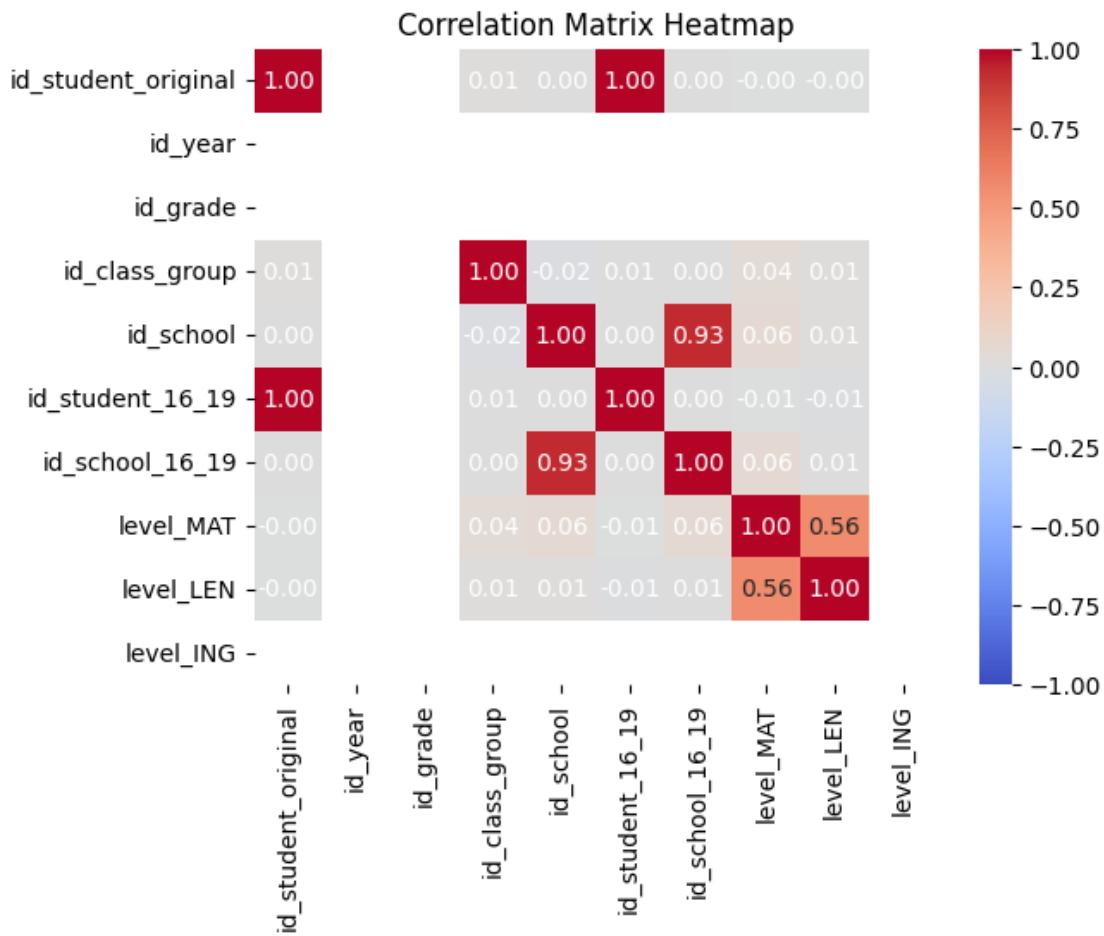
GOOD FEATURES: 9

| | |
|---------------------|----------|
| id_student_original | 0.000000 |
| id_year | 0.000000 |
| id_grade | 0.000000 |
| id_class_group | 0.154667 |
| id_school | 0.000000 |
| id_student_16_19 | 0.103898 |
| id_school_16_19 | 0.062956 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |

dtype: float64

BAD FEATURES

Series([], dtype: float64)



| | id_student_original | id_year | id_grade | id_class_group | \ |
|------------------|---------------------|------------------|-----------------|----------------|-----|
| id_questionnaire | | | | | |
| 1 | 33613.0 | 2016 | 3 | | A |
| 2 | 19294.0 | 2016 | 3 | | A |
| 3 | 19587.0 | 2016 | 3 | | NaN |
| 4 | 29985.0 | 2016 | 3 | | A |
| 5 | 6982.0 | 2016 | 3 | | A |
| ... | ... | ... | ... | ... | ... |
| 20426 | 5794.0 | 2016 | 3 | | NaN |
| 20427 | 3000.0 | 2016 | 3 | | A |
| 20428 | 36202.0 | 2016 | 3 | | B |
| 20429 | 21532.0 | 2016 | 3 | | A |
| 20430 | 3094.0 | 2016 | 3 | | NaN |
| | id_school | id_student_16_19 | id_school_16_19 | level_MAT | \ |
| id_questionnaire | | | | | |
| 1 | 2415.0 | 14374.0 | | 569.0 | 3.0 |
| 2 | 1842.0 | 8001.0 | | 273.0 | 1.0 |

| | | | | |
|-------|--------|---------|-------|-----|
| 3 | 1432.0 | 8142.0 | 82.0 | 1.0 |
| 4 | 2280.0 | 12800.0 | 505.0 | 2.0 |
| 5 | 2040.0 | 2606.0 | 390.0 | 4.0 |
| ... | ... | ... | ... | ... |
| 20426 | 1863.0 | NaN | NaN | 1.0 |
| 20427 | 2203.0 | 877.0 | 468.0 | 2.0 |
| 20428 | 1368.0 | 15545.0 | 51.0 | 2.0 |
| 20429 | 2373.0 | 8990.0 | 549.0 | 3.0 |
| 20430 | 1907.0 | 912.0 | 327.0 | 2.0 |

| | level_LEN | level_ING |
|------------------|-----------|-----------|
| id_questionnaire | | |
| 1 | 3.0 | NaN |
| 2 | 1.0 | NaN |
| 3 | 3.0 | NaN |
| 4 | 2.0 | NaN |
| 5 | 3.0 | NaN |
| ... | ... | ... |
| 20426 | 1.0 | NaN |
| 20427 | 3.0 | NaN |
| 20428 | 2.0 | NaN |
| 20429 | 3.0 | NaN |
| 20430 | 3.0 | NaN |

[17806 rows x 10 columns]

| | id_student_original | id_year | id_grade | id_class_group | \ |
|---------------------|---------------------|------------------|-----------------|----------------|-----|
| id_student_original | 1.000000 | NaN | NaN | 0.008156 | |
| id_year | | NaN | NaN | NaN | NaN |
| id_grade | | NaN | NaN | NaN | NaN |
| id_class_group | 0.008156 | NaN | NaN | 1.000000 | |
| id_school | 0.000439 | NaN | NaN | -0.020820 | |
| id_student_16_19 | 0.999983 | NaN | NaN | 0.005759 | |
| id_school_16_19 | 0.000417 | NaN | NaN | 0.000943 | |
| level_MAT | -0.003242 | NaN | NaN | 0.042456 | |
| level_LEN | -0.004734 | NaN | NaN | 0.011373 | |
| level_ING | | NaN | NaN | NaN | NaN |
| | id_school | id_student_16_19 | id_school_16_19 | level_MAT | \ |
| id_student_original | 0.000439 | 0.999983 | 0.000417 | -0.003242 | |
| id_year | NaN | NaN | NaN | NaN | NaN |
| id_grade | NaN | NaN | NaN | NaN | NaN |
| id_class_group | -0.020820 | 0.005759 | 0.000943 | 0.042456 | |
| id_school | 1.000000 | 0.000108 | 0.929463 | 0.061969 | |
| id_student_16_19 | 0.000108 | 1.000000 | 0.000665 | -0.006903 | |
| id_school_16_19 | 0.929463 | 0.000665 | 1.000000 | 0.059139 | |
| level_MAT | 0.061969 | -0.006903 | 0.059139 | 1.000000 | |
| level_LEN | 0.012964 | -0.010989 | 0.006073 | 0.562532 | |

| | | | | |
|---------------------|-----------|-----------|-----|-----|
| level_ING | NaN | NaN | NaN | NaN |
| | level_LEN | level_ING | | |
| id_student_original | -0.004734 | NaN | | |
| id_year | NaN | NaN | | |
| id_grade | NaN | NaN | | |
| id_class_group | 0.011373 | NaN | | |
| id_school | 0.012964 | NaN | | |
| id_student_16_19 | -0.010989 | NaN | | |
| id_school_16_19 | 0.006073 | NaN | | |
| level_MAT | 0.562532 | NaN | | |
| level_LEN | 1.000000 | NaN | | |
| level_ING | NaN | NaN | | |

5.4 Student Questionnaire

```
[82]: df_sel_students, correlation_matrix_sel_students = 
    compute_exploratory_analysis(df=df_sel, column_pattern="s_",
    missing_threshold=0.095, annot=False)
```

GOOD FEATURES: 18

| | |
|-----------------------------------|----------|
| s_gender | 0.000056 |
| s_birth_year | 0.050376 |
| s_is_living_with_mother | 0.071661 |
| s_has_repeated | 0.081152 |
| s_frequency_of_skips | 0.060261 |
| s_homeworks_day_per_week | 0.046894 |
| s_extent_of_teachers_affinity | 0.076772 |
| s_frequency_of_computer_usage | 0.056049 |
| s_frequency_of_internet_usage | 0.055824 |
| s_frequency_of_work_with_teachers | 0.056329 |
| s_frequency_of_materials_in_class | 0.059811 |
| s_frequency_of_evaluations | 0.058632 |
| s_extent_of_teacher_performance | 0.059025 |
| s_extent_of_class_env | 0.059250 |
| s_extent_of_classmates_affinity | 0.060036 |
| s_extent_of_school_satisfaction | 0.057396 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |

dtype: float64

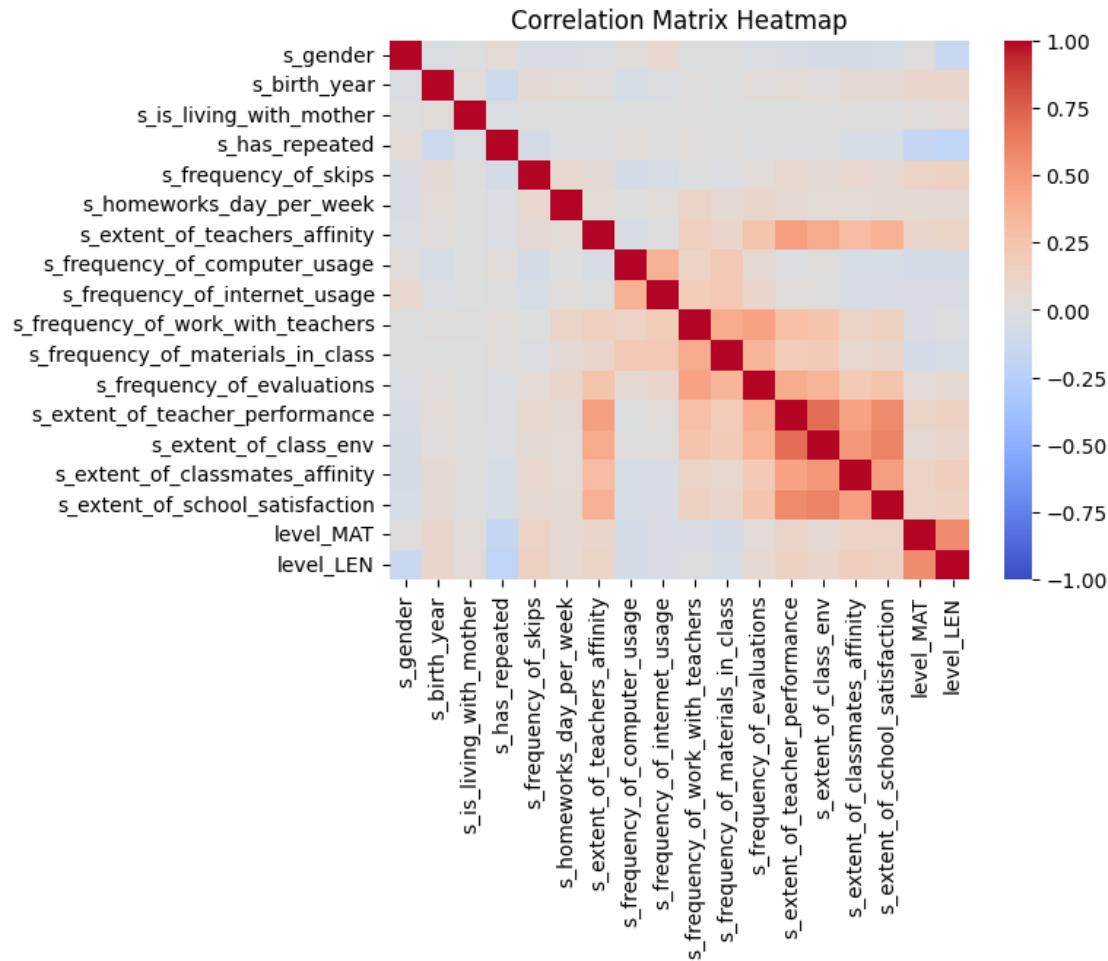
BAD FEATURES

| | |
|----------------------------------|----------|
| s_is_living_with_father | 0.137594 |
| s_is_living_with_siblings | 0.387229 |
| s_is_living_with_other_relatives | 0.837190 |
| s_birth_country | 1.000000 |
| s_nazionality_country | 1.000000 |
| s_weight | 1.000000 |

```

s_extent_of_math_affinity           1.000000
s_extent_of_reading_affinity        1.000000
level_ING                           1.000000
dtype: float64

```



| id_questionnaire | s_gender | s_birth_year | s_is_living_with_mother | \ |
|------------------|----------|--------------|-------------------------|------|
| 1 | FEMALE | 2007.0 | | True |
| 2 | MALE | 2007.0 | | True |
| 3 | FEMALE | 2007.0 | | True |
| 4 | MALE | 2007.0 | | True |
| 5 | FEMALE | 2007.0 | | True |
| ... | ... | ... | | ... |
| 20426 | FEMALE | 2001.0 | | True |
| 20427 | FEMALE | 2007.0 | | True |
| 20428 | MALE | 2001.0 | | True |
| 20429 | MALE | 2007.0 | | True |

| | | | |
|-------------------------|-------------------------------|-------------------------------|------|
| 20430 | FEMALE | 2007.0 | True |
| | s_has_repeated | s_frequency_of_skips | \ |
| id_questionnaire | | | |
| 1 | False | 1.000000 | |
| 2 | True | 1.000000 | |
| 3 | False | 1.000000 | |
| 4 | False | 1.000000 | |
| 5 | False | 1.000000 | |
| ... | ... | ... | |
| 20426 | NaN | 0.000000 | |
| 20427 | False | 1.000000 | |
| 20428 | NaN | 0.333333 | |
| 20429 | False | 1.000000 | |
| 20430 | False | 1.000000 | |
| | s_homeworks_day_per_week | s_extent_of_teachers_affinity | \ |
| id_questionnaire | | | |
| 1 | 0.0 | 1.0 | |
| 2 | 3.0 | 1.0 | |
| 3 | 2.0 | NaN | |
| 4 | 3.0 | 1.0 | |
| 5 | 1.0 | 1.0 | |
| ... | ... | ... | |
| 20426 | 2.0 | NaN | |
| 20427 | 3.0 | 1.0 | |
| 20428 | 4.0 | NaN | |
| 20429 | 3.0 | 1.0 | |
| 20430 | 2.0 | 1.0 | |
| | s_frequency_of_computer_usage | \ | |
| id_questionnaire | | | |
| 1 | 0.111111 | | |
| 2 | 0.333333 | | |
| 3 | 0.666667 | | |
| 4 | 0.333333 | | |
| 5 | 0.000000 | | |
| ... | ... | | |
| 20426 | NaN | | |
| 20427 | 0.000000 | | |
| 20428 | 0.222222 | | |
| 20429 | 0.000000 | | |
| 20430 | 0.111111 | | |
| | s_frequency_of_internet_usage | \ | |
| id_questionnaire | | | |
| 1 | 0.066667 | | |
| 2 | 0.600000 | | |

| | | |
|--|----------|----------|
| 3 | 0.666667 | |
| 4 | 0.266667 | |
| 5 | 0.133333 | |
| ... | ... | |
| 20426 | 0.333333 | |
| 20427 | 0.133333 | |
| 20428 | 0.933333 | |
| 20429 | 0.533333 | |
| 20430 | 0.400000 | |
| s_frequency_of_work_with_teachers \ | | |
| id_questionnaire | | |
| 1 | 0.733333 | |
| 2 | 0.533333 | |
| 3 | 0.833333 | |
| 4 | 0.400000 | |
| 5 | 0.566667 | |
| ... | ... | |
| 20426 | 0.333333 | |
| 20427 | 0.666667 | |
| 20428 | 0.518519 | |
| 20429 | 0.633333 | |
| 20430 | 0.629630 | |
| s_frequency_of_materials_in_class \ | | |
| id_questionnaire | | |
| 1 | 0.380952 | |
| 2 | 0.714286 | |
| 3 | 1.000000 | |
| 4 | NaN | |
| 5 | 0.666667 | |
| ... | ... | |
| 20426 | NaN | |
| 20427 | 0.476190 | |
| 20428 | 0.777778 | |
| 20429 | 0.142857 | |
| 20430 | 0.476190 | |
| s_frequency_of_evaluations s_extent_of_teacher_performance \ | | |
| id_questionnaire | | |
| 1 | 0.740741 | 0.833333 |
| 2 | 0.888889 | 0.800000 |
| 3 | 0.750000 | 0.800000 |
| 4 | 0.541667 | 0.800000 |
| 5 | 0.888889 | 1.000000 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.740741 | 0.900000 |

| | | |
|---|----------|----------|
| 20428 | 0.740741 | 0.566667 |
| 20429 | 0.740741 | 1.000000 |
| 20430 | 0.481481 | 0.733333 |
| s_extent_of_class_env s_extent_of_classmates_affinity \ | | |
| id_questionnaire | | |
| 1 | 0.791667 | 0.714286 |
| 2 | 0.791667 | 0.714286 |
| 3 | 0.833333 | 0.833333 |
| 4 | 0.750000 | 0.857143 |
| 5 | 1.000000 | 0.952381 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.916667 | 0.857143 |
| 20428 | 0.958333 | 0.666667 |
| 20429 | 0.875000 | 0.714286 |
| 20430 | 0.708333 | 0.619048 |
| s_extent_of_school_satisfaction level_MAT level_LEN | | |
| id_questionnaire | | |
| 1 | 0.944444 | 3.0 |
| 2 | 1.000000 | 1.0 |
| 3 | 0.888889 | 1.0 |
| 4 | 0.722222 | 2.0 |
| 5 | 1.000000 | 4.0 |
| ... | ... | ... |
| 20426 | 1.000000 | 1.0 |
| 20427 | 1.000000 | 2.0 |
| 20428 | 0.833333 | 2.0 |
| 20429 | 1.000000 | 3.0 |
| 20430 | 0.722222 | 2.0 |

[17806 rows x 18 columns]

| | | |
|-----------------------------------|--------------|-----------|
| s_gender | s_birth_year | \ |
| s_gender | 1.000000 | -0.025734 |
| s_birth_year | -0.025734 | 1.000000 |
| s_is_living_with_mother | -0.004612 | 0.016656 |
| s_has_repeated | 0.040699 | -0.118357 |
| s_frequency_of_skips | -0.032429 | 0.054848 |
| s_homeworks_day_per_week | -0.031404 | 0.043845 |
| s_extent_of_teachers_affinity | -0.028543 | 0.028999 |
| s_frequency_of_computer_usage | 0.019260 | -0.054042 |
| s_frequency_of_internet_usage | 0.084017 | -0.026979 |
| s_frequency_of_work_with_teachers | -0.013262 | 0.012553 |
| s_frequency_of_materials_in_class | 0.000793 | -0.003437 |
| s_frequency_of_evaluations | -0.028531 | 0.030408 |
| s_extent_of_teacher_performance | -0.044767 | 0.045375 |

| | | |
|-----------------------------------|----------------------------|------------------|
| s_extent_of_class_env | -0.055349 | 0.029812 |
| s_extent_of_classmates_affinity | -0.055421 | 0.055133 |
| s_extent_of_school_satisfaction | -0.054659 | 0.057673 |
| level_MAT | 0.015317 | 0.094234 |
| level_LEN | -0.144875 | 0.101092 |
| | | |
| | s_is_living_with_mother | s_has_repeated \ |
| s_gender | -0.004612 | 0.040699 |
| s_birth_year | 0.016656 | -0.118357 |
| s_is_living_with_mother | 1.000000 | -0.026872 |
| s_has_repeated | -0.026872 | 1.000000 |
| s_frequency_of_skips | 0.007770 | -0.076749 |
| s_homeworks_day_per_week | -0.000438 | -0.030218 |
| s_extent_of_teachers_affinity | -0.002969 | -0.024342 |
| s_frequency_of_computer_usage | -0.006162 | 0.023778 |
| s_frequency_of_internet_usage | -0.004206 | 0.007180 |
| s_frequency_of_work_with_teachers | 0.002344 | 0.022051 |
| s_frequency_of_materials_in_class | -0.000594 | 0.020193 |
| s_frequency_of_evaluations | -0.000971 | -0.017233 |
| s_extent_of_teacher_performance | -0.000717 | -0.030589 |
| s_extent_of_class_env | 0.000941 | -0.021100 |
| s_extent_of_classmates_affinity | 0.014985 | -0.049876 |
| s_extent_of_school_satisfaction | 0.007443 | -0.054415 |
| level_MAT | 0.022023 | -0.164473 |
| level_LEN | 0.036011 | -0.201384 |
| | | |
| | s_frequency_of_skips \ | |
| s_gender | -0.032429 | |
| s_birth_year | 0.054848 | |
| s_is_living_with_mother | 0.007770 | |
| s_has_repeated | -0.076749 | |
| s_frequency_of_skips | 1.000000 | |
| s_homeworks_day_per_week | 0.083523 | |
| s_extent_of_teachers_affinity | 0.057898 | |
| s_frequency_of_computer_usage | -0.077787 | |
| s_frequency_of_internet_usage | -0.052809 | |
| s_frequency_of_work_with_teachers | -0.003545 | |
| s_frequency_of_materials_in_class | -0.018838 | |
| s_frequency_of_evaluations | 0.045844 | |
| s_extent_of_teacher_performance | 0.077858 | |
| s_extent_of_class_env | 0.054547 | |
| s_extent_of_classmates_affinity | 0.079323 | |
| s_extent_of_school_satisfaction | 0.068743 | |
| level_MAT | 0.122328 | |
| level_LEN | 0.135020 | |
| | | |
| | s_homeworks_day_per_week \ | |
| s_gender | -0.031404 | |

| | |
|-----------------------------------|-----------|
| s_birth_year | 0.043845 |
| s_is_living_with_mother | -0.000438 |
| s_has_repeated | -0.030218 |
| s_frequency_of_skips | 0.083523 |
| s_homeworks_day_per_week | 1.000000 |
| s_extent_of_teachers_affinity | 0.042352 |
| s_frequency_of_computer_usage | -0.001209 |
| s_frequency_of_internet_usage | 0.020738 |
| s_frequency_of_work_with_teachers | 0.110804 |
| s_frequency_of_materials_in_class | 0.059834 |
| s_frequency_of_evaluations | 0.091831 |
| s_extent_of_teacher_performance | 0.057171 |
| s_extent_of_class_env | 0.046462 |
| s_extent_of_classmates_affinity | 0.042416 |
| s_extent_of_school_satisfaction | 0.049517 |
| level_MAT | 0.058022 |
| level_LEN | 0.069309 |

| | |
|-----------------------------------|---------------------------------|
| | s_extent_of_teachers_affinity \ |
| s_gender | -0.028543 |
| s_birth_year | 0.028999 |
| s_is_living_with_mother | -0.002969 |
| s_has_repeated | -0.024342 |
| s_frequency_of_skips | 0.057898 |
| s_homeworks_day_per_week | 0.042352 |
| s_extent_of_teachers_affinity | 1.000000 |
| s_frequency_of_computer_usage | -0.039669 |
| s_frequency_of_internet_usage | -0.008730 |
| s_frequency_of_work_with_teachers | 0.161501 |
| s_frequency_of_materials_in_class | 0.094192 |
| s_frequency_of_evaluations | 0.248668 |
| s_extent_of_teacher_performance | 0.469525 |
| s_extent_of_class_env | 0.409045 |
| s_extent_of_classmates_affinity | 0.308001 |
| s_extent_of_school_satisfaction | 0.370532 |
| level_MAT | 0.093792 |
| level_LEN | 0.116560 |

| | |
|-------------------------------|---------------------------------|
| | s_frequency_of_computer_usage \ |
| s_gender | 0.019260 |
| s_birth_year | -0.054042 |
| s_is_living_with_mother | -0.006162 |
| s_has_repeated | 0.023778 |
| s_frequency_of_skips | -0.077787 |
| s_homeworks_day_per_week | -0.001209 |
| s_extent_of_teachers_affinity | -0.039669 |
| s_frequency_of_computer_usage | 1.000000 |
| s_frequency_of_internet_usage | 0.371735 |

| | |
|-----------------------------------|-----------|
| s_frequency_of_work_with_teachers | 0.120296 |
| s_frequency_of_materials_in_class | 0.215274 |
| s_frequency_of_evaluations | 0.064127 |
| s_extent_of_teacher_performance | -0.011863 |
| s_extent_of_class_env | 0.014833 |
| s_extent_of_classmates_affinity | -0.052212 |
| s_extent_of_school_satisfaction | -0.051609 |
| level_MAT | -0.072532 |
| level_LEN | -0.075436 |

| | |
|-----------------------------------|---------------------------------|
| | s_frequency_of_internet_usage \ |
| s_gender | 0.084017 |
| s_birth_year | -0.026979 |
| s_is_living_with_mother | -0.004206 |
| s_has_repeated | 0.007180 |
| s_frequency_of_skips | -0.052809 |
| s_homeworks_day_per_week | 0.020738 |
| s_extent_of_teachers_affinity | -0.008730 |
| s_frequency_of_computer_usage | 0.371735 |
| s_frequency_of_internet_usage | 1.000000 |
| s_frequency_of_work_with_teachers | 0.184811 |
| s_frequency_of_materials_in_class | 0.215844 |
| s_frequency_of_evaluations | 0.097839 |
| s_extent_of_teacher_performance | 0.020481 |
| s_extent_of_class_env | 0.022687 |
| s_extent_of_classmates_affinity | -0.043809 |
| s_extent_of_school_satisfaction | -0.039423 |
| level_MAT | -0.036665 |
| level_LEN | -0.037401 |

| | |
|-----------------------------------|-------------------------------------|
| | s_frequency_of_work_with_teachers \ |
| s_gender | -0.013262 |
| s_birth_year | 0.012553 |
| s_is_living_with_mother | 0.002344 |
| s_has_repeated | 0.022051 |
| s_frequency_of_skips | -0.003545 |
| s_homeworks_day_per_week | 0.110804 |
| s_extent_of_teachers_affinity | 0.161501 |
| s_frequency_of_computer_usage | 0.120296 |
| s_frequency_of_internet_usage | 0.184811 |
| s_frequency_of_work_with_teachers | 1.000000 |
| s_frequency_of_materials_in_class | 0.407241 |
| s_frequency_of_evaluations | 0.459210 |
| s_extent_of_teacher_performance | 0.284243 |
| s_extent_of_class_env | 0.253826 |
| s_extent_of_classmates_affinity | 0.115582 |
| s_extent_of_school_satisfaction | 0.140080 |
| level_MAT | -0.038320 |

| | |
|-----------------------------------|-------------------------------------|
| level_LEN | -0.016607 |
| | s_frequency_of_materials_in_class \ |
| s_gender | 0.000793 |
| s_birth_year | -0.003437 |
| s_is_living_with_mother | -0.000594 |
| s_has_repeated | 0.020193 |
| s_frequency_of_skips | -0.018838 |
| s_homeworks_day_per_week | 0.059834 |
| s_extent_of_teachers_affinity | 0.094192 |
| s_frequency_of_computer_usage | 0.215274 |
| s_frequency_of_internet_usage | 0.215844 |
| s_frequency_of_work_with_teachers | 0.407241 |
| s_frequency_of_materials_in_class | 1.000000 |
| s_frequency_of_evaluations | 0.346366 |
| s_extent_of_teacher_performance | 0.192643 |
| s_extent_of_class_env | 0.198315 |
| s_extent_of_classmates_affinity | 0.075477 |
| s_extent_of_school_satisfaction | 0.088556 |
| level_MAT | -0.066594 |
| level_LEN | -0.048885 |
| | s_frequency_of_evaluations \ |
| s_gender | -0.028531 |
| s_birth_year | 0.030408 |
| s_is_living_with_mother | -0.000971 |
| s_has_repeated | -0.017233 |
| s_frequency_of_skips | 0.045844 |
| s_homeworks_day_per_week | 0.091831 |
| s_extent_of_teachers_affinity | 0.248668 |
| s_frequency_of_computer_usage | 0.064127 |
| s_frequency_of_internet_usage | 0.097839 |
| s_frequency_of_work_with_teachers | 0.459210 |
| s_frequency_of_materials_in_class | 0.346366 |
| s_frequency_of_evaluations | 1.000000 |
| s_extent_of_teacher_performance | 0.405473 |
| s_extent_of_class_env | 0.353524 |
| s_extent_of_classmates_affinity | 0.208706 |
| s_extent_of_school_satisfaction | 0.246491 |
| level_MAT | 0.033004 |
| level_LEN | 0.062949 |
| | s_extent_of_teacher_performance \ |
| s_gender | -0.044767 |
| s_birth_year | 0.045375 |
| s_is_living_with_mother | -0.000717 |
| s_has_repeated | -0.030589 |
| s_frequency_of_skips | 0.077858 |

| | |
|-----------------------------------|-----------|
| s_homeworks_day_per_week | 0.057171 |
| s_extent_of_teachers_affinity | 0.469525 |
| s_frequency_of_computer_usage | -0.011863 |
| s_frequency_of_internet_usage | 0.020481 |
| s_frequency_of_work_with_teachers | 0.284243 |
| s_frequency_of_materials_in_class | 0.192643 |
| s_frequency_of_evaluations | 0.405473 |
| s_extent_of_teacher_performance | 1.000000 |
| s_extent_of_class_env | 0.699774 |
| s_extent_of_classmates_affinity | 0.455324 |
| s_extent_of_school_satisfaction | 0.572676 |
| level_MAT | 0.110412 |
| level_LEN | 0.138279 |
| | |
| s_extent_of_class_env \ | |
| s_gender | -0.055349 |
| s_birth_year | 0.029812 |
| s_is_living_with_mother | 0.000941 |
| s_has_repeated | -0.021100 |
| s_frequency_of_skips | 0.054547 |
| s_homeworks_day_per_week | 0.046462 |
| s_extent_of_teachers_affinity | 0.409045 |
| s_frequency_of_computer_usage | 0.014833 |
| s_frequency_of_internet_usage | 0.022687 |
| s_frequency_of_work_with_teachers | 0.253826 |
| s_frequency_of_materials_in_class | 0.198315 |
| s_frequency_of_evaluations | 0.353524 |
| s_extent_of_teacher_performance | 0.699774 |
| s_extent_of_class_env | 1.000000 |
| s_extent_of_classmates_affinity | 0.512753 |
| s_extent_of_school_satisfaction | 0.603268 |
| level_MAT | 0.059059 |
| level_LEN | 0.098072 |
| | |
| s_extent_of_classmates_affinity \ | |
| s_gender | -0.055421 |
| s_birth_year | 0.055133 |
| s_is_living_with_mother | 0.014985 |
| s_has_repeated | -0.049876 |
| s_frequency_of_skips | 0.079323 |
| s_homeworks_day_per_week | 0.042416 |
| s_extent_of_teachers_affinity | 0.308001 |
| s_frequency_of_computer_usage | -0.052212 |
| s_frequency_of_internet_usage | -0.043809 |
| s_frequency_of_work_with_teachers | 0.115582 |
| s_frequency_of_materials_in_class | 0.075477 |
| s_frequency_of_evaluations | 0.208706 |
| s_extent_of_teacher_performance | 0.455324 |

| | | | |
|-----------------------------------|-----------|-----------|---|
| s_extent_of_class_env | 0.512753 | | |
| s_extent_of_classmates_affinity | 1.000000 | | |
| s_extent_of_school_satisfaction | 0.471544 | | |
| level_MAT | 0.132252 | | |
| level_LEN | 0.166773 | | |
| | | | s_extent_of_school_satisfaction \ level_MAT |
| s_gender | -0.054659 | 0.015317 | |
| s_birth_year | 0.057673 | 0.094234 | |
| s_is_living_with_mother | 0.007443 | 0.022023 | |
| s_has_repeated | -0.054415 | -0.164473 | |
| s_frequency_of_skips | 0.068743 | 0.122328 | |
| s_homeworks_day_per_week | 0.049517 | 0.058022 | |
| s_extent_of_teachers_affinity | 0.370532 | 0.093792 | |
| s_frequency_of_computer_usage | -0.051609 | -0.072532 | |
| s_frequency_of_internet_usage | -0.039423 | -0.036665 | |
| s_frequency_of_work_with_teachers | 0.140080 | -0.038320 | |
| s_frequency_of_materials_in_class | 0.088556 | -0.066594 | |
| s_frequency_of_evaluations | 0.246491 | 0.033004 | |
| s_extent_of_teacher_performance | 0.572676 | 0.110412 | |
| s_extent_of_class_env | 0.603268 | 0.059059 | |
| s_extent_of_classmates_affinity | 0.471544 | 0.132252 | |
| s_extent_of_school_satisfaction | 1.000000 | 0.123259 | |
| level_MAT | 0.123259 | 1.000000 | |
| level_LEN | 0.146688 | 0.562532 | |
| | | | level_LEN |
| s_gender | -0.144875 | | |
| s_birth_year | 0.101092 | | |
| s_is_living_with_mother | 0.036011 | | |
| s_has_repeated | -0.201384 | | |
| s_frequency_of_skips | 0.135020 | | |
| s_homeworks_day_per_week | 0.069309 | | |
| s_extent_of_teachers_affinity | 0.116560 | | |
| s_frequency_of_computer_usage | -0.075436 | | |
| s_frequency_of_internet_usage | -0.037401 | | |
| s_frequency_of_work_with_teachers | -0.016607 | | |
| s_frequency_of_materials_in_class | -0.048885 | | |
| s_frequency_of_evaluations | 0.062949 | | |
| s_extent_of_teacher_performance | 0.138279 | | |
| s_extent_of_class_env | 0.098072 | | |
| s_extent_of_classmates_affinity | 0.166773 | | |
| s_extent_of_school_satisfaction | 0.146688 | | |
| level_MAT | 0.562532 | | |
| level_LEN | 1.000000 | | |

5.5 Family Questionnaire

```
[83]: df_sel_families, correlation_matrix_sel_families =  
    compute_exploratory_analysis(df=df_sel, column_pattern="f_",  
    missing_threshold=0.3, annot=False)
```

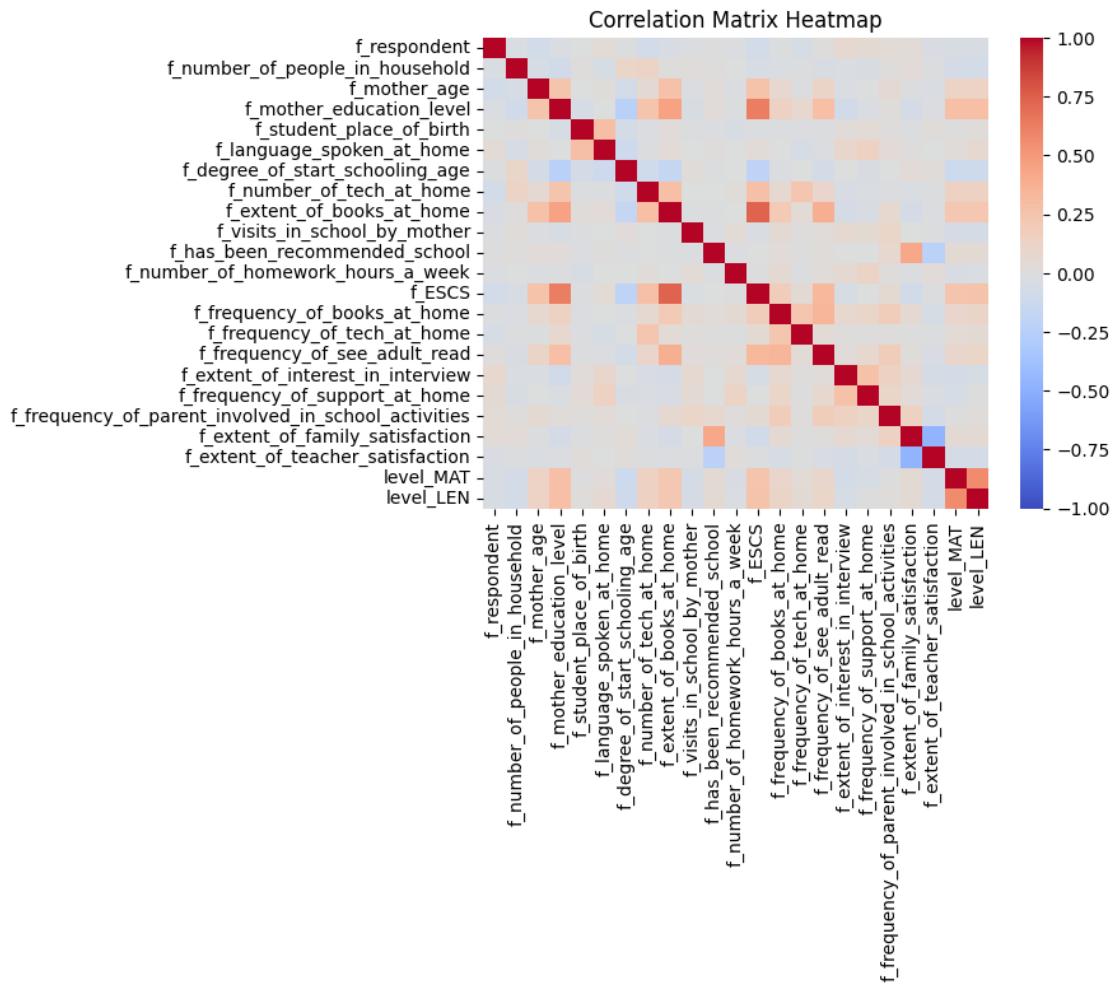
GOOD FEATURES: 23

| | |
|---|----------|
| f_respondent | 0.288217 |
| f_number_of_people_in_household | 0.299562 |
| f_mother_age | 0.281534 |
| f_mother_education_level | 0.291082 |
| f_student_place_of_birth | 0.287768 |
| f_language_spoken_at_home | 0.287937 |
| f_degree_of_start_schooling_age | 0.293665 |
| f_number_of_tech_at_home | 0.281984 |
| f_extent_of_books_at_home | 0.274907 |
| f_visits_in_school_by_mother | 0.289790 |
| f_has_been_recommended_school | 0.282882 |
| f_number_of_homework_hours_a_week | 0.278445 |
| f_ESCS | 0.275357 |
| f_frequency_of_books_at_home | 0.290295 |
| f_frequency_of_tech_at_home | 0.291531 |
| f_frequency_of_see_adult_read | 0.274739 |
| f_extent_of_interest_in_interview | 0.278052 |
| f_frequency_of_support_at_home | 0.275862 |
| f_frequency_of_parent_involved_in_school_activities | 0.278502 |
| f_extent_of_family_satisfaction | 0.277547 |
| f_extent_of_teacher_satisfaction | 0.277940 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |
| dtype: float64 | |

BAD FEATURES

| | |
|---|----------|
| f_father_age | 0.331405 |
| f_father_education_level | 0.348085 |
| f_mother_employment_status | 0.304504 |
| f_father_employment_status | 0.358194 |
| f_mother_place_of_birth | 0.327530 |
| f_father_place_of_birth | 0.369145 |
| f_degree_of_years_in_spanish_education_system | 0.690554 |
| f_visits_in_school_by_father | 0.376783 |
| f_parental_education_expectations | 0.370156 |
| f_mother_occupation | 0.302145 |
| f_father_occupation | 0.352128 |
| f_number_of_children_in_household | 1.000000 |
| f_type_of_family_unit | 1.000000 |
| f_monthly_household_income | 1.000000 |
| level_ING | 1.000000 |

dtype: float64



| | f_respondent | f_number_of_people_in_household | f_mother_age | \ |
|------------------|--------------|---------------------------------|--------------|------|
| id_questionnaire | MOTHER | | | |
| 1 | NaN | | 3.0 | 43.0 |
| 2 | MOTHER | | NaN | NaN |
| 3 | MOTHER | | 4.0 | 45.0 |
| 4 | MOTHER | | 4.0 | 39.0 |
| 5 | FATHER | | 4.0 | 39.0 |
| ... | ... | | ... | ... |
| 20426 | FATHER | | 3.0 | 31.0 |
| 20427 | MOTHER | | 3.0 | 37.0 |
| 20428 | NaN | | NaN | NaN |
| 20429 | NaN | | NaN | NaN |
| 20430 | NaN | | NaN | NaN |

| | f_mother_education_level | f_student_place_of_birth | \ |
|-------------------------|------------------------------|---------------------------------|---|
| id_questionnaire | | | |
| 1 | 7.0 | CANARY_ISLANDS | |
| 2 | NaN | NaN | |
| 3 | 3.0 | CANARY_ISLANDS | |
| 4 | 5.0 | CANARY_ISLANDS | |
| 5 | 9.0 | CANARY_ISLANDS | |
| ... | ... | ... | |
| 20426 | 3.0 | CANARY_ISLANDS | |
| 20427 | 5.0 | CANARY_ISLANDS | |
| 20428 | NaN | NaN | |
| 20429 | NaN | NaN | |
| 20430 | NaN | NaN | |
| | | | |
| | f_language_spoken_at_home | f_degree_of_start_schooling_age | \ |
| id_questionnaire | | | |
| 1 | SPANISH | 1.0 | |
| 2 | NaN | NaN | |
| 3 | SPANISH | 1.0 | |
| 4 | SPANISH | 1.0 | |
| 5 | SPANISH | 1.0 | |
| ... | ... | ... | |
| 20426 | SPANISH | 2.0 | |
| 20427 | SPANISH | 2.0 | |
| 20428 | NaN | NaN | |
| 20429 | NaN | NaN | |
| 20430 | NaN | NaN | |
| | | | |
| | f_number_of_tech_at_home | f_extent_of_books_at_home | \ |
| id_questionnaire | | | |
| 1 | 3.0 | 0.75 | |
| 2 | NaN | NaN | |
| 3 | 4.0 | 0.25 | |
| 4 | 3.0 | 0.75 | |
| 5 | 7.0 | 1.00 | |
| ... | ... | ... | |
| 20426 | 4.0 | 0.00 | |
| 20427 | 5.0 | 0.50 | |
| 20428 | NaN | NaN | |
| 20429 | NaN | NaN | |
| 20430 | NaN | NaN | |
| | | | |
| | f_visits_in_school_by_mother | .. | \ |
| id_questionnaire | | | |
| 1 | ONCE_PER_WEEK | .. | |
| 2 | NaN | .. | |
| 3 | ONCE_PER_MONTH | .. | |
| 4 | ONCE_PER_WEEK | .. | |

| | | |
|--|----------------|----------|
| 5 | ONCE_PER_MONTH | ... |
| ... | ... | ... |
| 20426 | NaN | ... |
| 20427 | SOMETIMES | ... |
| 20428 | NaN | ... |
| 20429 | NaN | ... |
| 20430 | NaN | ... |
| | | |
| f_frequency_of_books_at_home f_frequency_of_tech_at_home \ | | |
| id_questionnaire | | |
| 1 | 1.000000 | 1.000000 |
| 2 | NaN | NaN |
| 3 | 0.444444 | 0.333333 |
| 4 | 0.333333 | 0.333333 |
| 5 | 0.555556 | 0.500000 |
| ... | ... | ... |
| 20426 | 0.333333 | 1.000000 |
| 20427 | 0.444444 | 0.666667 |
| 20428 | NaN | NaN |
| 20429 | NaN | NaN |
| 20430 | NaN | NaN |
| | | |
| f_frequency_of_see_adult_read \ | | |
| id_questionnaire | | |
| 1 | 0.625 | |
| 2 | NaN | |
| 3 | 0.250 | |
| 4 | 0.500 | |
| 5 | 0.625 | |
| ... | ... | |
| 20426 | 0.000 | |
| 20427 | 0.500 | |
| 20428 | NaN | |
| 20429 | NaN | |
| 20430 | NaN | |
| | | |
| f_extent_of_interest_in_interview \ | | |
| id_questionnaire | | |
| 1 | 1.000000 | |
| 2 | NaN | |
| 3 | 1.000000 | |
| 4 | 1.000000 | |
| 5 | NaN | |
| ... | ... | |
| 20426 | 0.444444 | |
| 20427 | 0.500000 | |
| 20428 | NaN | |
| 20429 | NaN | |

| | | | |
|------------------|---|-----|-----|
| 20430 | | NaN | |
| | f_frequency_of_support_at_home \ | | |
| id_questionnaire | | | |
| 1 | 1.000000 | | |
| 2 | NaN | | |
| 3 | 1.000000 | | |
| 4 | 1.000000 | | |
| 5 | 0.888889 | | |
| ... | ... | | |
| 20426 | 0.800000 | | |
| 20427 | 0.888889 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | f_frequency_of_parent_involved_in_school_activities \ | | |
| id_questionnaire | | | |
| 1 | 0.333333 | | |
| 2 | NaN | | |
| 3 | 0.166667 | | |
| 4 | 0.250000 | | |
| 5 | 0.250000 | | |
| ... | ... | | |
| 20426 | 0.000000 | | |
| 20427 | 0.000000 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | f_extent_of_family_satisfaction \ | | |
| id_questionnaire | | | |
| 1 | 0.700000 | | |
| 2 | NaN | | |
| 3 | 0.291667 | | |
| 4 | 1.000000 | | |
| 5 | 0.833333 | | |
| ... | ... | | |
| 20426 | 0.791667 | | |
| 20427 | 0.291667 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | f_extent_of_teacher_satisfaction level_MAT level_LEN | | |
| id_questionnaire | | | |
| 1 | 0.15 | 3.0 | 3.0 |
| 2 | NaN | 1.0 | 1.0 |

| | | | |
|-------|------|-----|-----|
| 3 | 0.50 | 1.0 | 3.0 |
| 4 | 0.20 | 2.0 | 2.0 |
| 5 | 0.35 | 4.0 | 3.0 |
| ... | ... | ... | ... |
| 20426 | 0.25 | 1.0 | 1.0 |
| 20427 | 0.40 | 2.0 | 3.0 |
| 20428 | NaN | 2.0 | 2.0 |
| 20429 | NaN | 3.0 | 3.0 |
| 20430 | NaN | 2.0 | 3.0 |

[17806 rows x 23 columns]

| | f_respondent \ |
|--|----------------|
| f_respondent | 1.000000 |
| f_number_of_people_in_household | -0.027957 |
| f_mother_age | -0.081211 |
| f_mother_education_level | -0.027144 |
| f_student_place_of_birth | -0.006793 |
| f_language_spoken_at_home | 0.041598 |
| f_degree_of_start_schooling_age | -0.014239 |
| f_number_of_tech_at_home | -0.084977 |
| f_extent_of_books_at_home | -0.038491 |
| f_visits_in_school_by_mother | -0.017420 |
| f_has_been_recommended_school | 0.002542 |
| f_number_of_homework_hours_a_week | -0.015882 |
| f_ESCS | -0.082319 |
| f_frequency_of_books_at_home | -0.008995 |
| f_frequency_of_tech_at_home | -0.053953 |
| f_frequency_of_see_adult_read | 0.015517 |
| f_extent_of_interest_in_interview | 0.074843 |
| f_frequency_of_support_at_home | 0.054338 |
| f_frequency_of_parent_involved_in_school_activi... | 0.046602 |
| f_extent_of_family_satisfaction | 0.037620 |
| f_extent_of_teacher_satisfaction | -0.032144 |
| level_MAT | -0.040162 |
| level_LEN | -0.044839 |

| | |
|-------------------------------------|-----|
| ↳ f_number_of_people_in_household \ | ↳ |
| f_respondent | -0. |
| ↳ 027957 | |
| f_number_of_people_in_household | 1. |
| ↳ 000000 | |
| f_mother_age | -0. |
| ↳ 053139 | |
| f_mother_education_level | -0. |
| ↳ 088100 | |

| | |
|--|-----------|
| f_student_place_of_birth | 0. |
| ↳010731 | |
| f_language_spoken_at_home | -0. |
| ↳052196 | |
| f_degree_of_start_schooling_age | 0. |
| ↳108799 | |
| f_number_of_tech_at_home | 0. |
| ↳123348 | |
| f_extent_of_books_at_home | 0. |
| ↳011982 | |
| f_visits_in_school_by_mother | 0. |
| ↳016202 | |
| f_has_been_recommended_school | 0. |
| ↳014522 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳005058 | |
| f_ESCS | -0. |
| ↳040514 | |
| f_frequency_of_books_at_home | -0. |
| ↳025456 | |
| f_frequency_of_tech_at_home | -0. |
| ↳010474 | |
| f_frequency_of_see_adult_read | -0. |
| ↳031906 | |
| f_extent_of_interest_in_interview | -0. |
| ↳026799 | |
| f_frequency_of_support_at_home | -0. |
| ↳042393 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.009101 |
| f_extent_of_family_satisfaction | 0. |
| ↳031290 | |
| f_extent_of_teacher_satisfaction | -0. |
| ↳011043 | |
| level_MAT | -0. |
| ↳067898 | |
| level_LEN | -0. |
| ↳076081 | |
| f_mother_age \ | |
| f_respondent | -0.081211 |
| f_number_of_people_in_household | -0.053139 |
| f_mother_age | 1.000000 |
| f_mother_education_level | 0.250886 |
| f_student_place_of_birth | -0.002140 |
| f_language_spoken_at_home | 0.022580 |
| f_degree_of_start_schooling_age | -0.072617 |

| | |
|--|-----------|
| f_number_of_tech_at_home | 0.058864 |
| f_extent_of_books_at_home | 0.268057 |
| f_visits_in_school_by_mother | -0.015672 |
| f_has_been_recommended_school | 0.023831 |
| f_number_of_homework_hours_a_week | -0.019828 |
| f_ESCS | 0.261448 |
| f_frequency_of_books_at_home | 0.072558 |
| f_frequency_of_tech_at_home | -0.011576 |
| f_frequency_of_see_adult_read | 0.110363 |
| f_extent_of_interest_in_interview | -0.029604 |
| f_frequency_of_support_at_home | -0.002376 |
| f_frequency_of_parent_involved_in_school_activi... | 0.060719 |
| f_extent_of_family_satisfaction | -0.013724 |
| f_extent_of_teacher_satisfaction | -0.024134 |
| level_MAT | 0.126018 |
| level_LEN | 0.129967 |
| f_mother_education_level \ | |
| f_respondent | -0.027144 |
| f_number_of_people_in_household | -0.088100 |
| f_mother_age | 0.250886 |
| f_mother_education_level | 1.000000 |
| f_student_place_of_birth | -0.049596 |
| f_language_spoken_at_home | -0.002979 |
| f_degree_of_start_schooling_age | -0.248467 |
| f_number_of_tech_at_home | 0.254568 |
| f_extent_of_books_at_home | 0.457494 |
| f_visits_in_school_by_mother | -0.042295 |
| f_has_been_recommended_school | 0.027079 |
| f_number_of_homework_hours_a_week | -0.008756 |
| f_ESCS | 0.627503 |
| f_frequency_of_books_at_home | 0.146603 |
| f_frequency_of_tech_at_home | 0.074593 |
| f_frequency_of_see_adult_read | 0.284140 |
| f_extent_of_interest_in_interview | -0.089370 |
| f_frequency_of_support_at_home | -0.030900 |
| f_frequency_of_parent_involved_in_school_activi... | 0.020266 |
| f_extent_of_family_satisfaction | -0.065329 |
| f_extent_of_teacher_satisfaction | -0.018038 |
| level_MAT | 0.284138 |
| level_LEN | 0.283595 |
| f_student_place_of_birth \ | |
| f_respondent | -0.006793 |
| f_number_of_people_in_household | 0.010731 |
| f_mother_age | -0.002140 |
| f_mother_education_level | -0.049596 |
| f_student_place_of_birth | 1.000000 |

| | |
|--|-----------|
| f_language_spoken_at_home | 0.289808 |
| f_degree_of_start_schooling_age | -0.072643 |
| f_number_of_tech_at_home | -0.015643 |
| f_extent_of_books_at_home | 0.025610 |
| f_visits_in_school_by_mother | -0.012835 |
| f_has_been_recommended_school | -0.015724 |
| f_number_of_homework_hours_a_week | -0.042928 |
| f_ESCS | -0.012139 |
| f_frequency_of_books_at_home | -0.017911 |
| f_frequency_of_tech_at_home | -0.020781 |
| f_frequency_of_see_adult_read | -0.012698 |
| f_extent_of_interest_in_interview | 0.026882 |
| f_frequency_of_support_at_home | 0.044377 |
| f_frequency_of_parent_involved_in_school_activi... | 0.011125 |
| f_extent_of_family_satisfaction | -0.020163 |
| f_extent_of_teacher_satisfaction | 0.021383 |
| level_MAT | 0.000980 |
| level_LEN | 0.020267 |
| | |
| f_respondent | 0.041598 |
| f_number_of_people_in_household | -0.052196 |
| f_mother_age | 0.022580 |
| f_mother_education_level | -0.002979 |
| f_student_place_of_birth | 0.289808 |
| f_language_spoken_at_home | 1.000000 |
| f_degree_of_start_schooling_age | -0.112067 |
| f_number_of_tech_at_home | -0.008967 |
| f_extent_of_books_at_home | 0.035558 |
| f_visits_in_school_by_mother | -0.004309 |
| f_has_been_recommended_school | 0.015072 |
| f_number_of_homework_hours_a_week | -0.001131 |
| f_ESCS | 0.045499 |
| f_frequency_of_books_at_home | -0.006676 |
| f_frequency_of_tech_at_home | -0.049509 |
| f_frequency_of_see_adult_read | -0.021653 |
| f_extent_of_interest_in_interview | 0.091814 |
| f_frequency_of_support_at_home | 0.141668 |
| f_frequency_of_parent_involved_in_school_activi... | 0.035891 |
| f_extent_of_family_satisfaction | 0.014853 |
| f_extent_of_teacher_satisfaction | -0.003008 |
| level_MAT | 0.025272 |
| level_LEN | 0.066332 |
| | |
| ↳ f_degree_of_start_schooling_age \ | 0. |
| f_respondent | -0. |
| ↳ 014239 | |

| | |
|--|--|
| f_number_of_people_in_household | 0. |
| ↳108799 | |
| f_mother_age | -0. |
| ↳072617 | |
| f_mother_education_level | -0. |
| ↳248467 | |
| f_student_place_of_birth | -0. |
| ↳072643 | |
| f_language_spoken_at_home | -0. |
| ↳112067 | |
| f_degree_of_start_schooling_age | 1. |
| ↳000000 | |
| f_number_of_tech_at_home | -0. |
| ↳098786 | |
| f_extent_of_books_at_home | -0. |
| ↳170949 | |
| f_visits_in_school_by_mother | 0. |
| ↳027965 | |
| f_has_been_recommended_school | -0. |
| ↳010893 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳007506 | |
| f_ESCS | -0. |
| ↳210289 | |
| f_frequency_of_books_at_home | -0. |
| ↳021553 | |
| f_frequency_of_tech_at_home | -0. |
| ↳002300 | |
| f_frequency_of_see_adult_read | -0. |
| ↳076068 | |
| f_extent_of_interest_in_interview | -0. |
| ↳004336 | |
| f_frequency_of_support_at_home | -0. |
| ↳034542 | |
| f_frequency_of_parent_involved_in_school_activi... | -0.006201 |
| f_extent_of_family_satisfaction | 0. |
| ↳036661 | |
| f_extent_of_teacher_satisfaction | 0. |
| ↳015961 | |
| level_MAT | -0. |
| ↳115373 | |
| level_LEN | -0. |
| ↳108522 | |
| f_respondent | f_number_of_tech_at_home \ -0.084977 |

| | |
|--|-----------|
| f_number_of_people_in_household | 0.123348 |
| f_mother_age | 0.058864 |
| f_mother_education_level | 0.254568 |
| f_student_place_of_birth | -0.015643 |
| f_language_spoken_at_home | -0.008967 |
| f_degree_of_start_schooling_age | -0.098786 |
| f_number_of_tech_at_home | 1.000000 |
| f_extent_of_books_at_home | 0.283857 |
| f_visits_in_school_by_mother | -0.007627 |
| f_has_been_recommended_school | -0.001399 |
| f_number_of_homework_hours_a_week | 0.020601 |
| f_ESCS | 0.278867 |
| f_frequency_of_books_at_home | 0.063726 |
| f_frequency_of_tech_at_home | 0.241223 |
| f_frequency_of_see_adult_read | 0.100015 |
| f_extent_of_interest_in_interview | -0.036621 |
| f_frequency_of_support_at_home | -0.026188 |
| f_frequency_of_parent_involved_in_school_activi... | -0.011387 |
| f_extent_of_family_satisfaction | -0.030832 |
| f_extent_of_teacher_satisfaction | -0.012458 |
| level_MAT | 0.143473 |
| level_LEN | 0.146762 |
| f_extent_of_books_at_home \ | |
| f_respondent | -0.038491 |
| f_number_of_people_in_household | 0.011982 |
| f_mother_age | 0.268057 |
| f_mother_education_level | 0.457494 |
| f_student_place_of_birth | 0.025610 |
| f_language_spoken_at_home | 0.035558 |
| f_degree_of_start_schooling_age | -0.170949 |
| f_number_of_tech_at_home | 0.283857 |
| f_extent_of_books_at_home | 1.000000 |
| f_visits_in_school_by_mother | -0.011430 |
| f_has_been_recommended_school | -0.007821 |
| f_number_of_homework_hours_a_week | -0.005190 |
| f_ESCS | 0.735864 |
| f_frequency_of_books_at_home | 0.209352 |
| f_frequency_of_tech_at_home | 0.043936 |
| f_frequency_of_see_adult_read | 0.385506 |
| f_extent_of_interest_in_interview | -0.062068 |
| f_frequency_of_support_at_home | -0.033528 |
| f_frequency_of_parent_involved_in_school_activi... | 0.066643 |
| f_extent_of_family_satisfaction | -0.066426 |
| f_extent_of_teacher_satisfaction | -0.022848 |
| level_MAT | 0.229863 |
| level_LEN | 0.231046 |

| | | |
|--|------------------------------|-----|
| | f_visits_in_school_by_mother | ↳ \ |
| f_respondent | -0.017420 | |
| f_number_of_people_in_household | 0.016202 | |
| f_mother_age | -0.015672 | |
| f_mother_education_level | -0.042295 | |
| f_student_place_of_birth | -0.012835 | |
| f_language_spoken_at_home | -0.004309 | |
| f_degree_of_start_schooling_age | 0.027965 | |
| f_number_of_tech_at_home | -0.007627 | |
| f_extent_of_books_at_home | -0.011430 | |
| f_visits_in_school_by_mother | 1.000000 | |
| f_has_been_recommended_school | -0.022420 | |
| f_number_of_homework_hours_a_week | 0.041970 | |
| f_ESCS | -0.026805 | |
| f_frequency_of_books_at_home | 0.048104 | |
| f_frequency_of_tech_at_home | 0.012176 | |
| f_frequency_of_see_adult_read | 0.030557 | |
| f_extent_of_interest_in_interview | 0.063744 | |
| f_frequency_of_support_at_home | 0.054227 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.101717 | |
| f_extent_of_family_satisfaction | -0.002028 | |
| f_extent_of_teacher_satisfaction | -0.008348 | |
| level_MAT | -0.056037 | |
| level_LEN | -0.055724 | |
| | ... ↳ \ | |
| f_respondent | ... | |
| f_number_of_people_in_household | ... | |
| f_mother_age | ... | |
| f_mother_education_level | ... | |
| f_student_place_of_birth | ... | |
| f_language_spoken_at_home | ... | |
| f_degree_of_start_schooling_age | ... | |
| f_number_of_tech_at_home | ... | |
| f_extent_of_books_at_home | ... | |
| f_visits_in_school_by_mother | ... | |
| f_has_been_recommended_school | ... | |
| f_number_of_homework_hours_a_week | ... | |
| f_ESCS | ... | |
| f_frequency_of_books_at_home | ... | |
| f_frequency_of_tech_at_home | ... | |
| f_frequency_of_see_adult_read | ... | |
| f_extent_of_interest_in_interview | ... | |
| f_frequency_of_support_at_home | ... | |
| f_frequency_of_parent_involved_in_school_activi... | ... | |
| f_extent_of_family_satisfaction | ... | |

| | |
|--|--------------------------------|
| f_extent_of_teacher_satisfaction | ... |
| level_MAT | ... |
| level_LEN | ... |
| | f_frequency_of_books_at_home ↴ |
| ↳ \ | |
| f_respondent | -0.008995 |
| f_number_of_people_in_household | -0.025456 |
| f_mother_age | 0.072558 |
| f_mother_education_level | 0.146603 |
| f_student_place_of_birth | -0.017911 |
| f_language_spoken_at_home | -0.006676 |
| f_degree_of_start_schooling_age | -0.021553 |
| f_number_of_tech_at_home | 0.063726 |
| f_extent_of_books_at_home | 0.209352 |
| f_visits_in_school_by_mother | 0.048104 |
| f_has_been_recommended_school | 0.023591 |
| f_number_of_homework_hours_a_week | 0.057714 |
| f_ESCS | 0.175323 |
| f_frequency_of_books_at_home | 1.000000 |
| f_frequency_of_tech_at_home | 0.237772 |
| f_frequency_of_see_adult_read | 0.345352 |
| f_extent_of_interest_in_interview | 0.073173 |
| f_frequency_of_support_at_home | 0.106625 |
| f_frequency_of_parent_involved_in_school_activi... | 0.179154 |
| f_extent_of_family_satisfaction | 0.057873 |
| f_extent_of_teacher_satisfaction | -0.049062 |
| level_MAT | 0.097342 |
| level_LEN | 0.113689 |
| | f_frequency_of_tech_at_home ↴ |
| ↳ \ | |
| f_respondent | -0.053953 |
| f_number_of_people_in_household | -0.010474 |
| f_mother_age | -0.011576 |
| f_mother_education_level | 0.074593 |
| f_student_place_of_birth | -0.020781 |
| f_language_spoken_at_home | -0.049509 |
| f_degree_of_start_schooling_age | -0.002300 |
| f_number_of_tech_at_home | 0.241223 |
| f_extent_of_books_at_home | 0.043936 |
| f_visits_in_school_by_mother | 0.012176 |
| f_has_been_recommended_school | 0.004843 |
| f_number_of_homework_hours_a_week | -0.010289 |
| f_ESCS | 0.047837 |
| f_frequency_of_books_at_home | 0.237772 |
| f_frequency_of_tech_at_home | 1.000000 |

| | |
|--|-----------|
| f_frequency_of_see_adult_read | 0.040688 |
| f_extent_of_interest_in_interview | 0.011785 |
| f_frequency_of_support_at_home | 0.002813 |
| f_frequency_of_parent_involved_in_school_activi... | 0.010881 |
| f_extent_of_family_satisfaction | 0.007259 |
| f_extent_of_teacher_satisfaction | -0.010616 |
| level_MAT | 0.043599 |
| level_LEN | 0.048300 |

| | |
|--|-----------|
| ↳ f_frequency_of_see_adult_read \ | |
| f_respondent | 0.015517 |
| f_number_of_people_in_household | -0.031906 |
| f_mother_age | 0.110363 |
| f_mother_education_level | 0.284140 |
| f_student_place_of_birth | -0.012698 |
| f_language_spoken_at_home | -0.021653 |
| f_degree_of_start_schooling_age | -0.076068 |
| f_number_of_tech_at_home | 0.100015 |
| f_extent_of_books_at_home | 0.385506 |
| f_visits_in_school_by_mother | 0.030557 |
| f_has_been_recommended_school | 0.017556 |
| f_number_of_homework_hours_a_week | 0.024970 |
| f_ESCS | 0.330894 |
| f_frequency_of_books_at_home | 0.345352 |
| f_frequency_of_tech_at_home | 0.040688 |
| f_frequency_of_see_adult_read | 1.000000 |
| f_extent_of_interest_in_interview | 0.023952 |
| f_frequency_of_support_at_home | 0.077578 |
| f_frequency_of_parent_involved_in_school_activi... | 0.177247 |
| f_extent_of_family_satisfaction | 0.018249 |
| f_extent_of_teacher_satisfaction | -0.037240 |
| level_MAT | 0.088369 |
| level_LEN | 0.106418 |

| | |
|---------------------------------------|-----|
| ↳ f_extent_of_interest_in_interview \ | |
| f_respondent | 0. |
| ↳ 074843 | |
| f_number_of_people_in_household | -0. |
| ↳ 026799 | |
| f_mother_age | -0. |
| ↳ 029604 | |
| f_mother_education_level | -0. |
| ↳ 089370 | |
| f_student_place_of_birth | 0. |
| ↳ 026882 | |

| | |
|--|-----|
| f_language_spoken_at_home | 0. |
| ↳091814 | |
| f_degree_of_start_schooling_age | -0. |
| ↳004336 | |
| f_number_of_tech_at_home | -0. |
| ↳036621 | |
| f_extent_of_books_at_home | -0. |
| ↳062068 | |
| f_visits_in_school_by_mother | 0. |
| ↳063744 | |
| f_has_been_recommended_school | -0. |
| ↳000693 | |
| f_number_of_homework_hours_a_week | 0. |
| ↳068049 | |
| f_ESCS | -0. |
| ↳052693 | |
| f_frequency_of_books_at_home | 0. |
| ↳073173 | |
| f_frequency_of_tech_at_home | 0. |
| ↳011785 | |
| f_frequency_of_see_adult_read | 0. |
| ↳023952 | |
| f_extent_of_interest_in_interview | 1. |
| ↳000000 | |
| f_frequency_of_support_at_home | 0. |
| ↳266364 | |
| f_frequency_of_parent_involved_in_school_activi... | 0. |
| ↳139872 | |
| f_extent_of_family_satisfaction | 0. |
| ↳068859 | |
| f_extent_of_teacher_satisfaction | -0. |
| ↳060370 | |
| level_MAT | -0. |
| ↳072618 | |
| level_LEN | -0. |
| ↳052626 | |

| | |
|-----------------------------------|-----|
| ↳f_frequency_of_support_at_home \ | □ |
| f_respondent | 0. |
| ↳054338 | |
| f_number_of_people_in_household | -0. |
| ↳042393 | |
| f_mother_age | -0. |
| ↳002376 | |

| | |
|--|----------|
| f_mother_education_level | -0. |
| ↳030900 | |
| f_student_place_of_birth | 0. |
| ↳044377 | |
| f_language_spoken_at_home | 0. |
| ↳141668 | |
| f_degree_of_start_schooling_age | -0. |
| ↳034542 | |
| f_number_of_tech_at_home | -0. |
| ↳026188 | |
| f_extent_of_books_at_home | -0. |
| ↳033528 | |
| f_visits_in_school_by_mother | 0. |
| ↳054227 | |
| f_has_been_recommended_school | -0. |
| ↳004020 | |
| f_number_of_homework_hours_a_week | 0. |
| ↳119507 | |
| f_ESCS | -0. |
| ↳002452 | |
| f_frequency_of_books_at_home | 0. |
| ↳106625 | |
| f_frequency_of_tech_at_home | 0. |
| ↳002813 | |
| f_frequency_of_see_adult_read | 0. |
| ↳077578 | |
| f_extent_of_interest_in_interview | 0. |
| ↳266364 | |
| f_frequency_of_support_at_home | 1. |
| ↳000000 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.104213 |
| f_extent_of_family_satisfaction | 0. |
| ↳037971 | |
| f_extent_of_teacher_satisfaction | -0. |
| ↳026951 | |
| level_MAT | -0. |
| ↳050041 | |
| level_LEN | 0. |
| ↳001853 | |
| ↳f_frequency_of_parent_involved_in_school_activities \ | |
| f_respondent | 0.046602 |
| f_number_of_people_in_household | 0.009101 |

| | |
|--|-----------------------------------|
| f_mother_age | □ |
| ↳ | 0.060719 |
| f_mother_education_level | □ |
| ↳ | 0.020266 |
| f_student_place_of_birth | □ |
| ↳ | 0.011125 |
| f_language_spoken_at_home | □ |
| ↳ | 0.035891 |
| f_degree_of_start_schooling_age | □ |
| ↳ | -0.006201 |
| f_number_of_tech_at_home | □ |
| ↳ | -0.011387 |
| f_extent_of_books_at_home | □ |
| ↳ | 0.066643 |
| f_visits_in_school_by_mother | □ |
| ↳ | 0.101717 |
| f_has_been_recommended_school | □ |
| ↳ | 0.073856 |
| f_number_of_homework_hours_a_week | □ |
| ↳ | 0.015347 |
| f_ESCS | □ |
| ↳ | 0.047424 |
| f_frequency_of_books_at_home | □ |
| ↳ | 0.179154 |
| f_frequency_of_tech_at_home | □ |
| ↳ | 0.010881 |
| f_frequency_of_see_adult_read | □ |
| ↳ | 0.177247 |
| f_extent_of_interest_in_interview | □ |
| ↳ | 0.139872 |
| f_frequency_of_support_at_home | □ |
| ↳ | 0.104213 |
| f_frequency_of_parent_involved_in_school_activi... | □ |
| ↳ | 1.000000 |
| f_extent_of_family_satisfaction | □ |
| ↳ | 0.136940 |
| f_extent_of_teacher_satisfaction | □ |
| ↳ | -0.063903 |
| level_MAT | □ |
| ↳ | 0.002740 |
| level_LEN | □ |
| ↳ | 0.021056 |
| ↳ | f_extent_of_family_satisfaction \ |

| | |
|--|----------|
| f_respondent | 0. |
| ↳037620 | |
| f_number_of_people_in_household | 0. |
| ↳031290 | |
| f_mother_age | -0. |
| ↳013724 | |
| f_mother_education_level | -0. |
| ↳065329 | |
| f_student_place_of_birth | -0. |
| ↳020163 | |
| f_language_spoken_at_home | 0. |
| ↳014853 | |
| f_degree_of_start_schooling_age | 0. |
| ↳036661 | |
| f_number_of_tech_at_home | -0. |
| ↳030832 | |
| f_extent_of_books_at_home | -0. |
| ↳066426 | |
| f_visits_in_school_by_mother | -0. |
| ↳002028 | |
| f_has_been_recommended_school | 0. |
| ↳426081 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳019991 | |
| f_ESCS | -0. |
| ↳087052 | |
| f_frequency_of_books_at_home | 0. |
| ↳057873 | |
| f_frequency_of_tech_at_home | 0. |
| ↳007259 | |
| f_frequency_of_see_adult_read | 0. |
| ↳018249 | |
| f_extent_of_interest_in_interview | 0. |
| ↳068859 | |
| f_frequency_of_support_at_home | 0. |
| ↳037971 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.136940 |
| f_extent_of_family_satisfaction | 1. |
| ↳000000 | |
| f_extent_of_teacher_satisfaction | -0. |
| ↳474855 | |
| level_MAT | 0. |
| ↳050280 | |
| level_LEN | 0. |
| ↳053399 | |

| | |
|--|-----|
| | □ |
| ↳ f_extent_of_teacher_satisfaction \ | |
| f_respondent | -0. |
| ↳ 032144 | |
| f_number_of_people_in_household | -0. |
| ↳ 011043 | |
| f_mother_age | -0. |
| ↳ 024134 | |
| f_mother_education_level | -0. |
| ↳ 018038 | |
| f_student_place_of_birth | 0. |
| ↳ 021383 | |
| f_language_spoken_at_home | -0. |
| ↳ 003008 | |
| f_degree_of_start_schooling_age | 0. |
| ↳ 015961 | |
| f_number_of_tech_at_home | -0. |
| ↳ 012458 | |
| f_extent_of_books_at_home | -0. |
| ↳ 022848 | |
| f_visits_in_school_by_mother | -0. |
| ↳ 008348 | |
| f_has_been_recommended_school | -0. |
| ↳ 229920 | |
| f_number_of_homework_hours_a_week | 0. |
| ↳ 028860 | |
| f_ESCS | -0. |
| ↳ 007822 | |
| f_frequency_of_books_at_home | -0. |
| ↳ 049062 | |
| f_frequency_of_tech_at_home | -0. |
| ↳ 010616 | |
| f_frequency_of_see_adult_read | -0. |
| ↳ 037240 | |
| f_extent_of_interest_in_interview | -0. |
| ↳ 060370 | |
| f_frequency_of_support_at_home | -0. |
| ↳ 026951 | |
| f_frequency_of_parent_involved_in_school_activi... | -0. |
| ↳ 063903 | |
| f_extent_of_family_satisfaction | -0. |
| ↳ 474855 | |
| f_extent_of_teacher_satisfaction | 1. |
| ↳ 000000 | |
| level_MAT | -0. |
| ↳ 055982 | |

| | | |
|--|-----------|-----------|
| level_LEN | | -0. |
| ↳067184 | | |
| f_respondent | level_MAT | level_LEN |
| f_number_of_people_in_household | -0.040162 | -0.044839 |
| f_mother_age | -0.067898 | -0.076081 |
| f_mother_education_level | 0.126018 | 0.129967 |
| f_student_place_of_birth | 0.284138 | 0.283595 |
| f_language_spoken_at_home | 0.000980 | 0.020267 |
| f_degree_of_start_schooling_age | 0.025272 | 0.066332 |
| f_number_of_tech_at_home | -0.115373 | -0.108522 |
| f_extent_of_books_at_home | 0.143473 | 0.146762 |
| f_visits_in_school_by_mother | 0.229863 | 0.231046 |
| f_has_been_recommended_school | -0.056037 | -0.055724 |
| f_number_of_homework_hours_a_week | 0.050717 | 0.048489 |
| f_ESCS | -0.035409 | -0.023550 |
| f_frequency_of_books_at_home | 0.250165 | 0.265560 |
| f_frequency_of_tech_at_home | 0.097342 | 0.113689 |
| f_frequency_of_see_adult_read | 0.043599 | 0.048300 |
| f_extent_of_interest_in_interview | 0.088369 | 0.106418 |
| f_frequency_of_support_at_home | -0.072618 | -0.052626 |
| f_frequency_of_parent_involved_in_school_activi... | -0.050041 | 0.001853 |
| f_extent_of_family_satisfaction | 0.002740 | 0.021056 |
| f_extent_of_teacher_satisfaction | 0.050280 | 0.053399 |
| level_MAT | -0.055982 | -0.067184 |
| level_LEN | 1.000000 | 0.562532 |
| | 0.562532 | 1.000000 |

[23 rows x 23 columns]

5.6 Teacher Questionnaire

```
[84]: df_sel_teachers, correlation_matrix_sel_teachers = ↳
    compute_exploratory_analysis(df=df_sel, column_pattern="t_", ↳
    ↳ missing_threshold=0.4, annot=False)
```

GOOD FEATURES: 31

| | |
|---|----------|
| t_gender | 0.273054 |
| t_age | 0.291643 |
| t_number_of_years_as_teacher | 0.276424 |
| t_number_of_years_in_school | 0.283444 |
| t_has_taught_same_group_last_two_years | 0.273110 |
| t_number_of_students_in_group | 0.275525 |
| t_number_of_teaching_hours_per_week | 0.286982 |
| t_average_explanation_time | 0.270920 |
| t_degree_of_individual_training_incidence | 0.347130 |
| t_seat_configuration | 0.273447 |
| t_behaviour_problems_solution | 0.275750 |

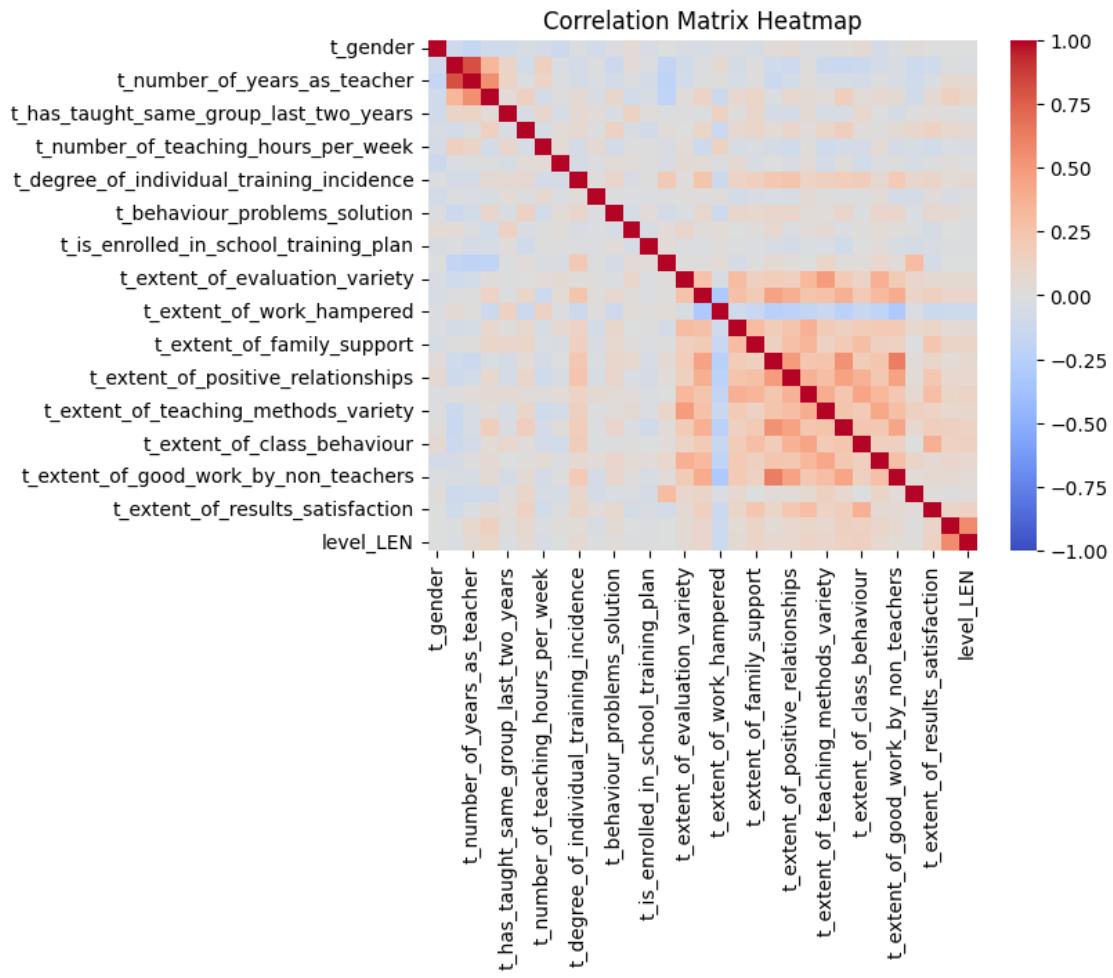
| | |
|--|----------|
| t_number_of_meetings_with_families | 0.308267 |
| t_is_enrolled_in_school_training_plan | 0.273503 |
| t_number_of_training_hours_last_six_years | 0.331854 |
| t_extent_of_evaluation_variety | 0.271032 |
| t_extent_of_pfc_incidence | 0.335617 |
| t_extent_of_work_hampered | 0.274907 |
| t_extent_of_family_interest | 0.273503 |
| t_extent_of_family_support | 0.274402 |
| t_extent_of_work_facilitated_by_management | 0.277322 |
| t_extent_of_positive_relationships | 0.272436 |
| t_extent_of_student_involvement_during_class | 0.272155 |
| t_extent_of_teaching_methods_variety | 0.271032 |
| t_extent_of_opinion_on_school | 0.293890 |
| t_extent_of_class_behaviour | 0.273728 |
| t_extent_of_resource_variety | 0.271032 |
| t_extent_of_good_work_by_non_teachers | 0.283893 |
| t_number_of_individual_training_topics | 0.377457 |
| t_extent_of_results_satisfaction | 0.271987 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |

dtype: float64

BAD FEATURES

| | |
|---|----------|
| t_number_of_students_disadvantaged_economic_situation | 0.592216 |
| t_number_of_foreign_studentsSpeaking_spanish | 0.471021 |
| t_number_of_foreign_students_notSpeaking_spanish | 0.475458 |
| t_number_of_training_hours_ceu_offer | 1.000000 |
| t_main_topic_of_pfc | 1.000000 |
| t_number_of_special_attention_students | 0.431877 |
| t_number_of_subjects_taught | 1.000000 |
| t_extent_of_satisfaction_job_and_school | 1.000000 |
| level_ING | 1.000000 |

dtype: float64



| | t_gender | t_age | t_number_of_years_as_teacher | \ |
|-------------------------------|----------|-------|------------------------------|------|
| id_questionnaire | | | | |
| 1 | NaN | NaN | | NaN |
| 2 | NaN | NaN | | NaN |
| 3 | NaN | NaN | | NaN |
| 4 | FEMALE | 56.0 | | 29.0 |
| 5 | FEMALE | 44.0 | | 20.0 |
| ... | ... | ... | | ... |
| 20426 | NaN | NaN | | NaN |
| 20427 | FEMALE | 48.0 | | 27.0 |
| 20428 | MALE | 34.0 | | 7.0 |
| 20429 | NaN | NaN | | NaN |
| 20430 | NaN | NaN | | NaN |
| t_number_of_years_in_school \ | | | | |
| id_questionnaire | | | | NaN |
| 1 | | | | NaN |

| | | |
|------------------|--|-------|
| 2 | | NaN |
| 3 | | NaN |
| 4 | | 18.0 |
| 5 | | 17.0 |
| ... | | ... |
| 20426 | | NaN |
| 20427 | | 11.0 |
| 20428 | | 1.0 |
| 20429 | | NaN |
| 20430 | | NaN |
| | t_has_taught_same_group_last_two_years \ | |
| id_questionnaire | | |
| 1 | | NaN |
| 2 | | NaN |
| 3 | | NaN |
| 4 | | False |
| 5 | | False |
| ... | | ... |
| 20426 | | NaN |
| 20427 | | False |
| 20428 | | False |
| 20429 | | NaN |
| 20430 | | NaN |
| | t_number_of_students_in_group \ | |
| id_questionnaire | | |
| 1 | | NaN |
| 2 | | NaN |
| 3 | | NaN |
| 4 | | 26.0 |
| 5 | | 26.0 |
| ... | | ... |
| 20426 | | NaN |
| 20427 | | 25.0 |
| 20428 | | 26.0 |
| 20429 | | NaN |
| 20430 | | NaN |
| | t_number_of_teaching_hours_per_week \ | |
| id_questionnaire | | |
| 1 | | NaN |
| 2 | | NaN |
| 3 | | NaN |
| 4 | | 15.0 |
| 5 | | 18.0 |
| ... | | ... |
| 20426 | | NaN |

```

20427           18.0
20428           12.0
20429           NaN
20430           NaN

t_average_explanation_time \
id_questionnaire
1             NaN
2             NaN
3             NaN
4             2.0
5             2.0
...
20426           ...
20427           NaN
20428           2.0
20429           NaN
20430           NaN

t_degree_of_individual_training_incidence \
id_questionnaire
1             NaN
2             NaN
3             NaN
4             NaN
5             4.0
...
20426           ...
20427           4.0
20428           NaN
20429           NaN
20430           NaN

t_seat_configuration ... \
id_questionnaire
1             NaN ...
2             NaN ...
3             NaN ...
4             5.0 ...
5             5.0 ...
...
20426           ...
20427           NaN ...
20428           4.0 ...
20429           NaN ...
20430           NaN ...

t_extent_of_student_involvement_during_class \

```

```

id_questionnaire
1
2
3
4
5
...
20426
20427
20428
20429
20430

t_extent_of_teaching_methods_variety \
id_questionnaire
1
2
3
4
5
...
20426
20427
20428
20429
20430

t_extent_of_opinion_on_school t_extent_of_class_behaviour \
id_questionnaire
1
2
3
4
5
...
20426
20427
20428
20429
20430

t_extent_of_resource_variety \
id_questionnaire
1
2
3
4
5

```

| | | ... | ... |
|-------------------------------|---|------------------------|------------------------|
| 20426 | | NaN | |
| 20427 | | 0.571429 | |
| 20428 | | 0.583333 | |
| 20429 | | NaN | |
| 20430 | | NaN | |
| | | | <code>\</code> |
| | <code>t_extent_of_good_work_by_non_teachers</code> | | |
| | | | |
| <code>id_questionnaire</code> | | | |
| 1 | | NaN | |
| 2 | | NaN | |
| 3 | | NaN | |
| 4 | | 0.555556 | |
| 5 | | 0.888889 | |
| | | | <code>\</code> |
| | <code>t_number_of_individual_training_topics</code> | | |
| | | | |
| <code>id_questionnaire</code> | | | |
| 1 | | NaN | |
| 2 | | NaN | |
| 3 | | NaN | |
| 4 | | NaN | |
| 5 | | 1.0 | |
| | | | <code>\</code> |
| | <code>t_extent_of_results_satisfaction</code> | <code>level_MAT</code> | <code>level_LEN</code> |
| | | | |
| <code>id_questionnaire</code> | | | |
| 1 | | NaN | 3.0 |
| 2 | | NaN | 1.0 |
| 3 | | NaN | 3.0 |
| 4 | | 0.666667 | 2.0 |
| 5 | | 1.000000 | 4.0 |
| | | ... | ... |
| 20426 | | NaN | 1.0 |
| 20427 | | 0.666667 | 2.0 |
| 20428 | | 0.666667 | 2.0 |
| 20429 | | NaN | 3.0 |
| 20430 | | NaN | 2.0 |

[17806 rows x 31 columns]

| | | | |
|--|------------------------------|-----------|---|
| t_gender | t_number_of_years_as_teacher | t_age | \ |
| t_age | 1.000000 | -0.106988 | |
| t_number_of_years_as_teacher | -0.106988 | 1.000000 | |
| t_number_of_years_in_school | -0.164927 | 0.805214 | |
| t_has_taught_same_group_last_two_years | -0.100052 | 0.342080 | |
| t_number_of_students_in_group | -0.099470 | 0.112678 | |
| t_number_of_teaching_hours_per_week | -0.039606 | -0.084781 | |
| t_average_explanation_time | -0.063430 | 0.161169 | |
| t_degree_of_individual_training_incidence | -0.120649 | -0.026750 | |
| t_seat_configuration | -0.018532 | -0.070094 | |
| t_behaviour_problems_solution | -0.084971 | -0.007977 | |
| t_number_of_meetings_with_families | -0.017883 | -0.128723 | |
| t_is_enrolled_in_school_training_plan | 0.042797 | 0.035827 | |
| t_number_of_training_hours_last_six_years | -0.036946 | -0.019760 | |
| t_extent_of_evaluation_variety | -0.007311 | -0.176008 | |
| t_extent_of_pfc_incidence | -0.038288 | -0.095122 | |
| t_extent_of_work_hampered | -0.049936 | -0.008681 | |
| t_extent_of_family_interest | -0.021475 | 0.052627 | |
| t_extent_of_family_support | -0.022273 | -0.060418 | |
| t_extent_of_work_facilitated_by_management | -0.052638 | 0.003515 | |
| t_extent_of_positive_relationships | 0.026460 | -0.097534 | |
| t_extent_of_student_involvement_during_class | 0.057162 | -0.115030 | |
| t_extent_of_teaching_methods_variety | -0.020070 | 0.012214 | |
| t_extent_of_opinion_on_school | -0.009020 | -0.125742 | |
| t_extent_of_class_behaviour | 0.015698 | -0.135391 | |
| t_extent_of_resource_variety | 0.062479 | -0.124766 | |
| t_extent_of_good_work_by_non_teachers | -0.066329 | -0.065868 | |
| t_number_of_individual_training_topics | -0.022120 | -0.041972 | |
| t_extent_of_results_satisfaction | 0.017530 | -0.112589 | |
| level_MAT | -0.004949 | -0.096093 | |
| level_LEN | -0.000143 | -0.008295 | |
| | -0.005552 | -0.024233 | |
| | | | |
| t_number_of_years_as_teacher | t_number_of_years_as_teacher | \ | |
| t_gender | -0.164927 | | |
| t_age | 0.805214 | | |
| t_number_of_years_as_teacher | 1.000000 | | |
| t_number_of_years_in_school | 0.551866 | | |
| t_has_taught_same_group_last_two_years | 0.120687 | | |
| t_number_of_students_in_group | -0.012364 | | |
| t_number_of_teaching_hours_per_week | 0.112551 | | |
| t_average_explanation_time | -0.013882 | | |
| t_degree_of_individual_training_incidence | -0.059970 | | |
| t_seat_configuration | -0.027214 | | |
| t_behaviour_problems_solution | -0.083623 | | |

| | |
|--|-----------|
| t_number_of_meetings_with_families | -0.009686 |
| t_is_enrolled_in_school_training_plan | -0.070146 |
| t_number_of_training_hours_last_six_years | -0.210125 |
| t_extent_of_evaluation_variety | -0.080935 |
| t_extent_of_pfc_incidence | 0.002415 |
| t_extent_of_work_hampered | 0.014978 |
| t_extent_of_family_interest | -0.054371 |
| t_extent_of_family_support | 0.008892 |
| t_extent_of_work_facilitated_by_management | -0.130148 |
| t_extent_of_positive_relationships | -0.079614 |
| t_extent_of_student_involvement_during_class | 0.024339 |
| t_extent_of_teaching_methods_variety | -0.046590 |
| t_extent_of_opinion_on_school | -0.047873 |
| t_extent_of_class_behaviour | -0.063738 |
| t_extent_of_resource_variety | 0.007308 |
| t_extent_of_good_work_by_non_teachers | -0.042023 |
| t_number_of_individual_training_topics | -0.098857 |
| t_extent_of_results_satisfaction | -0.028828 |
| level_MAT | 0.075011 |
| level_LEN | 0.050907 |

| | |
|--|-------------------------------|
| | t_number_of_years_in_school \ |
| t_gender | -0.100052 |
| t_age | 0.342080 |
| t_number_of_years_as_teacher | 0.551866 |
| t_number_of_years_in_school | 1.000000 |
| t_has_taught_same_group_last_two_years | 0.038472 |
| t_number_of_students_in_group | 0.148874 |
| t_number_of_teaching_hours_per_week | -0.077058 |
| t_average_explanation_time | 0.002995 |
| t_degree_of_individual_training_incidence | 0.059977 |
| t_seat_configuration | -0.040416 |
| tBehaviour_problems_solution | 0.086679 |
| t_number_of_meetings_with_families | -0.079157 |
| t_is_enrolled_in_school_training_plan | -0.047551 |
| t_number_of_training_hours_last_six_years | -0.201768 |
| t_extent_of_evaluation_variety | 0.018906 |
| t_extent_of_pfc_incidence | 0.128609 |
| t_extent_of_work_hampered | -0.123483 |
| t_extent_of_family_interest | 0.080315 |
| t_extent_of_family_support | 0.108870 |
| t_extent_of_work_facilitated_by_management | -0.029098 |
| t_extent_of_positive_relationships | 0.074178 |
| t_extent_of_student_involvement_during_class | 0.047081 |
| t_extent_of_teaching_methods_variety | 0.024319 |
| t_extent_of_opinion_on_school | 0.168196 |
| t_extent_of_class_behaviour | 0.041879 |
| t_extent_of_resource_variety | 0.056558 |

| | |
|---|-----------|
| t_extent_of_good_work_by_non_teachers | 0.052474 |
| t_number_of_individual_training_topics | -0.087610 |
| t_extent_of_results_satisfaction | 0.052541 |
| level_MAT | 0.151830 |
| level_LEN | 0.108267 |
| | |
| t_has_taught_same_group_last_two_years \t | |
| t_gender | -0. |
| 099470 | |
| t_age | 0. |
| 112678 | |
| t_number_of_years_as_teacher | 0. |
| 120687 | |
| t_number_of_years_in_school | 0. |
| 038472 | |
| t_has_taught_same_group_last_two_years | 1. |
| 000000 | |
| t_number_of_students_in_group | -0. |
| 032484 | |
| t_number_of_teaching_hours_per_week | 0. |
| 089767 | |
| t_average_explanation_time | -0. |
| 048343 | |
| t_degree_of_individual_training_incidence | 0. |
| 055218 | |
| t_seat_configuration | 0. |
| 038558 | |
| t_behaviour_problems_solution | -0. |
| 033473 | |
| t_number_of_meetings_with_families | 0. |
| 141232 | |
| t_is_enrolled_in_school_training_plan | 0. |
| 021192 | |
| t_number_of_training_hours_last_six_years | -0. |
| 012515 | |
| t_extent_of_evaluation_variety | 0. |
| 007145 | |
| t_extent_of_pfc_incidence | -0. |
| 012599 | |
| t_extent_of_work_hampered | 0. |
| 141869 | |
| t_extent_of_family_interest | 0. |
| 011439 | |
| t_extent_of_family_support | 0. |
| 098353 | |

| | |
|--|-----|
| t_extent_of_work_facilitated_by_management | -0. |
| ↳062418 | |
| t_extent_of_positive_relationships | -0. |
| ↳062956 | |
| t_extent_of_student_involvement_during_class | 0. |
| ↳049167 | |
| t_extent_of_teaching_methods_variety | -0. |
| ↳050967 | |
| t_extent_of_opinion_on_school | -0. |
| ↳037333 | |
| t_extent_of_class_behaviour | 0. |
| ↳085873 | |
| t_extent_of_resource_variety | -0. |
| ↳000101 | |
| t_extent_of_good_work_by_non_teachers | -0. |
| ↳060428 | |
| t_number_of_individual_training_topics | 0. |
| ↳014706 | |
| t_extent_of_results_satisfaction | 0. |
| ↳029821 | |
| level_MAT | 0. |
| ↳007877 | |
| level_LEN | -0. |
| ↳012844 | |

| | t_number_of_students_in_group \ |
|--|---------------------------------|
| t_gender | -0.039606 |
| t_age | -0.084781 |
| t_number_of_years_as_teacher | -0.012364 |
| t_number_of_years_in_school | 0.148874 |
| t_has_taught_same_group_last_two_years | -0.032484 |
| t_number_of_students_in_group | 1.000000 |
| t_number_of_teaching_hours_per_week | -0.053343 |
| t_average_explanation_time | 0.040897 |
| t_degree_of_individual_training_incidence | 0.065211 |
| t_seat_configuration | -0.009042 |
| t_behaviour_problems_solution | 0.145043 |
| t_number_of_meetings_with_families | -0.033945 |
| t_is_enrolled_in_school_training_plan | -0.086156 |
| t_number_of_training_hours_last_six_years | 0.027917 |
| t_extent_of_evaluation_variety | -0.002029 |
| t_extent_of_pfc_incidence | 0.104163 |
| t_extent_of_work_hampered | -0.127681 |
| t_extent_of_family_interest | 0.070680 |
| t_extent_of_family_support | 0.104725 |
| t_extent_of_work_facilitated_by_management | 0.040518 |
| t_extent_of_positive_relationships | 0.098453 |

| | |
|--|-----------|
| t_extent_of_student_involvement_during_class | 0.023562 |
| t_extent_of_teaching_methods_variety | 0.108129 |
| t_extent_of_opinion_on_school | 0.166899 |
| t_extent_of_class_behaviour | 0.025933 |
| t_extent_of_resource_variety | 0.014967 |
| t_extent_of_good_work_by_non_teachers | 0.054066 |
| t_number_of_individual_training_topics | 0.090980 |
| t_extent_of_results_satisfaction | 0.133450 |
| level_MAT | 0.072164 |
| level_LEN | 0.062272 |
| | |
| t_number_of_teaching_hours_per_week \ | - |
| t_gender | -0.063430 |
| t_age | 0.161169 |
| t_number_of_years_as_teacher | 0.112551 |
| t_number_of_years_in_school | -0.077058 |
| t_has_taught_same_group_last_two_years | 0.089767 |
| t_number_of_students_in_group | -0.053343 |
| t_number_of_teaching_hours_per_week | 1.000000 |
| t_average_explanation_time | 0.042068 |
| t_degree_of_individual_training_incidence | -0.067785 |
| t_seat_configuration | 0.066526 |
| tBehaviour_problems_solution | -0.083733 |
| t_number_of_meetings_with_families | 0.001374 |
| t_is_enrolled_in_school_training_plan | 0.000971 |
| t_number_of_training_hours_last_six_years | -0.034319 |
| t_extent_of_evaluation_variety | 0.038189 |
| t_extent_of_pfc_incidence | -0.112766 |
| t_extent_of_work_hampered | 0.137327 |
| t_extent_of_family_interest | -0.048010 |
| t_extent_of_family_support | -0.030155 |
| t_extent_of_work_facilitated_by_management | -0.061017 |
| t_extent_of_positive_relationships | -0.095523 |
| t_extent_of_student_involvement_during_class | 0.022033 |
| t_extent_of_teaching_methods_variety | -0.093943 |
| t_extent_of_opinion_on_school | -0.064910 |
| t_extent_of_class_behaviour | -0.067174 |
| t_extent_of_resource_variety | 0.044952 |
| t_extent_of_good_work_by_non_teachers | -0.066695 |
| t_number_of_individual_training_topics | -0.050515 |
| t_extent_of_results_satisfaction | -0.078304 |
| level_MAT | -0.025020 |
| level_LEN | -0.032582 |
| | |
| t_average_explanation_time \ | - |
| t_gender | -0.120649 |

| | |
|--|-----------|
| t_age | -0.026750 |
| t_number_of_years_as_teacher | -0.013882 |
| t_number_of_years_in_school | 0.002995 |
| t_has_taught_same_group_last_two_years | -0.048343 |
| t_number_of_students_in_group | 0.040897 |
| t_number_of_teaching_hours_per_week | 0.042068 |
| t_average_explanation_time | 1.000000 |
| t_degree_of_individual_training_incidence | -0.058005 |
| t_seat_configuration | -0.020963 |
| t_behaviour_problems_solution | 0.041441 |
| t_number_of_meetings_with_families | 0.019709 |
| t_is_enrolled_in_school_training_plan | 0.002856 |
| t_number_of_training_hours_last_six_years | -0.037435 |
| t_extent_of_evaluation_variety | 0.051429 |
| t_extent_of_pfc_incidence | 0.046514 |
| t_extent_of_work_hampered | -0.018812 |
| t_extent_of_family_interest | 0.066496 |
| t_extent_of_family_support | -0.031747 |
| t_extent_of_work_facilitated_by_management | -0.005192 |
| t_extent_of_positive_relationships | -0.036478 |
| t_extent_of_student_involvement_during_class | 0.032047 |
| t_extent_of_teaching_methods_variety | -0.075840 |
| t_extent_of_opinion_on_school | 0.019898 |
| t_extent_of_class_beaviour | -0.082599 |
| t_extent_of_resource_variety | -0.017647 |
| t_extent_of_good_work_by_non_teachers | 0.007743 |
| t_number_of_individual_training_topics | -0.050090 |
| t_extent_of_results_satisfaction | -0.013376 |
| level_MAT | 0.021821 |
| level_LEN | -0.007260 |

```

          □
~t_degree_of_individual_training_incidence  \
t_gender                                     -0.
~018532
t_age                                         -0.
~070094
t_number_of_years_as_teacher                  -0.
~059970
t_number_of_years_in_school                   0.
~059977
t_has_taught_same_group_last_two_years       0.
~055218
t_number_of_students_in_group                 0.
~065211
t_number_of_teaching_hours_per_week          -0.
~067785

```

| | |
|--|-----|
| t_average_explanation_time | -0. |
| ↳058005 | |
| t_degree_of_individual_training_incidence | 1. |
| ↳000000 | |
| t_seat_configuration | 0. |
| ↳021087 | |
| t_behaviour_problems_solution | 0. |
| ↳099269 | |
| t_number_of_meetings_with_families | -0. |
| ↳031389 | |
| t_is_enrolled_in_school_training_plan | 0. |
| ↳003682 | |
| t_number_of_training_hours_last_six_years | 0. |
| ↳216023 | |
| t_extent_of_evaluation_variety | 0. |
| ↳016456 | |
| t_extent_of_pfc_incidence | 0. |
| ↳248168 | |
| t_extent_of_work_hampered | -0. |
| ↳121155 | |
| t_extent_of_family_interest | 0. |
| ↳129112 | |
| t_extent_of_family_support | 0. |
| ↳158743 | |
| t_extent_of_work_facilitated_by_management | 0. |
| ↳223523 | |
| t_extent_of_positive_relationships | 0. |
| ↳256147 | |
| t_extent_of_student_involvement_during_class | 0. |
| ↳125704 | |
| t_extent_of_teaching_methods_variety | 0. |
| ↳155654 | |
| t_extent_of_opinion_on_school | 0. |
| ↳186371 | |
| t_extent_of_class_behaviour | 0. |
| ↳177928 | |
| t_extent_of_resource_variety | 0. |
| ↳067379 | |
| t_extent_of_good_work_by_non_teachers | 0. |
| ↳203504 | |
| t_number_of_individual_training_topics | 0. |
| ↳088132 | |
| t_extent_of_results_satisfaction | 0. |
| ↳112130 | |
| level_MAT | 0. |
| ↳044813 | |

| | |
|-----------|----|
| level_LEN | 0. |
| ↳ 058198 | |

| | | |
|--|-----------|-----|
| t_seat_configuration | ... | \ |
| | -0.084971 | ... |
| t_gender | -0.007977 | ... |
| t_age | -0.027214 | ... |
| t_number_of_years_as_teacher | -0.040416 | ... |
| t_number_of_years_in_school | 0.038558 | ... |
| t_has_taught_same_group_last_two_years | -0.009042 | ... |
| t_number_of_students_in_group | 0.066526 | ... |
| t_number_of_teaching_hours_per_week | -0.020963 | ... |
| t_average_explanation_time | 0.021087 | ... |
| t_degree_of_individual_training_incidence | 1.000000 | ... |
| t_seat_configuration | -0.019926 | ... |
| t_behaviour_problems_solution | -0.018988 | ... |
| t_number_of_meetings_with_families | -0.022430 | ... |
| t_is_enrolled_in_school_training_plan | -0.010753 | ... |
| t_number_of_training_hours_last_six_years | 0.009719 | ... |
| t_extent_of_evaluation_variety | 0.009078 | ... |
| t_extent_of_pfc_incidence | 0.008878 | ... |
| t_extent_of_work_hampered | -0.074942 | ... |
| t_extent_of_family_interest | -0.033717 | ... |
| t_extent_of_family_support | -0.024033 | ... |
| t_extent_of_positive_relationships | -0.042779 | ... |
| t_extent_of_student_involvement_during_class | 0.049695 | ... |
| t_extent_of_teaching_methods_variety | 0.001414 | ... |
| t_extent_of_opinion_on_school | -0.012346 | ... |
| t_extent_of_class_behaviour | -0.010096 | ... |
| t_extent_of_resource_variety | 0.037983 | ... |
| t_extent_of_good_work_by_non_teachers | -0.070059 | ... |
| t_number_of_individual_training_topics | -0.059415 | ... |
| t_extent_of_results_satisfaction | 0.027751 | ... |
| level_MAT | -0.036483 | ... |
| level_LEN | -0.014880 | ... |

| | | |
|--|---|---|
| ↳ t_extent_of_student_involvement_during_class | \ | □ |
| t_gender | | □ |
| ↳ -0.020070 | | □ |
| t_age | | □ |
| ↳ 0.012214 | | □ |
| t_number_of_years_as_teacher | | □ |
| ↳ 0.024339 | | □ |
| t_number_of_years_in_school | | □ |
| ↳ 0.047081 | | □ |

| | |
|--|---|
| t_has_taught_same_group_last_two_years | □ |
| ↳ 0.049167 | |
| t_number_of_students_in_group | □ |
| ↳ 0.023562 | |
| t_number_of_teaching_hours_per_week | □ |
| ↳ 0.022033 | |
| t_average_explanation_time | □ |
| ↳ 0.032047 | |
| t_degree_of_individual_training_incidence | □ |
| ↳ 0.125704 | |
| t_seat_configuration | □ |
| ↳ 0.049695 | |
| t_behaviour_problems_solution | □ |
| ↳ 0.042778 | |
| t_number_of_meetings_with_families | □ |
| ↳ 0.026070 | |
| t_is_enrolled_in_school_training_plan | □ |
| ↳ -0.029118 | |
| t_number_of_training_hours_last_six_years | □ |
| ↳ -0.002080 | |
| t_extent_of_evaluation_variety | □ |
| ↳ 0.329147 | |
| t_extent_of_pfc_incidence | □ |
| ↳ 0.243255 | |
| t_extent_of_work_hampered | □ |
| ↳ -0.178566 | |
| t_extent_of_family_interest | □ |
| ↳ 0.380032 | |
| t_extent_of_family_support | □ |
| ↳ 0.348986 | |
| t_extent_of_work_facilitated_by_management | □ |
| ↳ 0.239679 | |
| t_extent_of_positive_relationships | □ |
| ↳ 0.372735 | |
| t_extent_of_student_involvement_during_class | □ |
| ↳ 1.000000 | |
| t_extent_of_teaching_methods_variety | □ |
| ↳ 0.397081 | |
| t_extent_of_opinion_on_school | □ |
| ↳ 0.237279 | |
| t_extent_of_class_beaviour | □ |
| ↳ 0.439388 | |
| t_extent_of_resource_variety | □ |
| ↳ 0.332805 | |
| t_extent_of_good_work_by_non_teachers | □ |
| ↳ 0.230650 | |

| | |
|--|-----|
| t_number_of_individual_training_topics | □ |
| ↳ 0.069593 | |
| t_extent_of_results_satisfaction | □ |
| ↳ 0.293641 | |
| level_MAT | □ |
| ↳ 0.107216 | |
| level_LEN | □ |
| ↳ 0.118362 | |
| ↳ t_extent_of_teaching_methods_variety \ | □ |
| t_gender | -0. |
| ↳ 0.09020 | |
| t_age | -0. |
| ↳ -125742 | |
| t_number_of_years_as_teacher | -0. |
| ↳ -0.046590 | |
| t_number_of_years_in_school | 0. |
| ↳ -0.024319 | |
| t_has_taught_same_group_last_two_years | -0. |
| ↳ -0.050967 | |
| t_number_of_students_in_group | 0. |
| ↳ -0.108129 | |
| t_number_of_teaching_hours_per_week | -0. |
| ↳ -0.093943 | |
| t_average_explanation_time | -0. |
| ↳ -0.075840 | |
| t_degree_of_individual_training_incidence | 0. |
| ↳ -0.155654 | |
| t_seat_configuration | 0. |
| ↳ -0.001414 | |
| t_behaviour_problems_solution | 0. |
| ↳ -0.030955 | |
| t_number_of_meetings_with_families | 0. |
| ↳ -0.049045 | |
| t_is_enrolled_in_school_training_plan | -0. |
| ↳ -0.026398 | |
| t_number_of_training_hours_last_six_years | 0. |
| ↳ -0.106046 | |
| t_extent_of_evaluation_variety | 0. |
| ↳ -0.488262 | |
| t_extent_of_pfc_incidence | 0. |
| ↳ -0.266336 | |
| t_extent_of_work_hampered | -0. |
| ↳ -0.134169 | |

| | |
|--|----|
| t_extent_of_family_interest | 0. |
| ↳196369 | |
| t_extent_of_family_support | 0. |
| ↳146982 | |
| t_extent_of_work_facilitated_by_management | 0. |
| ↳257184 | |
| t_extent_of_positive_relationships | 0. |
| ↳296364 | |
| t_extent_of_student_involvement_during_class | 0. |
| ↳397081 | |
| t_extent_of_teaching_methods_variety | 1. |
| ↳000000 | |
| t_extent_of_opinion_on_school | 0. |
| ↳249851 | |
| t_extent_of_class_behaviour | 0. |
| ↳203190 | |
| t_extent_of_resource_variety | 0. |
| ↳422508 | |
| t_extent_of_good_work_by_non_teachers | 0. |
| ↳292029 | |
| t_number_of_individual_training_topics | 0. |
| ↳153010 | |
| t_extent_of_results_satisfaction | 0. |
| ↳129843 | |
| level_MAT | 0. |
| ↳081908 | |
| level_LEN | 0. |
| ↳088948 | |

| | |
|---|---------------------------------|
| | t_extent_of_opinion_on_school \ |
| t_gender | 0.015698 |
| t_age | -0.135391 |
| t_number_of_years_as_teacher | -0.047873 |
| t_number_of_years_in_school | 0.168196 |
| t_has_taught_same_group_last_two_years | -0.037333 |
| t_number_of_students_in_group | 0.166899 |
| t_number_of_teaching_hours_per_week | -0.064910 |
| t_average_explanation_time | 0.019898 |
| t_degree_of_individual_training_incidence | 0.186371 |
| t_seat_configuration | -0.012346 |
| tBehaviour_problems_solution | 0.097148 |
| t_number_of_meetings_with_families | -0.022824 |
| t_is_enrolled_in_school_training_plan | -0.093654 |
| t_number_of_training_hours_last_six_years | 0.023433 |
| t_extent_of_evaluation_variety | 0.196332 |
| t_extent_of_pfc_incidence | 0.379672 |

| | |
|--|-----------|
| t_extent_of_work_hampered | -0.227954 |
| t_extent_of_family_interest | 0.155561 |
| t_extent_of_family_support | 0.208881 |
| t_extent_of_work_facilitated_by_management | 0.538857 |
| t_extent_of_positive_relationships | 0.455556 |
| t_extent_of_student_involvement_during_class | 0.237279 |
| t_extent_of_teaching_methods_variety | 0.249851 |
| t_extent_of_opinion_on_school | 1.000000 |
| t_extent_of_class_behaviour | 0.236334 |
| t_extent_of_resource_variety | 0.218786 |
| t_extent_of_good_work_by_non_teachers | 0.440960 |
| t_number_of_individual_training_topics | 0.081463 |
| t_extent_of_results_satisfaction | 0.171718 |
| level_MAT | 0.150765 |
| level_LEN | 0.140045 |

| | |
|--|-------------------------------|
| | t_extent_of_class_behaviour \ |
| t_gender | 0.062479 |
| t_age | -0.124766 |
| t_number_of_years_as_teacher | -0.063738 |
| t_number_of_years_in_school | 0.041879 |
| t_has_taught_same_group_last_two_years | 0.085873 |
| t_number_of_students_in_group | 0.025933 |
| t_number_of_teaching_hours_per_week | -0.067174 |
| t_average_explanation_time | -0.082599 |
| t_degree_of_individual_training_incidence | 0.177928 |
| t_seat_configuration | -0.010096 |
| t_beaviour_problems_solution | -0.010889 |
| t_number_of_meetings_with_families | 0.008213 |
| t_is_enrolled_in_school_training_plan | -0.006256 |
| t_number_of_training_hours_last_six_years | 0.023666 |
| t_extent_of_evaluation_variety | 0.120303 |
| t_extent_of_pfc_incidence | 0.198886 |
| t_extent_of_work_hampered | -0.153506 |
| t_extent_of_family_interest | 0.188523 |
| t_extent_of_family_support | 0.293336 |
| t_extent_of_work_facilitated_by_management | 0.194664 |
| t_extent_of_positive_relationships | 0.370046 |
| t_extent_of_student_involvement_during_class | 0.439388 |
| t_extent_of_teaching_methods_variety | 0.203190 |
| t_extent_of_opinion_on_school | 0.236334 |
| t_extent_of_class_behaviour | 1.000000 |
| t_extent_of_resource_variety | 0.157627 |
| t_extent_of_good_work_by_non_teachers | 0.155926 |
| t_number_of_individual_training_topics | -0.001298 |
| t_extent_of_results_satisfaction | 0.375323 |
| level_MAT | 0.147322 |
| level_LEN | 0.152896 |

| | |
|--|-----------|
| t_extent_of_resource_variety \ | |
| t_gender | -0.066329 |
| t_age | -0.065868 |
| t_number_of_years_as_teacher | 0.007308 |
| t_number_of_years_in_school | 0.056558 |
| t_has_taught_same_group_last_two_years | -0.000101 |
| t_number_of_students_in_group | 0.014967 |
| t_number_of_teaching_hours_per_week | 0.044952 |
| t_average_explanation_time | -0.017647 |
| t_degree_of_individual_training_incidence | 0.067379 |
| t_seat_configuration | 0.037983 |
| t_behaviour_problems_solution | 0.101157 |
| t_number_of_meetings_with_families | 0.045830 |
| t_is_enrolled_in_school_training_plan | 0.024593 |
| t_number_of_training_hours_last_six_years | 0.085218 |
| t_extent_of_evaluation_variety | 0.382609 |
| t_extent_of_pfc_incidence | 0.318244 |
| t_extent_of_work_hampered | -0.197045 |
| t_extent_of_family_interest | 0.209696 |
| t_extent_of_family_support | 0.148578 |
| t_extent_of_work_facilitated_by_management | 0.238818 |
| t_extent_of_positive_relationships | 0.223770 |
| t_extent_of_student_involvement_during_class | 0.332805 |
| t_extent_of_teaching_methods_variety | 0.422508 |
| t_extent_of_opinion_on_school | 0.218786 |
| t_extent_of_class_beaviour | 0.157627 |
| t_extent_of_resource_variety | 1.000000 |
| t_extent_of_good_work_by_non_teachers | 0.278978 |
| t_number_of_individual_training_topics | 0.112688 |
| t_extent_of_results_satisfaction | 0.060411 |
| level_MAT | 0.096082 |
| level_LEN | 0.073635 |

| | |
|--|-----|
| ✉t_extent_of_good_work_by_non_teachers \ | |
| t_gender | -0. |
| ✉022120 | |
| t_age | -0. |
| ✉041972 | |
| t_number_of_years_as_teacher | -0. |
| ✉042023 | |
| t_number_of_years_in_school | 0. |
| ✉052474 | |
| t_has_taught_same_group_last_two_years | -0. |
| ✉060428 | |

| | |
|--|-----|
| t_number_of_students_in_group | 0. |
| ↳054066 | |
| t_number_of_teaching_hours_per_week | -0. |
| ↳066695 | |
| t_average_explanation_time | 0. |
| ↳007743 | |
| t_degree_of_individual_training_incidence | 0. |
| ↳203504 | |
| t_seat_configuration | -0. |
| ↳070059 | |
| t_behaviour_problems_solution | 0. |
| ↳095364 | |
| t_number_of_meetings_with_families | 0. |
| ↳018461 | |
| t_is_enrolled_in_school_training_plan | -0. |
| ↳039312 | |
| t_number_of_training_hours_last_six_years | 0. |
| ↳023957 | |
| t_extent_of_evaluation_variety | 0. |
| ↳202534 | |
| t_extent_of_pfc_incidence | 0. |
| ↳406188 | |
| t_extent_of_work_hampered | -0. |
| ↳319484 | |
| t_extent_of_family_interest | 0. |
| ↳208978 | |
| t_extent_of_family_support | 0. |
| ↳133561 | |
| t_extent_of_work_facilitated_by_management | 0. |
| ↳627799 | |
| t_extent_of_positive_relationships | 0. |
| ↳458111 | |
| t_extent_of_student_involvement_during_class | 0. |
| ↳230650 | |
| t_extent_of_teaching_methods_variety | 0. |
| ↳292029 | |
| t_extent_of_opinion_on_school | 0. |
| ↳440960 | |
| t_extent_of_class_beaviour | 0. |
| ↳155926 | |
| t_extent_of_resource_variety | 0. |
| ↳278978 | |
| t_extent_of_good_work_by_non_teachers | 1. |
| ↳000000 | |
| t_number_of_individual_training_topics | 0. |
| ↳042748 | |

| | |
|---|-----|
| t_extent_of_results_satisfaction | 0. |
| ↳056610 | |
| level_MAT | 0. |
| ↳067266 | |
| level_LEN | 0. |
| ↳044953 | |
| ↳t_number_of_individual_training_topics \ □ | |
| t_gender | 0. |
| ↳017530 | |
| t_age | -0. |
| ↳112589 | |
| t_number_of_years_as_teacher | -0. |
| ↳098857 | |
| t_number_of_years_in_school | -0. |
| ↳087610 | |
| t_has_taught_same_group_last_two_years | 0. |
| ↳014706 | |
| t_number_of_students_in_group | 0. |
| ↳090980 | |
| t_number_of_teaching_hours_per_week | -0. |
| ↳050515 | |
| t_average_explanation_time | -0. |
| ↳050090 | |
| t_degree_of_individual_training_incidence | 0. |
| ↳088132 | |
| t_seat_configuration | -0. |
| ↳059415 | |
| t_behaviour_problems_solution | -0. |
| ↳028153 | |
| t_number_of_meetings_with_families | -0. |
| ↳020567 | |
| t_is_enrolled_in_school_training_plan | -0. |
| ↳059328 | |
| t_number_of_training_hours_last_six_years | 0. |
| ↳309339 | |
| t_extent_of_evaluation_variety | 0. |
| ↳100841 | |
| t_extent_of_pfc_incidence | 0. |
| ↳110764 | |
| t_extent_of_work_hampered | -0. |
| ↳025433 | |
| t_extent_of_family_interest | 0. |
| ↳073678 | |

| | |
|--|-----|
| t_extent_of_family_support | -0. |
| ↳005552 | |
| t_extent_of_work_facilitated_by_management | 0. |
| ↳035817 | |
| t_extent_of_positive_relationships | 0. |
| ↳035576 | |
| t_extent_of_student_involvement_during_class | 0. |
| ↳069593 | |
| t_extent_of_teaching_methods_variety | 0. |
| ↳153010 | |
| t_extent_of_opinion_on_school | 0. |
| ↳081463 | |
| t_extent_of_class_behaviour | -0. |
| ↳001298 | |
| t_extent_of_resource_variety | 0. |
| ↳112688 | |
| t_extent_of_good_work_by_non_teachers | 0. |
| ↳042748 | |
| t_number_of_individual_training_topics | 1. |
| ↳000000 | |
| t_extent_of_results_satisfaction | 0. |
| ↳026206 | |
| level_MAT | 0. |
| ↳002458 | |
| level_LEN | 0. |
| ↳013597 | |

| | |
|---|-----------|
| t_extent_of_results_satisfaction | \ |
| t_gender | -0.004949 |
| t_age | -0.096093 |
| t_number_of_years_as_teacher | -0.028828 |
| t_number_of_years_in_school | 0.052541 |
| t_has_taught_same_group_last_two_years | 0.029821 |
| t_number_of_students_in_group | 0.133450 |
| t_number_of_teaching_hours_per_week | -0.078304 |
| t_average_explanation_time | -0.013376 |
| t_degree_of_individual_training_incidence | 0.112130 |
| t_seat_configuration | 0.027751 |
| tBehaviour_problems_solution | 0.071713 |
| t_number_of_meetings_with_families | -0.054693 |
| t_is_enrolled_in_school_training_plan | -0.033996 |
| t_number_of_training_hours_last_six_years | -0.064414 |
| t_extent_of_evaluation_variety | 0.057017 |
| t_extent_of_pfc_incidence | 0.163975 |
| t_extent_of_work_hampered | -0.125497 |
| t_extent_of_family_interest | 0.107760 |
| t_extent_of_family_support | 0.237994 |

| | |
|--|---------------------|
| t_extent_of_work_facilitated_by_management | 0.107434 |
| t_extent_of_positive_relationships | 0.232811 |
| t_extent_of_student_involvement_during_class | 0.293641 |
| t_extent_of_teaching_methods_variety | 0.129843 |
| t_extent_of_opinion_on_school | 0.171718 |
| t_extent_of_class_behaviour | 0.375323 |
| t_extent_of_resource_variety | 0.060411 |
| t_extent_of_good_work_by_non_teachers | 0.056610 |
| t_number_of_individual_training_topics | 0.026206 |
| t_extent_of_results_satisfaction | 1.000000 |
| level_MAT | 0.113681 |
| level_LEN | 0.133119 |
| | |
| level_MAT | level_LEN |
| t_gender | -0.000143 -0.005552 |
| t_age | -0.008295 -0.024233 |
| t_number_of_years_as_teacher | 0.075011 0.050907 |
| t_number_of_years_in_school | 0.151830 0.108267 |
| t_has_taught_same_group_last_two_years | 0.007877 -0.012844 |
| t_number_of_students_in_group | 0.072164 0.062272 |
| t_number_of_teaching_hours_per_week | -0.025020 -0.032582 |
| t_average_explanation_time | 0.021821 -0.007260 |
| t_degree_of_individual_training_incidence | 0.044813 0.058198 |
| t_seat_configuration | -0.036483 -0.014880 |
| t_beaviour_problems_solution | 0.049166 0.021260 |
| t_number_of_meetings_with_families | -0.001645 -0.012352 |
| t_is_enrolled_in_school_training_plan | -0.013105 -0.010456 |
| t_number_of_training_hours_last_six_years | -0.007779 -0.006782 |
| t_extent_of_evaluation_variety | 0.049057 0.051692 |
| t_extent_of_pfc_incidence | 0.094366 0.097278 |
| t_extent_of_work_hampered | -0.112958 -0.110672 |
| t_extent_of_family_interest | 0.046225 0.050040 |
| t_extent_of_family_support | 0.109480 0.115443 |
| t_extent_of_work_facilitated_by_management | 0.044843 0.065517 |
| t_extent_of_positive_relationships | 0.083215 0.079217 |
| t_extent_of_student_involvement_during_class | 0.107216 0.118362 |
| t_extent_of_teaching_methods_variety | 0.081908 0.088948 |
| t_extent_of_opinion_on_school | 0.150765 0.140045 |
| t_extent_of_class_behaviour | 0.147322 0.152896 |
| t_extent_of_resource_variety | 0.096082 0.073635 |
| t_extent_of_good_work_by_non_teachers | 0.067266 0.044953 |
| t_number_of_individual_training_topics | 0.002458 0.013597 |
| t_extent_of_results_satisfaction | 0.113681 0.133119 |
| level_MAT | 1.000000 0.562532 |
| level_LEN | 0.562532 1.000000 |

[31 rows x 31 columns]

5.7 Principals Questionnaire

```
[85]: df_sel_principals, correlation_matrix_sel_principals =  
    compute_exploratory_analysis(df=df_sel, column_pattern="p_",  
    missing_threshold=0.1, annot=False)
```

GOOD FEATURES: 35

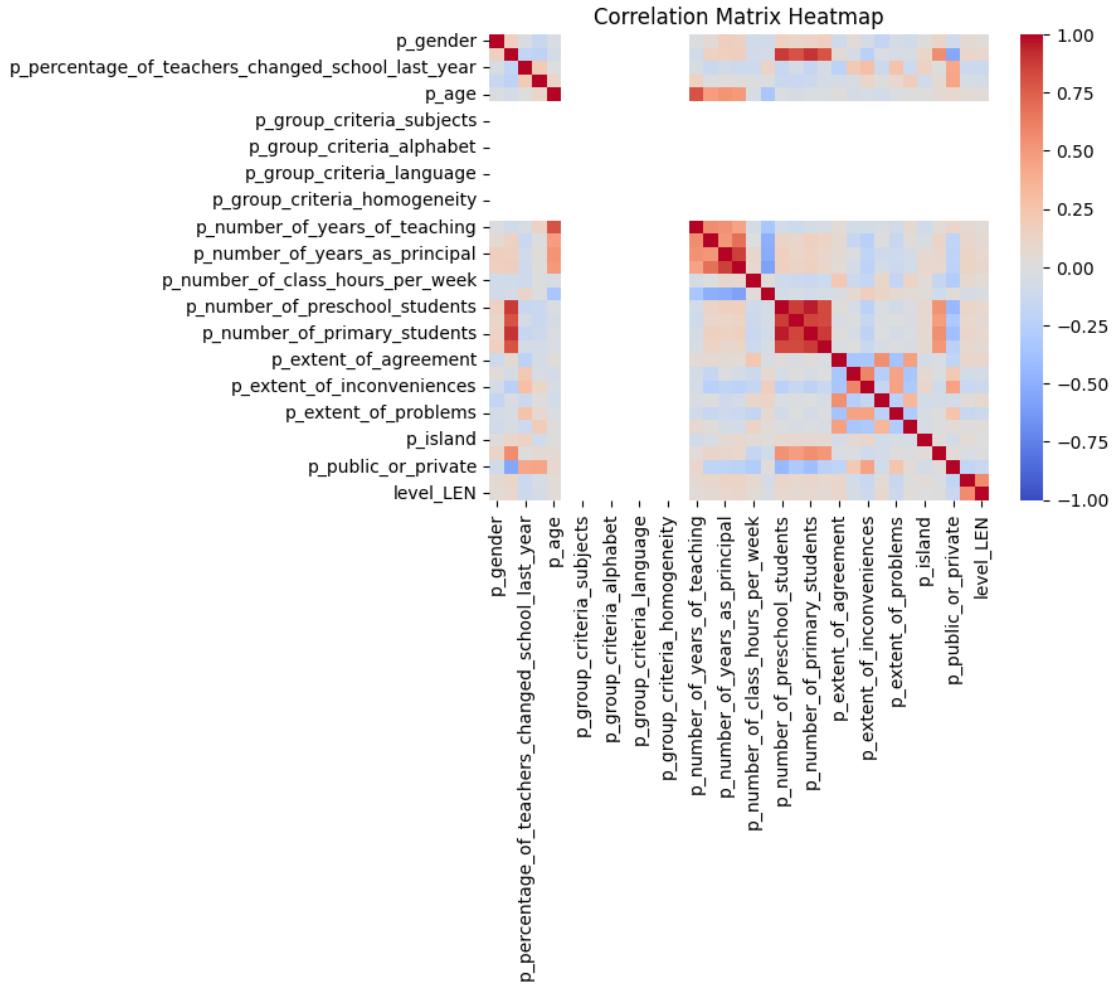
| | |
|---|----------|
| p_gender | 0.048916 |
| p_number_of_teachers_in_school | 0.055318 |
| p_percentage_of_teachers_changed_school_last_year | 0.050264 |
| p_attitude_teacher_training_courses | 0.056105 |
| p_age | 0.051724 |
| p_group_criteria_random | 0.000000 |
| p_group_criteria_subjects | 0.000000 |
| p_group_criteria_other | 0.000000 |
| p_group_criteria_alphabet | 0.000000 |
| p_group_criteria_gender | 0.000000 |
| p_group_criteria_language | 0.000000 |
| p_group_criteria_performance | 0.000000 |
| p_group_criteria_homogeneity | 0.000000 |
| p_group_criteria_heterogeneity | 0.000000 |
| p_number_of_years_of_teaching | 0.058520 |
| p_number_of_years_in_school | 0.053690 |
| p_number_of_years_as_principal | 0.061889 |
| p_number_of_years_as_principal_in_school | 0.054420 |
| p_number_of_class_hours_per_week | 0.098001 |
| p_number_of_principlas_10_years | 0.057958 |
| p_number_of_preschool_students | 0.067056 |
| p_number_of_preschool_groups | 0.075199 |
| p_number_of_primary_students | 0.054757 |
| p_number_of_primary_groups | 0.070650 |
| p_extent_of_agreement | 0.047568 |
| p_extent_of_factors_limiting_effectiveness | 0.048916 |
| p_extent_of_inconveniences | 0.047568 |
| p_extent_of_management | 0.047568 |
| p_extent_of_problems | 0.047568 |
| p_extent_of_satisfaction | 0.047568 |
| p_island | 0.000000 |
| p_number_of_school_tech_resources | 0.000000 |
| p_public_or_private | 0.000000 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |
| dtype: float64 | |

BAD FEATURES

| | |
|--|----------|
| p_number_of_abroad_students_country_no_spanish | 0.117657 |
| p_number_of_abroad_students_country_spanish | 0.133101 |
| p_number_of_teachers_1_education | 1.000000 |

| | |
|---|----------|
| p_number_of_mandatory_teachers_2_education | 1.000000 |
| p_number_of_teachers_1_education_more_5_years | 1.000000 |
| p_number_of_mandatory_teachers_2_education_more_5_years | 1.000000 |
| p_extent_of_satisfaction_students_results | 1.000000 |
| p_extent_of_expected_students_results | 1.000000 |
| p_extent_of_students_improvement_expectation | 1.000000 |
| p_school_teacher_training_plan | 1.000000 |
| p_school_teacher_training_plan_main_theme | 1.000000 |
| p_number_of_students | 0.249017 |
| p_number_of_groups | 0.229754 |
| p_number_of_groups_evaluated_grade | 1.000000 |
| p_rate_4_grade_mandatory_2_education_students_different_nationality | 1.000000 |
| p_rate_3_grade_mandatory_2_education_students_different_nationality | 1.000000 |
| p_rate_6_grade_mandatory_2_education_students_different_nationality | 1.000000 |
| level_ING | 1.000000 |

dtype: float64



```

          p_gender  p_number_of_teachers_in_school  \
id_questionnaire
1                  MALE                      19.0
2                  FEMALE                     26.0
3                  FEMALE                     42.0
4                  MALE                      15.0
5                  MALE                      22.0
...
...                  ...
20426                 FEMALE                     24.0
20427                 FEMALE                     15.0
20428                 MALE                      27.0
20429                 FEMALE                     23.0
20430                 MALE                      15.0

          p_percentage_of_teachers_changed_school_last_year  \
id_questionnaire
1                           3.0
2                           2.0
3                           2.0
4                           1.0
5                           1.0
...
...                           ...
20426                         4.0
20427                         2.0
20428                         1.0
20429                         1.0
20430                         3.0

          p_attitude_teacher_training_courses  p_age  \
id_questionnaire
1                           3.0   50.0
2                           3.0   58.0
3                           2.0   45.0
4                           3.0   46.0
5                           2.0   56.0
...
...                           ...
20426                         3.0   46.0
20427                         3.0   49.0
20428                         3.0   59.0
20429                         4.0   64.0
20430                         2.0   51.0

          p_group_criteria_random  p_group_criteria_subjects  \
id_questionnaire
1                           False                      False
2                           False                      False
3                           False                      False
4                           False                      False

```

| | | |
|--|-----------|-------|
| 5 | False | False |
| ... | ... | ... |
| 20426 | False | False |
| 20427 | False | False |
| 20428 | False | False |
| 20429 | False | False |
| 20430 | False | False |
| | | |
| p_group_criteria_other p_group_criteria_alphabet \ | | |
| id_questionnaire | | |
| 1 | False | False |
| 2 | False | False |
| 3 | False | False |
| 4 | False | False |
| 5 | False | False |
| ... | ... | ... |
| 20426 | False | False |
| 20427 | False | False |
| 20428 | False | False |
| 20429 | False | False |
| 20430 | False | False |
| | | |
| p_group_criteria_gender ... \ | | |
| id_questionnaire | | |
| 1 | False ... | ... |
| 2 | False ... | ... |
| 3 | False ... | ... |
| 4 | False ... | ... |
| 5 | False ... | ... |
| ... | | ... |
| 20426 | False ... | ... |
| 20427 | False ... | ... |
| 20428 | False ... | ... |
| 20429 | False ... | ... |
| 20430 | False ... | ... |
| | | |
| p_extent_of_factors_limiting_effectiveness \ | | |
| id_questionnaire | | |
| 1 | 0.666667 | |
| 2 | 0.375000 | |
| 3 | 0.500000 | |
| 4 | 0.625000 | |
| 5 | 0.458333 | |
| ... | ... | ... |
| 20426 | 0.583333 | |
| 20427 | 0.333333 | |
| 20428 | 0.458333 | |
| 20429 | 0.083333 | |

| | | |
|-------------------------|----------------------------|-------------------------------------|
| 20430 | | 0.583333 |
| | p_extent_of_inconveniences | p_extent_of_management \ |
| id_questionnaire | | |
| 1 | 0.750000 | 0.666667 |
| 2 | 0.305556 | 0.857143 |
| 3 | 0.606061 | 0.666667 |
| 4 | 0.666667 | 0.809524 |
| 5 | 0.333333 | 0.714286 |
| ... | ... | ... |
| 20426 | 0.555556 | 0.952381 |
| 20427 | 0.416667 | 0.761905 |
| 20428 | 0.388889 | 0.809524 |
| 20429 | 0.000000 | 1.000000 |
| 20430 | 0.777778 | 0.666667 |
| | p_extent_of_problems | p_extent_of_satisfaction \ |
| id_questionnaire | | |
| 1 | 0.314815 | 0.611111 |
| 2 | 0.074074 | 0.888889 |
| 3 | 0.314815 | 0.666667 |
| 4 | 0.129630 | 0.555556 |
| 5 | 0.055556 | 0.722222 |
| ... | ... | ... |
| 20426 | 0.129630 | 0.666667 |
| 20427 | 0.055556 | 0.777778 |
| 20428 | 0.156863 | 0.888889 |
| 20429 | 0.025641 | 1.000000 |
| 20430 | 0.129630 | 0.555556 |
| | p_island | p_number_of_school_tech_resources \ |
| id_questionnaire | | |
| 1 | TENERIFE_CAPITAL | 196.0 |
| 2 | GRAN_CANARIA_CAPITAL | 157.0 |
| 3 | GRAN_CANARIA_CAPITAL | 62.0 |
| 4 | TENERIFE_CAPITAL | 131.0 |
| 5 | TENERIFE_CAPITAL | 118.0 |
| ... | ... | ... |
| 20426 | GRAN_CANARIA_PROVINCE | 264.0 |
| 20427 | TENERIFE_CAPITAL | 178.0 |
| 20428 | GRAN_CANARIA_CAPITAL | 311.0 |
| 20429 | TENERIFE_CAPITAL | 30.0 |
| 20430 | TENERIFE_CAPITAL | 54.0 |
| | p_public_or_private | level_MAT level_LEN |
| id_questionnaire | | |
| 1 | PUBLIC | 3.0 3.0 |
| 2 | PUBLIC | 1.0 1.0 |

| | | | |
|-------|---------|-----|-----|
| 3 | PRIVATE | 1.0 | 3.0 |
| 4 | PUBLIC | 2.0 | 2.0 |
| 5 | PRIVATE | 4.0 | 3.0 |
| ... | ... | ... | ... |
| 20426 | PUBLIC | 1.0 | 1.0 |
| 20427 | PUBLIC | 2.0 | 3.0 |
| 20428 | PUBLIC | 2.0 | 2.0 |
| 20429 | PRIVATE | 3.0 | 3.0 |
| 20430 | PUBLIC | 2.0 | 3.0 |

[17806 rows x 35 columns]

| | p_gender | \ |
|---|-----------|---|
| p_gender | 1.000000 | |
| p_number_of_teachers_in_school | 0.159623 | |
| p_percentage_of_teachers_changed_school_last_year | -0.045782 | |
| p_attitude_teacher_training_courses | -0.155428 | |
| p_age | -0.024211 | |
| p_group_criteria_random | NaN | |
| p_group_criteria_subjects | NaN | |
| p_group_criteria_other | NaN | |
| p_group_criteria_alphabet | NaN | |
| p_group_criteria_gender | NaN | |
| p_group_criteria_language | NaN | |
| p_group_criteria_performance | NaN | |
| p_group_criteria_homogeneity | NaN | |
| p_group_criteria_heterogeneity | NaN | |
| p_number_of_years_of_teaching | -0.020059 | |
| p_number_of_years_in_school | 0.047504 | |
| p_number_of_years_as_principal | 0.167834 | |
| p_number_of_years_as_principal_in_school | 0.155515 | |
| p_number_of_class_hours_per_week | -0.096391 | |
| p_number_of_principlas_10_years | -0.091932 | |
| p_number_of_preschool_students | 0.146669 | |
| p_number_of_preschool_groups | 0.107065 | |
| p_number_of_primary_students | 0.128383 | |
| p_number_of_primary_groups | 0.160362 | |
| p_extent_of_agreement | -0.108918 | |
| p_extent_of_factors_limiting_effectiveness | 0.038589 | |
| p_extent_of_inconveniences | -0.067401 | |
| p_extent_of_management | -0.176006 | |
| p_extent_of_problems | -0.056263 | |
| p_extent_of_satisfaction | -0.095692 | |
| p_island | 0.009655 | |
| p_number_of_school_tech_resources | 0.111593 | |
| p_public_or_private | -0.099218 | |
| level_MAT | 0.053646 | |
| level_LEN | 0.044194 | |

| | |
|---|-----------|
| ↳ p_number_of_teachers_in_school \ | |
| p_gender | 0.159623 |
| p_number_of_teachers_in_school | 1.000000 |
| p_percentage_of_teachers_changed_school_last_year | -0.185265 |
| p_attitude_teacher_training_courses | -0.215315 |
| p_age | -0.071810 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.094354 |
| p_number_of_years_in_school | 0.142224 |
| p_number_of_years_as_principal | 0.161235 |
| p_number_of_years_as_principal_in_school | 0.165651 |
| p_number_of_class_hours_per_week | -0.091841 |
| p_number_of_principlas_10_years | -0.066192 |
| p_number_of_preschool_students | 0.880144 |
| p_number_of_preschool_groups | 0.802674 |
| p_number_of_primary_students | 0.898519 |
| p_number_of_primary_groups | 0.794199 |
| p_extent_of_agreement | 0.053070 |
| p_extent_of_factors_limiting_effectiveness | -0.061530 |
| p_extent_of_inconveniences | -0.240613 |
| p_extent_of_management | -0.027679 |
| p_extent_of_problems | -0.054402 |
| p_extent_of_satisfaction | -0.041268 |
| p_island | 0.107208 |
| p_number_of_school_tech_resources | 0.556685 |
| p_public_or_private | -0.547485 |
| level_MAT | 0.102478 |
| level_LEN | 0.085440 |

| | |
|---|--|
| ↳ p_percentage_of_teachers_changed_school_last_year \ | |
| p_gender | |
| ↳ -0.045782 | |
| p_number_of_teachers_in_school | |
| ↳ -0.185265 | |
| p_percentage_of_teachers_changed_school_last_year | |
| ↳ 1.000000 | |

| | |
|--|-----------|
| p_attitude_teacher_training_courses | □ |
| ↳ | 0.201196 |
| p_age | □ |
| ↳ | -0.004783 |
| p_group_criteria_random | □ |
| ↳ | NaN |
| p_group_criteria_subjects | □ |
| ↳ | NaN |
| p_group_criteria_other | □ |
| ↳ | NaN |
| p_group_criteria_alphabet | □ |
| ↳ | NaN |
| p_group_criteria_gender | □ |
| ↳ | NaN |
| p_group_criteria_language | □ |
| ↳ | NaN |
| p_group_criteria_performance | □ |
| ↳ | NaN |
| p_group_criteria_homogeneity | □ |
| ↳ | NaN |
| p_group_criteria_heterogeneity | □ |
| ↳ | NaN |
| p_number_of_years_of_teaching | □ |
| ↳ | -0.044489 |
| p_number_of_years_in_school | □ |
| ↳ | -0.134029 |
| p_number_of_years_as_principal | □ |
| ↳ | -0.091029 |
| p_number_of_years_as_principal_in_school | □ |
| ↳ | -0.114515 |
| p_number_of_class_hours_per_week | □ |
| ↳ | -0.114304 |
| p_number_of_principlas_10_years | □ |
| ↳ | 0.110425 |
| p_number_of_preschool_students | □ |
| ↳ | -0.151578 |
| p_number_of_preschool_groups | □ |
| ↳ | -0.060950 |
| p_number_of_primary_students | □ |
| ↳ | -0.162638 |
| p_number_of_primary_groups | □ |
| ↳ | -0.061627 |
| p_extent_of_agreement | □ |
| ↳ | -0.221886 |
| p_extent_of_factors_limiting_effectiveness | □ |
| ↳ | 0.212428 |

| | |
|---|-----|
| p_extent_of_inconveniences | □ |
| ↳ 0.281746 | |
| p_extent_of_management | □ |
| ↳ -0.120551 | |
| p_extent_of_problems | □ |
| ↳ 0.262679 | |
| p_extent_of_satisfaction | □ |
| ↳ -0.113346 | |
| p_island | □ |
| ↳ 0.135192 | |
| p_number_of_school_tech_resources | □ |
| ↳ 0.004551 | |
| p_public_or_private | □ |
| ↳ 0.434857 | |
| level_MAT | □ |
| ↳ -0.132012 | |
| level_LEN | □ |
| ↳ -0.124095 | |
| □ | |
| ↳ p_attitude_teacher_training_courses \ | |
| p_gender | -0. |
| ↳ 155428 | |
| p_number_of_teachers_in_school | -0. |
| ↳ 215315 | |
| p_percentage_of_teachers_changed_school_last_year | 0. |
| ↳ 201196 | |
| p_attitude_teacher_training_courses | 1. |
| ↳ 000000 | |
| p_age | 0. |
| ↳ 106640 | |
| p_group_criteria_random | □ |
| ↳ NaN | |
| p_group_criteria_subjects | □ |
| ↳ NaN | |
| p_group_criteria_other | □ |
| ↳ NaN | |
| p_group_criteria_alphabet | □ |
| ↳ NaN | |
| p_group_criteria_gender | □ |
| ↳ NaN | |
| p_group_criteria_language | □ |
| ↳ NaN | |
| p_group_criteria_performance | □ |
| ↳ NaN | |

| | |
|--|-----|
| p_group_criteria_homogeneity | □ |
| ↳ NaN | |
| p_group_criteria_heterogeneity | □ |
| ↳ NaN | |
| p_number_of_years_of_teaching | 0. |
| ↳ 148419 | |
| p_number_of_years_in_school | -0. |
| ↳ 017325 | |
| p_number_of_years_as_principal | 0. |
| ↳ 016209 | |
| p_number_of_years_as_principal_in_school | 0. |
| ↳ 008065 | |
| p_number_of_class_hours_per_week | -0. |
| ↳ 009184 | |
| p_number_of_principals_10_years | -0. |
| ↳ 014383 | |
| p_number_of_preschool_students | -0. |
| ↳ 136417 | |
| p_number_of_preschool_groups | -0. |
| ↳ 144948 | |
| p_number_of_primary_students | -0. |
| ↳ 121403 | |
| p_number_of_primary_groups | -0. |
| ↳ 076768 | |
| p_extent_of_agreement | -0. |
| ↳ 059628 | |
| p_extent_of_factors_limiting_effectiveness | -0. |
| ↳ 044016 | |
| p_extent_of_inconveniences | 0. |
| ↳ 101608 | |
| p_extent_of_management | 0. |
| ↳ 010726 | |
| p_extent_of_problems | 0. |
| ↳ 083005 | |
| p_extent_of_satisfaction | 0. |
| ↳ 173843 | |
| p_island | -0. |
| ↳ 087793 | |
| p_number_of_school_tech_resources | 0. |
| ↳ 059893 | |
| p_public_or_private | 0. |
| ↳ 444140 | |
| level_MAT | -0. |
| ↳ 053197 | |
| level_LEN | -0. |
| ↳ 061591 | |

| | |
|---|---------------------------|
| p_gender | -0.024211 |
| p_number_of_teachers_in_school | -0.071810 |
| p_percentage_of_teachers_changed_school_last_year | -0.004783 |
| p_attitude_teacher_training_courses | 0.106640 |
| p_age | 1.000000 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.797119 |
| p_number_of_years_in_school | 0.479378 |
| p_number_of_years_as_principal | 0.529904 |
| p_number_of_years_as_principal_in_school | 0.496292 |
| p_number_of_class_hours_per_week | -0.046085 |
| p_number_of_principlas_10_years | -0.336140 |
| p_number_of_preschool_students | -0.024041 |
| p_number_of_preschool_groups | -0.061992 |
| p_number_of_primary_students | -0.023715 |
| p_number_of_primary_groups | -0.027358 |
| p_extent_of_agreement | 0.016133 |
| p_extent_of_factors_limiting_effectiveness | -0.066245 |
| p_extent_of_inconveniences | -0.045046 |
| p_extent_of_management | -0.085886 |
| p_extent_of_problems | -0.030693 |
| p_extent_of_satisfaction | 0.014912 |
| p_island | 0.003910 |
| p_number_of_school_tech_resources | 0.061936 |
| p_public_or_private | 0.072827 |
| level_MAT | 0.044703 |
| level_LEN | 0.037460 |
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| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
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| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |

| | |
|---|-----|
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_class_hours_per_week | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_subjects \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_class_hours_per_week | NaN |
| p_number_of_principlas_10_years | NaN |

| | |
|---|-----|
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_other \ | |
| p_gender | NaN |
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| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_class_hours_per_week | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |

| | |
|---|-----|
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_alphabet \ | |
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| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_class_hours_per_week | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_gender \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |

| | |
|--|-----|
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_class_hours_per_week | NaN |
| p_number_of_principals_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |

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| | |
|---|-----|
| p_gender | ... |
| p_number_of_teachers_in_school | ... |
| p_percentage_of_teachers_changed_school_last_year | ... |
| p_attitude_teacher_training_courses | ... |
| p_age | ... |
| p_group_criteria_random | ... |
| p_group_criteria_subjects | ... |
| p_group_criteria_other | ... |
| p_group_criteria_alphabet | ... |
| p_group_criteria_gender | ... |
| p_group_criteria_language | ... |
| p_group_criteria_performance | ... |
| p_group_criteria_homogeneity | ... |
| p_group_criteria_heterogeneity | ... |
| p_number_of_years_of_teaching | ... |
| p_number_of_years_in_school | ... |

| | |
|---|-----|
| p_number_of_years_as_principal | ... |
| p_number_of_years_as_principal_in_school | ... |
| p_number_of_class_hours_per_week | ... |
| p_number_of_principals_10_years | ... |
| p_number_of_preschool_students | ... |
| p_number_of_preschool_groups | ... |
| p_number_of_primary_students | ... |
| p_number_of_primary_groups | ... |
| p_extent_of_agreement | ... |
| p_extent_of_factors_limiting_effectiveness | ... |
| p_extent_of_inconveniences | ... |
| p_extent_of_management | ... |
| p_extent_of_problems | ... |
| p_extent_of_satisfaction | ... |
| p_island | ... |
| p_number_of_school_tech_resources | ... |
| p_public_or_private | ... |
| level_MAT | ... |
| level_LEN | ... |
| | |
| ↳ p_extent_of_factors_limiting_effectiveness \ | □ |
| p_gender | □ |
| ↳ 0.038589 | □ |
| p_number_of_teachers_in_school | □ |
| ↳ -0.061530 | □ |
| p_percentage_of_teachers_changed_school_last_year | □ |
| ↳ 0.212428 | □ |
| p_attitude_teacher_training_courses | □ |
| ↳ -0.044016 | □ |
| p_age | □ |
| ↳ -0.066245 | □ |
| p_group_criteria_random | □ |
| ↳ NaN | □ |
| p_group_criteria_subjects | □ |
| ↳ NaN | □ |
| p_group_criteria_other | □ |
| ↳ NaN | □ |
| p_group_criteria_alphabet | □ |
| ↳ NaN | □ |
| p_group_criteria_gender | □ |
| ↳ NaN | □ |
| p_group_criteria_language | □ |
| ↳ NaN | □ |
| p_group_criteria_performance | □ |
| ↳ NaN | □ |

| | |
|--|---|
| p_group_criteria_homogeneity | □ |
| ↳ NaN | □ |
| p_group_criteria_heterogeneity | □ |
| ↳ NaN | □ |
| p_number_of_years_of_teaching | □ |
| ↳ -0.073058 | □ |
| p_number_of_years_in_school | □ |
| ↳ -0.160859 | □ |
| p_number_of_years_as_principal | □ |
| ↳ -0.022741 | □ |
| p_number_of_years_as_principal_in_school | □ |
| ↳ -0.075019 | □ |
| p_number_of_class_hours_per_week | □ |
| ↳ -0.121794 | □ |
| p_number_of_principiplas_10_years | □ |
| ↳ 0.067971 | □ |
| p_number_of_preschool_students | □ |
| ↳ -0.051689 | □ |
| p_number_of_preschool_groups | □ |
| ↳ 0.000143 | □ |
| p_number_of_primary_students | □ |
| ↳ -0.053022 | □ |
| p_number_of_primary_groups | □ |
| ↳ -0.004780 | □ |
| p_extent_of_agreement | □ |
| ↳ -0.330075 | □ |
| p_extent_of_factors_limiting_effectiveness | □ |
| ↳ 1.000000 | □ |
| p_extent_of_inconveniences | □ |
| ↳ 0.599354 | □ |
| p_extent_of_management | □ |
| ↳ -0.263730 | □ |
| p_extent_of_problems | □ |
| ↳ 0.448839 | □ |
| p_extent_of_satisfaction | □ |
| ↳ -0.342985 | □ |
| p_island | □ |
| ↳ 0.055340 | □ |
| p_number_of_school_tech_resources | □ |
| ↳ -0.020285 | □ |
| p_public_or_private | □ |
| ↳ 0.215288 | □ |
| level_MAT | □ |
| ↳ -0.080427 | □ |
| level_LEN | □ |
| ↳ -0.062271 | □ |

| | p_extent_of_inconveniences \ |
|---|------------------------------|
| p_gender | -0.067401 |
| p_number_of_teachers_in_school | -0.240613 |
| p_percentage_of_teachers_changed_school_last_year | 0.281746 |
| p_attitude_teacher_training_courses | 0.101608 |
| p_age | -0.045046 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.073439 |
| p_number_of_years_in_school | -0.244957 |
| p_number_of_years_as_principal | -0.201010 |
| p_number_of_years_as_principal_in_school | -0.226483 |
| p_number_of_class_hours_per_week | -0.165187 |
| p_number_of_principlas_10_years | 0.168138 |
| p_number_of_preschool_students | -0.230243 |
| p_number_of_preschool_groups | -0.150370 |
| p_number_of_primary_students | -0.215991 |
| p_number_of_primary_groups | -0.138480 |
| p_extent_of_agreement | -0.340746 |
| p_extent_of_factors_limiting_effectiveness | 0.599354 |
| p_extent_of_inconveniences | 1.000000 |
| p_extent_of_management | -0.162628 |
| p_extent_of_problems | 0.459965 |
| p_extent_of_satisfaction | -0.311237 |
| p_island | 0.093214 |
| p_number_of_school_tech_resources | -0.097926 |
| p_public_or_private | 0.454093 |
| level_MAT | -0.142821 |
| level_LEN | -0.121366 |

| | p_extent_of_management \ |
|---|--------------------------|
| p_gender | -0.176006 |
| p_number_of_teachers_in_school | -0.027679 |
| p_percentage_of_teachers_changed_school_last_year | -0.120551 |
| p_attitude_teacher_training_courses | 0.010726 |
| p_age | -0.085886 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |

| | |
|---|-----------|
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.035008 |
| p_number_of_years_in_school | 0.005647 |
| p_number_of_years_as_principal | -0.108370 |
| p_number_of_years_as_principal_in_school | -0.066178 |
| p_number_of_class_hours_per_week | 0.108932 |
| p_number_of_principlas_10_years | 0.116240 |
| p_number_of_preschool_students | -0.028844 |
| p_number_of_preschool_groups | -0.016151 |
| p_number_of_primary_students | -0.003104 |
| p_number_of_primary_groups | -0.052893 |
| p_extent_of_agreement | 0.553430 |
| p_extent_of_factors_limiting_effectiveness | -0.263730 |
| p_extent_of_inconveniences | -0.162628 |
| p_extent_of_management | 1.000000 |
| p_extent_of_problems | -0.232462 |
| p_extent_of_satisfaction | 0.337143 |
| p_island | -0.082008 |
| p_number_of_school_tech_resources | -0.074406 |
| p_public_or_private | -0.079065 |
| level_MAT | 0.038399 |
| level_LEN | 0.074959 |
| p_extent_of_problems \ | |
| p_gender | -0.056263 |
| p_number_of_teachers_in_school | -0.054402 |
| p_percentage_of_teachers_changed_school_last_year | 0.262679 |
| p_attitude_teacher_training_courses | 0.083005 |
| p_age | -0.030693 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.089881 |
| p_number_of_years_in_school | -0.154163 |
| p_number_of_years_as_principal | -0.111545 |
| p_number_of_years_as_principal_in_school | -0.128506 |
| p_number_of_class_hours_per_week | -0.175868 |
| p_number_of_principlas_10_years | 0.064288 |

| | |
|---|-----------|
| p_number_of_preschool_students | -0.086756 |
| p_number_of_preschool_groups | -0.002107 |
| p_number_of_primary_students | -0.065957 |
| p_number_of_primary_groups | -0.008929 |
| p_extent_of_agreement | -0.365932 |
| p_extent_of_factors_limiting_effectiveness | 0.448839 |
| p_extent_of_inconveniences | 0.459965 |
| p_extent_of_management | -0.232462 |
| p_extent_of_problems | 1.000000 |
| p_extent_of_satisfaction | -0.295867 |
| p_island | -0.043104 |
| p_number_of_school_tech_resources | 0.012170 |
| p_public_or_private | 0.253034 |
| level_MAT | -0.152743 |
| level_LEN | -0.117485 |
| p_extent_of_satisfaction \ | |
| p_gender | -0.095692 |
| p_number_of_teachers_in_school | -0.041268 |
| p_percentage_of_teachers_changed_school_last_year | -0.113346 |
| p_attitude_teacher_training_courses | 0.173843 |
| p_age | 0.014912 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.064672 |
| p_number_of_years_in_school | 0.020068 |
| p_number_of_years_as_principal | -0.059122 |
| p_number_of_years_as_principal_in_school | -0.085462 |
| p_number_of_class_hours_per_week | 0.121301 |
| p_number_of_principlas_10_years | 0.041289 |
| p_number_of_preschool_students | -0.018821 |
| p_number_of_preschool_groups | -0.032589 |
| p_number_of_primary_students | -0.028711 |
| p_number_of_primary_groups | -0.041391 |
| p_extent_of_agreement | 0.461188 |
| p_extent_of_factors_limiting_effectiveness | -0.342985 |
| p_extent_of_inconveniences | -0.311237 |
| p_extent_of_management | 0.337143 |
| p_extent_of_problems | -0.295867 |
| p_extent_of_satisfaction | 1.000000 |
| p_island | -0.049515 |

| | |
|---|------------|
| p_number_of_school_tech_resources | -0.009083 |
| p_public_or_private | 0.033937 |
| level_MAT | 0.014379 |
| level_LEN | 0.030505 |
| | p_island \ |
| p_gender | 0.009655 |
| p_number_of_teachers_in_school | 0.107208 |
| p_percentage_of_teachers_changed_school_last_year | 0.135192 |
| p_attitude_teacher_training_courses | -0.087793 |
| p_age | 0.003910 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.099812 |
| p_number_of_years_in_school | -0.041988 |
| p_number_of_years_as_principal | 0.059209 |
| p_number_of_years_as_principal_in_school | 0.081011 |
| p_number_of_class_hours_per_week | 0.033677 |
| p_number_of_principlas_10_years | 0.018335 |
| p_number_of_preschool_students | 0.072474 |
| p_number_of_preschool_groups | 0.085912 |
| p_number_of_primary_students | 0.066444 |
| p_number_of_primary_groups | 0.063813 |
| p_extent_of_agreement | -0.057438 |
| p_extent_of_factors_limiting_effectiveness | 0.055340 |
| p_extent_of_inconveniences | 0.093214 |
| p_extent_of_management | -0.082008 |
| p_extent_of_problems | -0.043104 |
| p_extent_of_satisfaction | -0.049515 |
| p_island | 1.000000 |
| p_number_of_school_tech_resources | 0.027829 |
| p_public_or_private | -0.074768 |
| level_MAT | 0.044030 |
| level_LEN | -0.001744 |

□

```

  ↵p_number_of_school_tech_resources \
p_gender
  ↵111593

```

0.

| | |
|---|-----|
| p_number_of_teachers_in_school | 0. |
| ↳556685 | |
| p_percentage_of_teachers_changed_school_last_year | 0. |
| ↳004551 | |
| p_attitude_teacher_training_courses | 0. |
| ↳059893 | |
| p_age | 0. |
| ↳061936 | |
| p_group_criteria_random | □ |
| ↳NaN | |
| p_group_criteria_subjects | □ |
| ↳NaN | |
| p_group_criteria_other | □ |
| ↳NaN | |
| p_group_criteria_alphabet | □ |
| ↳NaN | |
| p_group_criteria_gender | □ |
| ↳NaN | |
| p_group_criteria_language | □ |
| ↳NaN | |
| p_group_criteria_performance | □ |
| ↳NaN | |
| p_group_criteria_homogeneity | □ |
| ↳NaN | |
| p_group_criteria_heterogeneity | □ |
| ↳NaN | |
| p_number_of_years_of_teaching | 0. |
| ↳032275 | |
| p_number_of_years_in_school | 0. |
| ↳113806 | |
| p_number_of_years_as_principal | 0. |
| ↳093311 | |
| p_number_of_years_as_principal_in_school | 0. |
| ↳084736 | |
| p_number_of_class_hours_per_week | -0. |
| ↳161634 | |
| p_number_of_principals_10_years | -0. |
| ↳095084 | |
| p_number_of_preschool_students | 0. |
| ↳535117 | |
| p_number_of_preschool_groups | 0. |
| ↳477388 | |
| p_number_of_primary_students | 0. |
| ↳550508 | |
| p_number_of_primary_groups | 0. |
| ↳512754 | |

| | |
|--|-----|
| p_extent_of_agreement | -0. |
| ↳029804 | |
| p_extent_of_factors_limiting_effectiveness | -0. |
| ↳020285 | |
| p_extent_of_inconveniences | -0. |
| ↳097926 | |
| p_extent_of_management | -0. |
| ↳074406 | |
| p_extent_of_problems | 0. |
| ↳012170 | |
| p_extent_of_satisfaction | -0. |
| ↳009083 | |
| p_island | 0. |
| ↳027829 | |
| p_number_of_school_tech_resources | 1. |
| ↳000000 | |
| p_public_or_private | 0. |
| ↳025741 | |
| level_MAT | -0. |
| ↳028566 | |
| level_LEN | 0. |
| ↳005489 | |

| | |
|---|-----------------------|
| | p_public_or_private \ |
| p_gender | -0.099218 |
| p_number_of_teachers_in_school | -0.547485 |
| p_percentage_of_teachers_changed_school_last_year | 0.434857 |
| p_attitude_teacher_training_courses | 0.444140 |
| p_age | 0.072827 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.098537 |
| p_number_of_years_in_school | -0.199116 |
| p_number_of_years_as_principal | -0.209854 |
| p_number_of_years_as_principal_in_school | -0.223973 |
| p_number_of_class_hours_per_week | -0.274363 |
| p_number_of_principals_10_years | 0.028208 |
| p_number_of_preschool_students | -0.433325 |
| p_number_of_preschool_groups | -0.319348 |
| p_number_of_primary_students | -0.391661 |

| | | |
|---|-----------|-----------|
| p_number_of_primary_groups | -0.228892 | |
| p_extent_of_agreement | -0.198010 | |
| p_extent_of_factors_limiting_effectiveness | 0.215288 | |
| p_extent_of_inconveniences | 0.454093 | |
| p_extent_of_management | -0.079065 | |
| p_extent_of_problems | 0.253034 | |
| p_extent_of_satisfaction | 0.033937 | |
| p_island | -0.074768 | |
| p_number_of_school_tech_resources | 0.025741 | |
| p_public_or_private | 1.000000 | |
| level_MAT | -0.182115 | |
| level_LEN | -0.141777 | |
| | level_MAT | level_LEN |
| p_gender | 0.053646 | 0.044194 |
| p_number_of_teachers_in_school | 0.102478 | 0.085440 |
| p_percentage_of_teachers_changed_school_last_year | -0.132012 | -0.124095 |
| p_attitude_teacher_training_courses | -0.053197 | -0.061591 |
| p_age | 0.044703 | 0.037460 |
| p_group_criteria_random | NaN | NaN |
| p_group_criteria_subjects | NaN | NaN |
| p_group_criteria_other | NaN | NaN |
| p_group_criteria_alphabet | NaN | NaN |
| p_group_criteria_gender | NaN | NaN |
| p_group_criteria_language | NaN | NaN |
| p_group_criteria_performance | NaN | NaN |
| p_group_criteria_homogeneity | NaN | NaN |
| p_group_criteria_heterogeneity | NaN | NaN |
| p_number_of_years_of_teaching | 0.059156 | 0.035318 |
| p_number_of_years_in_school | 0.089493 | 0.060077 |
| p_number_of_years_as_principal | 0.118076 | 0.085325 |
| p_number_of_years_as_principal_in_school | 0.120255 | 0.089276 |
| p_number_of_class_hours_per_week | 0.075927 | 0.041353 |
| p_number_of_principlas_10_years | -0.063751 | -0.033567 |
| p_number_of_preschool_students | 0.106308 | 0.085683 |
| p_number_of_preschool_groups | 0.084685 | 0.059827 |
| p_number_of_primary_students | 0.097782 | 0.083027 |
| p_number_of_primary_groups | 0.074565 | 0.048145 |
| p_extent_of_agreement | 0.089626 | 0.096205 |
| p_extent_of_factors_limiting_effectiveness | -0.080427 | -0.062271 |
| p_extent_of_inconveniences | -0.142821 | -0.121366 |
| p_extent_of_management | 0.038399 | 0.074959 |
| p_extent_of_problems | -0.152743 | -0.117485 |
| p_extent_of_satisfaction | 0.014379 | 0.030505 |
| p_island | 0.044030 | -0.001744 |
| p_number_of_school_tech_resources | -0.028566 | 0.005489 |
| p_public_or_private | -0.182115 | -0.141777 |
| level_MAT | 1.000000 | 0.562532 |

```
level_LEN 0.562532 1.000000
```

[35 rows x 35 columns]

```
[86]: df_sel_principals, _ = compute_exploratory_analysis(df=df_sel, ↴  
    ↴column_pattern="p_", missing_threshold=0.09, annot=False)  
df_sel_principals
```

GOOD FEATURES: 34

| | |
|---|----------|
| p_gender | 0.048916 |
| p_number_of_teachers_in_school | 0.055318 |
| p_percentage_of_teachers_changed_school_last_year | 0.050264 |
| p_attitude_teacher_training_courses | 0.056105 |
| p_age | 0.051724 |
| p_group_criteria_random | 0.000000 |
| p_group_criteria_subjects | 0.000000 |
| p_group_criteria_other | 0.000000 |
| p_group_criteria_alphabet | 0.000000 |
| p_group_criteria_gender | 0.000000 |
| p_group_criteria_language | 0.000000 |
| p_group_criteria_performance | 0.000000 |
| p_group_criteria_homogeneity | 0.000000 |
| p_group_criteria_heterogeneity | 0.000000 |
| p_number_of_years_of_teaching | 0.058520 |
| p_number_of_years_in_school | 0.053690 |
| p_number_of_years_as_principal | 0.061889 |
| p_number_of_years_as_principal_in_school | 0.054420 |
| p_number_of_principals_10_years | 0.057958 |
| p_number_of_preschool_students | 0.067056 |
| p_number_of_preschool_groups | 0.075199 |
| p_number_of_primary_students | 0.054757 |
| p_number_of_primary_groups | 0.070650 |
| p_extent_of_agreement | 0.047568 |
| p_extent_of_factors_limiting_effectiveness | 0.048916 |
| p_extent_of_inconveniences | 0.047568 |
| p_extent_of_management | 0.047568 |
| p_extent_of_problems | 0.047568 |
| p_extent_of_satisfaction | 0.047568 |
| p_island | 0.000000 |
| p_number_of_school_tech_resources | 0.000000 |
| p_public_or_private | 0.000000 |
| level_MAT | 0.000000 |
| level_LEN | 0.009772 |
| dtype: float64 | |

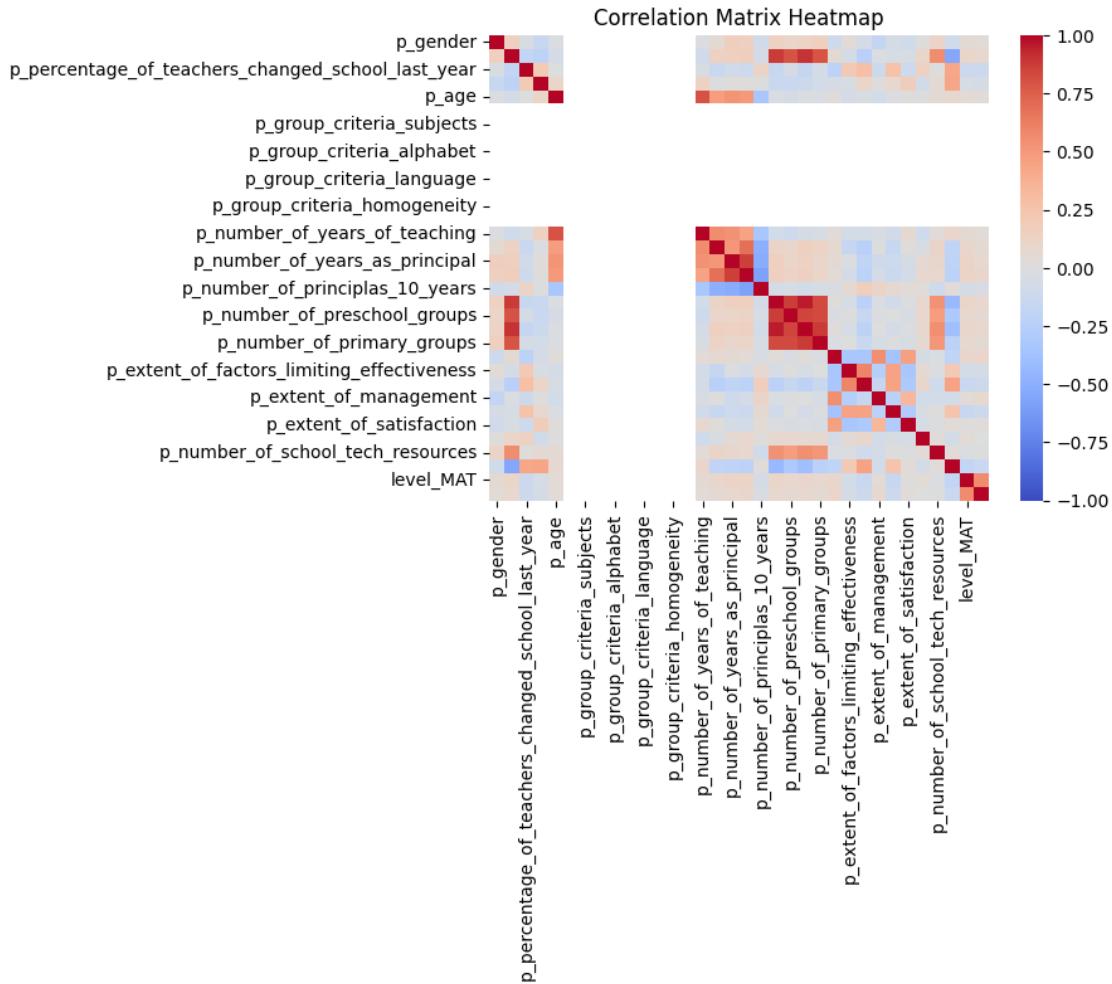
BAD FEATURES

| | |
|--|----------|
| p_number_of_abroad_students_country_no_spanish | 0.117657 |
| p_number_of_abroad_students_country_spanish | 0.133101 |

```

p_number_of_teachers_1_education           1.000000
p_number_of_mandatory_teachers_2_education 1.000000
p_number_of_teachers_1_education_more_5_years 1.000000
p_number_of_mandatory_teachers_2_education_more_5_years 1.000000
p_extent_of_satisfaction_students_results 1.000000
p_extent_of_expected_students_results      1.000000
p_extent_of_students_improvement_expectation 1.000000
p_school_teacher_training_plan            1.000000
p_school_teacher_training_plan_main_theme 1.000000
p_number_of_class_hours_per_week          0.098001
p_number_of_students                      0.249017
p_number_of_groups                        0.229754
p_number_of_groups_evaluated_grade        1.000000
p_rate_4_grade_mandatory_2_education_students_different_nationality 1.000000
p_rate_3_grade_mandatory_2_education_students_different_nationality 1.000000
p_rate_6_grade_mandatory_2_education_students_different_nationality 1.000000
level_ING                                1.000000
dtype: float64

```



| | | | |
|-------------------------|---|--------------------------------|---|
| | p_gender | p_number_of_teachers_in_school | \ |
| id_questionnaire | | | |
| 1 | MALE | 19.0 | |
| 2 | FEMALE | 26.0 | |
| 3 | FEMALE | 42.0 | |
| 4 | MALE | 15.0 | |
| 5 | MALE | 22.0 | |
| ... | ... | ... | |
| 20426 | FEMALE | 24.0 | |
| 20427 | FEMALE | 15.0 | |
| 20428 | MALE | 27.0 | |
| 20429 | FEMALE | 23.0 | |
| 20430 | MALE | 15.0 | |
| | p_percentage_of_teachers_changed_school_last_year | \ | |
| id_questionnaire | | | |
| 1 | | 3.0 | |
| 2 | | 2.0 | |
| 3 | | 2.0 | |
| 4 | | 1.0 | |
| 5 | | 1.0 | |
| ... | | ... | |
| 20426 | | 4.0 | |
| 20427 | | 2.0 | |
| 20428 | | 1.0 | |
| 20429 | | 1.0 | |
| 20430 | | 3.0 | |
| | p_attitude_teacher_training_courses | p_age | \ |
| id_questionnaire | | | |
| 1 | 3.0 | 50.0 | |
| 2 | 3.0 | 58.0 | |
| 3 | 2.0 | 45.0 | |
| 4 | 3.0 | 46.0 | |
| 5 | 2.0 | 56.0 | |
| ... | ... | ... | |
| 20426 | 3.0 | 46.0 | |
| 20427 | 3.0 | 49.0 | |
| 20428 | 3.0 | 59.0 | |
| 20429 | 4.0 | 64.0 | |
| 20430 | 2.0 | 51.0 | |
| | p_group_criteria_random | p_group_criteria_subjects | \ |
| id_questionnaire | | | |
| 1 | False | False | |

| | p_group_criteria_other | p_group_criteria_alphabet |
|------------------|--|---------------------------|
| id_questionnaire | | \ |
| 2 | False | False |
| 3 | False | False |
| 4 | False | False |
| 5 | False | False |
| ... | ... | ... |
| 20426 | False | False |
| 20427 | False | False |
| 20428 | False | False |
| 20429 | False | False |
| 20430 | False | False |
| | | |
| | p_group_criteria_other | p_group_criteria_alphabet |
| id_questionnaire | | \ |
| 1 | False | False |
| 2 | False | False |
| 3 | False | False |
| 4 | False | False |
| 5 | False | False |
| ... | ... | ... |
| 20426 | False | False |
| 20427 | False | False |
| 20428 | False | False |
| 20429 | False | False |
| 20430 | False | False |
| | | |
| | p_group_criteria_gender | ... |
| id_questionnaire | | \ |
| 1 | False | ... |
| 2 | False | ... |
| 3 | False | ... |
| 4 | False | ... |
| 5 | False | ... |
| ... | ... | ... |
| 20426 | False | ... |
| 20427 | False | ... |
| 20428 | False | ... |
| 20429 | False | ... |
| 20430 | False | ... |
| | | |
| | p_extent_of_factors_limiting_effectiveness | \ |
| id_questionnaire | | |
| 1 | | 0.666667 |
| 2 | | 0.375000 |
| 3 | | 0.500000 |
| 4 | | 0.625000 |
| 5 | | 0.458333 |
| ... | | ... |
| 20426 | | 0.583333 |

| | | |
|------------------|----------------------------|-------------------------------------|
| 20427 | | 0.333333 |
| 20428 | | 0.458333 |
| 20429 | | 0.083333 |
| 20430 | | 0.583333 |
| | p_extent_of_inconveniences | p_extent_of_management \ |
| id_questionnaire | | |
| 1 | 0.750000 | 0.666667 |
| 2 | 0.305556 | 0.857143 |
| 3 | 0.606061 | 0.666667 |
| 4 | 0.666667 | 0.809524 |
| 5 | 0.333333 | 0.714286 |
| ... | ... | ... |
| 20426 | 0.555556 | 0.952381 |
| 20427 | 0.416667 | 0.761905 |
| 20428 | 0.388889 | 0.809524 |
| 20429 | 0.000000 | 1.000000 |
| 20430 | 0.777778 | 0.666667 |
| | p_extent_of_problems | p_extent_of_satisfaction \ |
| id_questionnaire | | |
| 1 | 0.314815 | 0.611111 |
| 2 | 0.074074 | 0.888889 |
| 3 | 0.314815 | 0.666667 |
| 4 | 0.129630 | 0.555556 |
| 5 | 0.055556 | 0.722222 |
| ... | ... | ... |
| 20426 | 0.129630 | 0.666667 |
| 20427 | 0.055556 | 0.777778 |
| 20428 | 0.156863 | 0.888889 |
| 20429 | 0.025641 | 1.000000 |
| 20430 | 0.129630 | 0.555556 |
| | p_island | p_number_of_school_tech_resources \ |
| id_questionnaire | | |
| 1 | TENERIFE_CAPITAL | 196.0 |
| 2 | GRAN_CANARIA_CAPITAL | 157.0 |
| 3 | GRAN_CANARIA_CAPITAL | 62.0 |
| 4 | TENERIFE_CAPITAL | 131.0 |
| 5 | TENERIFE_CAPITAL | 118.0 |
| ... | ... | ... |
| 20426 | GRAN_CANARIA_PROVINCE | 264.0 |
| 20427 | TENERIFE_CAPITAL | 178.0 |
| 20428 | GRAN_CANARIA_CAPITAL | 311.0 |
| 20429 | TENERIFE_CAPITAL | 30.0 |
| 20430 | TENERIFE_CAPITAL | 54.0 |
| | p_public_or_private | level_MAT level_LEN |

| id_questionnaire | | | | |
|------------------|---------|-----|-----|--|
| 1 | PUBLIC | 3.0 | 3.0 | |
| 2 | PUBLIC | 1.0 | 1.0 | |
| 3 | PRIVATE | 1.0 | 3.0 | |
| 4 | PUBLIC | 2.0 | 2.0 | |
| 5 | PRIVATE | 4.0 | 3.0 | |
| ... | ... | ... | ... | |
| 20426 | PUBLIC | 1.0 | 1.0 | |
| 20427 | PUBLIC | 2.0 | 3.0 | |
| 20428 | PUBLIC | 2.0 | 2.0 | |
| 20429 | PRIVATE | 3.0 | 3.0 | |
| 20430 | PUBLIC | 2.0 | 3.0 | |

[17806 rows x 34 columns]

| | p_gender \ |
|---|------------|
| p_gender | 1.000000 |
| p_number_of_teachers_in_school | 0.159623 |
| p_percentage_of_teachers_changed_school_last_year | -0.045782 |
| p_attitude_teacher_training_courses | -0.155428 |
| p_age | -0.024211 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.020059 |
| p_number_of_years_in_school | 0.047504 |
| p_number_of_years_as_principal | 0.167834 |
| p_number_of_years_as_principal_in_school | 0.155515 |
| p_number_of_principals_10_years | -0.091932 |
| p_number_of_preschool_students | 0.146669 |
| p_number_of_preschool_groups | 0.107065 |
| p_number_of_primary_students | 0.128383 |
| p_number_of_primary_groups | 0.160362 |
| p_extent_of_agreement | -0.108918 |
| p_extent_of_factors_limiting_effectiveness | 0.038589 |
| p_extent_of_inconveniences | -0.067401 |
| p_extent_of_management | -0.176006 |
| p_extent_of_problems | -0.056263 |
| p_extent_of_satisfaction | -0.095692 |
| p_island | 0.009655 |
| p_number_of_school_tech_resources | 0.111593 |
| p_public_or_private | -0.099218 |

| | |
|-----------|----------|
| level_MAT | 0.053646 |
| level_LEN | 0.044194 |

| | |
|---|-----------|
| ↳ p_number_of_teachers_in_school \ | |
| p_gender | 0.159623 |
| p_number_of_teachers_in_school | 1.000000 |
| p_percentage_of_teachers_changed_school_last_year | -0.185265 |
| p_attitude_teacher_training_courses | -0.215315 |
| p_age | -0.071810 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.094354 |
| p_number_of_years_in_school | 0.142224 |
| p_number_of_years_as_principal | 0.161235 |
| p_number_of_years_as_principal_in_school | 0.165651 |
| p_number_of_principals_10_years | -0.066192 |
| p_number_of_preschool_students | 0.880144 |
| p_number_of_preschool_groups | 0.802674 |
| p_number_of_primary_students | 0.898519 |
| p_number_of_primary_groups | 0.794199 |
| p_extent_of_agreement | 0.053070 |
| p_extent_of_factors_limiting_effectiveness | -0.061530 |
| p_extent_of_inconveniences | -0.240613 |
| p_extent_of_management | -0.027679 |
| p_extent_of_problems | -0.054402 |
| p_extent_of_satisfaction | -0.041268 |
| p_island | 0.107208 |
| p_number_of_school_tech_resources | 0.556685 |
| p_public_or_private | -0.547485 |
| level_MAT | 0.102478 |
| level_LEN | 0.085440 |

| | |
|---|--|
| ↳ p_percentage_of_teachers_changed_school_last_year \ | |
| p_gender | |
| ↳ -0.045782 | |
| p_number_of_teachers_in_school | |
| ↳ -0.185265 | |

| | |
|---|---|
| p_percentage_of_teachers_changed_school_last_year | □ |
| ↳ 1.000000 | |
| p_attitude_teacher_training_courses | □ |
| ↳ 0.201196 | |
| p_age | □ |
| ↳ -0.004783 | |
| p_group_criteria_random | □ |
| ↳ NaN | |
| p_group_criteria_subjects | □ |
| ↳ NaN | |
| p_group_criteria_other | □ |
| ↳ NaN | |
| p_group_criteria_alphabet | □ |
| ↳ NaN | |
| p_group_criteria_gender | □ |
| ↳ NaN | |
| p_group_criteria_language | □ |
| ↳ NaN | |
| p_group_criteria_performance | □ |
| ↳ NaN | |
| p_group_criteria_homogeneity | □ |
| ↳ NaN | |
| p_group_criteria_heterogeneity | □ |
| ↳ NaN | |
| p_number_of_years_of_teaching | □ |
| ↳ -0.044489 | |
| p_number_of_years_in_school | □ |
| ↳ -0.134029 | |
| p_number_of_years_as_principal | □ |
| ↳ -0.091029 | |
| p_number_of_years_as_principal_in_school | □ |
| ↳ -0.114515 | |
| p_number_of_principlas_10_years | □ |
| ↳ 0.110425 | |
| p_number_of_preschool_students | □ |
| ↳ -0.151578 | |
| p_number_of_preschool_groups | □ |
| ↳ -0.060950 | |
| p_number_of_primary_students | □ |
| ↳ -0.162638 | |
| p_number_of_primary_groups | □ |
| ↳ -0.061627 | |
| p_extent_of_agreement | □ |
| ↳ -0.221886 | |
| p_extent_of_factors_limiting_effectiveness | □ |
| ↳ 0.212428 | |

| | |
|---|-----|
| p_extent_of_inconveniences | □ |
| ↳ 0.281746 | |
| p_extent_of_management | □ |
| ↳ -0.120551 | |
| p_extent_of_problems | □ |
| ↳ 0.262679 | |
| p_extent_of_satisfaction | □ |
| ↳ -0.113346 | |
| p_island | □ |
| ↳ 0.135192 | |
| p_number_of_school_tech_resources | □ |
| ↳ 0.004551 | |
| p_public_or_private | □ |
| ↳ 0.434857 | |
| level_MAT | □ |
| ↳ -0.132012 | |
| level_LEN | □ |
| ↳ -0.124095 | |
| □ | |
| ↳ p_attitude_teacher_training_courses \ | |
| p_gender | -0. |
| ↳ 155428 | |
| p_number_of_teachers_in_school | -0. |
| ↳ 215315 | |
| p_percentage_of_teachers_changed_school_last_year | 0. |
| ↳ 201196 | |
| p_attitude_teacher_training_courses | 1. |
| ↳ 000000 | |
| p_age | 0. |
| ↳ 106640 | |
| p_group_criteria_random | □ |
| ↳ NaN | |
| p_group_criteria_subjects | □ |
| ↳ NaN | |
| p_group_criteria_other | □ |
| ↳ NaN | |
| p_group_criteria_alphabet | □ |
| ↳ NaN | |
| p_group_criteria_gender | □ |
| ↳ NaN | |
| p_group_criteria_language | □ |
| ↳ NaN | |
| p_group_criteria_performance | □ |
| ↳ NaN | |

| | |
|--|-----|
| p_group_criteria_homogeneity | □ |
| ↳ NaN | |
| p_group_criteria_heterogeneity | □ |
| ↳ NaN | |
| p_number_of_years_of_teaching | 0. |
| ↳ 148419 | |
| p_number_of_years_in_school | -0. |
| ↳ 017325 | |
| p_number_of_years_as_principal | 0. |
| ↳ 016209 | |
| p_number_of_years_as_principal_in_school | 0. |
| ↳ 008065 | |
| p_number_of_principals_10_years | -0. |
| ↳ 014383 | |
| p_number_of_preschool_students | -0. |
| ↳ 136417 | |
| p_number_of_preschool_groups | -0. |
| ↳ 144948 | |
| p_number_of_primary_students | -0. |
| ↳ 121403 | |
| p_number_of_primary_groups | -0. |
| ↳ 076768 | |
| p_extent_of_agreement | -0. |
| ↳ 059628 | |
| p_extent_of_factors_limiting_effectiveness | -0. |
| ↳ 044016 | |
| p_extent_of_inconveniences | 0. |
| ↳ 101608 | |
| p_extent_of_management | 0. |
| ↳ 010726 | |
| p_extent_of_problems | 0. |
| ↳ 083005 | |
| p_extent_of_satisfaction | 0. |
| ↳ 173843 | |
| p_island | -0. |
| ↳ 087793 | |
| p_number_of_school_tech_resources | 0. |
| ↳ 059893 | |
| p_public_or_private | 0. |
| ↳ 444140 | |
| level_MAT | -0. |
| ↳ 053197 | |
| level_LEN | -0. |
| ↳ 061591 | |

p_age \

| | |
|---|-----------|
| p_gender | -0.024211 |
| p_number_of_teachers_in_school | -0.071810 |
| p_percentage_of_teachers_changed_school_last_year | -0.004783 |
| p_attitude_teacher_training_courses | 0.106640 |
| p_age | 1.000000 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.797119 |
| p_number_of_years_in_school | 0.479378 |
| p_number_of_years_as_principal | 0.529904 |
| p_number_of_years_as_principal_in_school | 0.496292 |
| p_number_of_principlas_10_years | -0.336140 |
| p_number_of_preschool_students | -0.024041 |
| p_number_of_preschool_groups | -0.061992 |
| p_number_of_primary_students | -0.023715 |
| p_number_of_primary_groups | -0.027358 |
| p_extent_of_agreement | 0.016133 |
| p_extent_of_factors_limiting_effectiveness | -0.066245 |
| p_extent_of_inconveniences | -0.045046 |
| p_extent_of_management | -0.085886 |
| p_extent_of_problems | -0.030693 |
| p_extent_of_satisfaction | 0.014912 |
| p_island | 0.003910 |
| p_number_of_school_tech_resources | 0.061936 |
| p_public_or_private | 0.072827 |
| level_MAT | 0.044703 |
| level_LEN | 0.037460 |
| p_group_criteria_random \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |

| | |
|---|-----|
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_subjects \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |

| | |
|---|-----|
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |
| p_group_criteria_other \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_principals_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |

p_group_criteria_alphabet \

| | |
|---|-----|
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_principals_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |

| | |
|---|-----|
| p_group_criteria_gender \ | |
| p_gender | NaN |
| p_number_of_teachers_in_school | NaN |
| p_percentage_of_teachers_changed_school_last_year | NaN |
| p_attitude_teacher_training_courses | NaN |
| p_age | NaN |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |

| | |
|--|-----|
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | NaN |
| p_number_of_years_in_school | NaN |
| p_number_of_years_as_principal | NaN |
| p_number_of_years_as_principal_in_school | NaN |
| p_number_of_principlas_10_years | NaN |
| p_number_of_preschool_students | NaN |
| p_number_of_preschool_groups | NaN |
| p_number_of_primary_students | NaN |
| p_number_of_primary_groups | NaN |
| p_extent_of_agreement | NaN |
| p_extent_of_factors_limiting_effectiveness | NaN |
| p_extent_of_inconveniences | NaN |
| p_extent_of_management | NaN |
| p_extent_of_problems | NaN |
| p_extent_of_satisfaction | NaN |
| p_island | NaN |
| p_number_of_school_tech_resources | NaN |
| p_public_or_private | NaN |
| level_MAT | NaN |
| level_LEN | NaN |

... \

| | |
|---|-----|
| p_gender | ... |
| p_number_of_teachers_in_school | ... |
| p_percentage_of_teachers_changed_school_last_year | ... |
| p_attitude_teacher_training_courses | ... |
| p_age | ... |
| p_group_criteria_random | ... |
| p_group_criteria_subjects | ... |
| p_group_criteria_other | ... |
| p_group_criteria_alphabet | ... |
| p_group_criteria_gender | ... |
| p_group_criteria_language | ... |
| p_group_criteria_performance | ... |
| p_group_criteria_homogeneity | ... |
| p_group_criteria_heterogeneity | ... |
| p_number_of_years_of_teaching | ... |
| p_number_of_years_in_school | ... |
| p_number_of_years_as_principal | ... |
| p_number_of_years_as_principal_in_school | ... |
| p_number_of_principlas_10_years | ... |
| p_number_of_preschool_students | ... |
| p_number_of_preschool_groups | ... |
| p_number_of_primary_students | ... |
| p_number_of_primary_groups | ... |
| p_extent_of_agreement | ... |

| | |
|---|-----|
| p_extent_of_factors_limiting_effectiveness | ... |
| p_extent_of_inconveniences | ... |
| p_extent_of_management | ... |
| p_extent_of_problems | ... |
| p_extent_of_satisfaction | ... |
| p_island | ... |
| p_number_of_school_tech_resources | ... |
| p_public_or_private | ... |
| level_MAT | ... |
| level_LEN | ... |
| | |
| ↳ p_extent_of_factors_limiting_effectiveness \ | □ |
| p_gender | □ |
| ↳ 0.038589 | □ |
| p_number_of_teachers_in_school | □ |
| ↳ -0.061530 | □ |
| p_percentage_of_teachers_changed_school_last_year | □ |
| ↳ 0.212428 | □ |
| p_attitude_teacher_training_courses | □ |
| ↳ -0.044016 | □ |
| p_age | □ |
| ↳ -0.066245 | □ |
| p_group_criteria_random | □ |
| ↳ NaN | □ |
| p_group_criteria_subjects | □ |
| ↳ NaN | □ |
| p_group_criteria_other | □ |
| ↳ NaN | □ |
| p_group_criteria_alphabet | □ |
| ↳ NaN | □ |
| p_group_criteria_gender | □ |
| ↳ NaN | □ |
| p_group_criteria_language | □ |
| ↳ NaN | □ |
| p_group_criteria_performance | □ |
| ↳ NaN | □ |
| p_group_criteria_homogeneity | □ |
| ↳ NaN | □ |
| p_group_criteria_heterogeneity | □ |
| ↳ NaN | □ |
| p_number_of_years_of_teaching | □ |
| ↳ -0.073058 | □ |
| p_number_of_years_in_school | □ |
| ↳ -0.160859 | □ |

| | |
|--|---|
| p_number_of_years_as_principal | □ |
| ↳ -0.022741 | |
| p_number_of_years_as_principal_in_school | □ |
| ↳ -0.075019 | |
| p_number_of_principals_10_years | □ |
| ↳ 0.067971 | |
| p_number_of_preschool_students | □ |
| ↳ -0.051689 | |
| p_number_of_preschool_groups | □ |
| ↳ 0.000143 | |
| p_number_of_primary_students | □ |
| ↳ -0.053022 | |
| p_number_of_primary_groups | □ |
| ↳ -0.004780 | |
| p_extent_of_agreement | □ |
| ↳ -0.330075 | |
| p_extent_of_factors_limiting_effectiveness | □ |
| ↳ 1.000000 | |
| p_extent_of_inconveniences | □ |
| ↳ 0.599354 | |
| p_extent_of_management | □ |
| ↳ -0.263730 | |
| p_extent_of_problems | □ |
| ↳ 0.448839 | |
| p_extent_of_satisfaction | □ |
| ↳ -0.342985 | |
| p_island | □ |
| ↳ 0.055340 | |
| p_number_of_school_tech_resources | □ |
| ↳ -0.020285 | |
| p_public_or_private | □ |
| ↳ 0.215288 | |
| level_MAT | □ |
| ↳ -0.080427 | |
| level_LEN | □ |
| ↳ -0.062271 | |

| | |
|---|------------------------------|
| | p_extent_of_inconveniences \ |
| p_gender | -0.067401 |
| p_number_of_teachers_in_school | -0.240613 |
| p_percentage_of_teachers_changed_school_last_year | 0.281746 |
| p_attitude_teacher_training_courses | 0.101608 |
| p_age | -0.045046 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |

| | |
|--|-----------|
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.073439 |
| p_number_of_years_in_school | -0.244957 |
| p_number_of_years_as_principal | -0.201010 |
| p_number_of_years_as_principal_in_school | -0.226483 |
| p_number_of_principlas_10_years | 0.168138 |
| p_number_of_preschool_students | -0.230243 |
| p_number_of_preschool_groups | -0.150370 |
| p_number_of_primary_students | -0.215991 |
| p_number_of_primary_groups | -0.138480 |
| p_extent_of_agreement | -0.340746 |
| p_extent_of_factors_limiting_effectiveness | 0.599354 |
| p_extent_of_inconveniences | 1.000000 |
| p_extent_of_management | -0.162628 |
| p_extent_of_problems | 0.459965 |
| p_extent_of_satisfaction | -0.311237 |
| p_island | 0.093214 |
| p_number_of_school_tech_resources | -0.097926 |
| p_public_or_private | 0.454093 |
| level_MAT | -0.142821 |
| level_LEN | -0.121366 |

| | |
|---|--------------------------|
| | p_extent_of_management \ |
| p_gender | -0.176006 |
| p_number_of_teachers_in_school | -0.027679 |
| p_percentage_of_teachers_changed_school_last_year | -0.120551 |
| p_attitude_teacher_training_courses | 0.010726 |
| p_age | -0.085886 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.035008 |
| p_number_of_years_in_school | 0.005647 |
| p_number_of_years_as_principal | -0.108370 |
| p_number_of_years_as_principal_in_school | -0.066178 |
| p_number_of_principlas_10_years | 0.116240 |
| p_number_of_preschool_students | -0.028844 |

| | |
|---|-----------|
| p_number_of_preschool_groups | -0.016151 |
| p_number_of_primary_students | -0.003104 |
| p_number_of_primary_groups | -0.052893 |
| p_extent_of_agreement | 0.553430 |
| p_extent_of_factors_limiting_effectiveness | -0.263730 |
| p_extent_of_inconveniences | -0.162628 |
| p_extent_of_management | 1.000000 |
| p_extent_of_problems | -0.232462 |
| p_extent_of_satisfaction | 0.337143 |
| p_island | -0.082008 |
| p_number_of_school_tech_resources | -0.074406 |
| p_public_or_private | -0.079065 |
| level_MAT | 0.038399 |
| level_LEN | 0.074959 |
| | |
| p_extent_of_problems \ | |
| p_gender | -0.056263 |
| p_number_of_teachers_in_school | -0.054402 |
| p_percentage_of_teachers_changed_school_last_year | 0.262679 |
| p_attitude_teacher_training_courses | 0.083005 |
| p_age | -0.030693 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.089881 |
| p_number_of_years_in_school | -0.154163 |
| p_number_of_years_as_principal | -0.111545 |
| p_number_of_years_as_principal_in_school | -0.128506 |
| p_number_of_principals_10_years | 0.064288 |
| p_number_of_preschool_students | -0.086756 |
| p_number_of_preschool_groups | -0.002107 |
| p_number_of_primary_students | -0.065957 |
| p_number_of_primary_groups | -0.008929 |
| p_extent_of_agreement | -0.365932 |
| p_extent_of_factors_limiting_effectiveness | 0.448839 |
| p_extent_of_inconveniences | 0.459965 |
| p_extent_of_management | -0.232462 |
| p_extent_of_problems | 1.000000 |
| p_extent_of_satisfaction | -0.295867 |
| p_island | -0.043104 |
| p_number_of_school_tech_resources | 0.012170 |
| p_public_or_private | 0.253034 |

| | |
|---|-----------|
| level_MAT | -0.152743 |
| level_LEN | -0.117485 |
| p_extent_of_satisfaction \ | |
| p_gender | -0.095692 |
| p_number_of_teachers_in_school | -0.041268 |
| p_percentage_of_teachers_changed_school_last_year | -0.113346 |
| p_attitude_teacher_training_courses | 0.173843 |
| p_age | 0.014912 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.064672 |
| p_number_of_years_in_school | 0.020068 |
| p_number_of_years_as_principal | -0.059122 |
| p_number_of_years_as_principal_in_school | -0.085462 |
| p_number_of_principlas_10_years | 0.041289 |
| p_number_of_preschool_students | -0.018821 |
| p_number_of_preschool_groups | -0.032589 |
| p_number_of_primary_students | -0.028711 |
| p_number_of_primary_groups | -0.041391 |
| p_extent_of_agreement | 0.461188 |
| p_extent_of_factors_limiting_effectiveness | -0.342985 |
| p_extent_of_inconveniences | -0.311237 |
| p_extent_of_management | 0.337143 |
| p_extent_of_problems | -0.295867 |
| p_extent_of_satisfaction | 1.000000 |
| p_island | -0.049515 |
| p_number_of_school_tech_resources | -0.009083 |
| p_public_or_private | 0.033937 |
| level_MAT | 0.014379 |
| level_LEN | 0.030505 |
| p_island \ | |
| p_gender | 0.009655 |
| p_number_of_teachers_in_school | 0.107208 |
| p_percentage_of_teachers_changed_school_last_year | 0.135192 |
| p_attitude_teacher_training_courses | -0.087793 |
| p_age | 0.003910 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |

| | |
|--|-----------|
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | -0.099812 |
| p_number_of_years_in_school | -0.041988 |
| p_number_of_years_as_principal | 0.059209 |
| p_number_of_years_as_principal_in_school | 0.081011 |
| p_number_of_principlas_10_years | 0.018335 |
| p_number_of_preschool_students | 0.072474 |
| p_number_of_preschool_groups | 0.085912 |
| p_number_of_primary_students | 0.066444 |
| p_number_of_primary_groups | 0.063813 |
| p_extent_of_agreement | -0.057438 |
| p_extent_of_factors_limiting_effectiveness | 0.055340 |
| p_extent_of_inconveniences | 0.093214 |
| p_extent_of_management | -0.082008 |
| p_extent_of_problems | -0.043104 |
| p_extent_of_satisfaction | -0.049515 |
| p_island | 1.000000 |
| p_number_of_school_tech_resources | 0.027829 |
| p_public_or_private | -0.074768 |
| level_MAT | 0.044030 |
| level_LEN | -0.001744 |

□

```

  ↵p_number_of_school_tech_resources \
p_gender
  ↵111593
0.

p_number_of_teachers_in_school
  ↵556685
0.

p_percentage_of_teachers_changed_school_last_year
  ↵004551
0.

p_attitude_teacher_training_courses
  ↵059893
0.

p_age
  ↵061936
0.

p_group_criteria_random
  ↵NaN
0.

p_group_criteria_subjects
  ↵NaN
0.

p_group_criteria_other
  ↵NaN
0.

p_group_criteria_alphabet
  ↵NaN
0.

```

| | |
|--|-----|
| p_group_criteria_gender | □ |
| ↳NaN | |
| p_group_criteria_language | □ |
| ↳NaN | |
| p_group_criteria_performance | □ |
| ↳NaN | |
| p_group_criteria_homogeneity | □ |
| ↳NaN | |
| p_group_criteria_heterogeneity | □ |
| ↳NaN | |
| p_number_of_years_of_teaching | 0. |
| ↳032275 | |
| p_number_of_years_in_school | 0. |
| ↳113806 | |
| p_number_of_years_as_principal | 0. |
| ↳093311 | |
| p_number_of_years_as_principal_in_school | 0. |
| ↳084736 | |
| p_number_of_principals_10_years | -0. |
| ↳095084 | |
| p_number_of_preschool_students | 0. |
| ↳535117 | |
| p_number_of_preschool_groups | 0. |
| ↳477388 | |
| p_number_of_primary_students | 0. |
| ↳550508 | |
| p_number_of_primary_groups | 0. |
| ↳512754 | |
| p_extent_of_agreement | -0. |
| ↳029804 | |
| p_extent_of_factors_limiting_effectiveness | -0. |
| ↳020285 | |
| p_extent_of_inconveniences | -0. |
| ↳097926 | |
| p_extent_of_management | -0. |
| ↳074406 | |
| p_extent_of_problems | 0. |
| ↳012170 | |
| p_extent_of_satisfaction | -0. |
| ↳009083 | |
| p_island | 0. |
| ↳027829 | |
| p_number_of_school_tech_resources | 1. |
| ↳000000 | |
| p_public_or_private | 0. |
| ↳025741 | |

| | |
|---|---------------------|
| level_MAT | -0. |
| ↳028566 | |
| level_LEN | 0. |
| ↳005489 | |
| p_public_or_private \ | |
| p_gender | -0.099218 |
| p_number_of_teachers_in_school | -0.547485 |
| p_percentage_of_teachers_changed_school_last_year | 0.434857 |
| p_attitude_teacher_training_courses | 0.444140 |
| p_age | 0.072827 |
| p_group_criteria_random | NaN |
| p_group_criteria_subjects | NaN |
| p_group_criteria_other | NaN |
| p_group_criteria_alphabet | NaN |
| p_group_criteria_gender | NaN |
| p_group_criteria_language | NaN |
| p_group_criteria_performance | NaN |
| p_group_criteria_homogeneity | NaN |
| p_group_criteria_heterogeneity | NaN |
| p_number_of_years_of_teaching | 0.098537 |
| p_number_of_years_in_school | -0.199116 |
| p_number_of_years_as_principal | -0.209854 |
| p_number_of_years_as_principal_in_school | -0.223973 |
| p_number_of_principals_10_years | 0.028208 |
| p_number_of_preschool_students | -0.433325 |
| p_number_of_preschool_groups | -0.319348 |
| p_number_of_primary_students | -0.391661 |
| p_number_of_primary_groups | -0.228892 |
| p_extent_of_agreement | -0.198010 |
| p_extent_of_factors_limiting_effectiveness | 0.215288 |
| p_extent_of_inconveniences | 0.454093 |
| p_extent_of_management | -0.079065 |
| p_extent_of_problems | 0.253034 |
| p_extent_of_satisfaction | 0.033937 |
| p_island | -0.074768 |
| p_number_of_school_tech_resources | 0.025741 |
| p_public_or_private | 1.000000 |
| level_MAT | -0.182115 |
| level_LEN | -0.141777 |
| | level_MAT level_LEN |
| p_gender | 0.053646 0.044194 |
| p_number_of_teachers_in_school | 0.102478 0.085440 |
| p_percentage_of_teachers_changed_school_last_year | -0.132012 -0.124095 |
| p_attitude_teacher_training_courses | -0.053197 -0.061591 |
| p_age | 0.044703 0.037460 |

| | | | |
|--|-----------|-----------|-----|
| p_group_criteria_random | | NaN | NaN |
| p_group_criteria_subjects | | NaN | NaN |
| p_group_criteria_other | | NaN | NaN |
| p_group_criteria_alphabet | | NaN | NaN |
| p_group_criteria_gender | | NaN | NaN |
| p_group_criteria_language | | NaN | NaN |
| p_group_criteria_performance | | NaN | NaN |
| p_group_criteria_homogeneity | | NaN | NaN |
| p_group_criteria_heterogeneity | | NaN | NaN |
| p_number_of_years_of_teaching | 0.059156 | 0.035318 | |
| p_number_of_years_in_school | 0.089493 | 0.060077 | |
| p_number_of_years_as_principal | 0.118076 | 0.085325 | |
| p_number_of_years_as_principal_in_school | 0.120255 | 0.089276 | |
| p_number_of_principlas_10_years | -0.063751 | -0.033567 | |
| p_number_of_preschool_students | 0.106308 | 0.085683 | |
| p_number_of_preschool_groups | 0.084685 | 0.059827 | |
| p_number_of_primary_students | 0.097782 | 0.083027 | |
| p_number_of_primary_groups | 0.074565 | 0.048145 | |
| p_extent_of_agreement | 0.089626 | 0.096205 | |
| p_extent_of_factors_limiting_effectiveness | -0.080427 | -0.062271 | |
| p_extent_of_inconveniences | -0.142821 | -0.121366 | |
| p_extent_of_management | 0.038399 | 0.074959 | |
| p_extent_of_problems | -0.152743 | -0.117485 | |
| p_extent_of_satisfaction | 0.014379 | 0.030505 | |
| p_island | 0.044030 | -0.001744 | |
| p_number_of_school_tech_resources | -0.028566 | 0.005489 | |
| p_public_or_private | -0.182115 | -0.141777 | |
| level_MAT | 1.000000 | 0.562532 | |
| level_LEN | 0.562532 | 1.000000 | |

[34 rows x 34 columns]

```
[86]:          p_gender  p_number_of_teachers_in_school  \
id_questionnaire
1                  MALE           19.0
2                 FEMALE          26.0
3                 FEMALE          42.0
4                  MALE           15.0
5                  MALE           22.0
...
...                   ...
20426                FEMALE          24.0
20427                FEMALE          15.0
20428                  MALE           27.0
20429                FEMALE          23.0
20430                  MALE           15.0

p_percentage_of_teachers_changed_school_last_year \
```

```

id_questionnaire
1                               3.0
2                               2.0
3                               2.0
4                               1.0
5                               1.0
...
20426                            ...
20427                            ...
20428                            ...
20429                            ...
20430                            ...

      p_attitude_teacher_training_courses  p_age  \
id_questionnaire
1                               3.0  50.0
2                               3.0  58.0
3                               2.0  45.0
4                               3.0  46.0
5                               2.0  56.0
...
20426                            ...
20427                            ...
20428                            ...
20429                            ...
20430                            ...

      p_group_criteria_random  p_group_criteria_subjects  \
id_questionnaire
1                               False  False
2                               False  False
3                               False  False
4                               False  False
5                               False  False
...
20426                            ...
20427                            ...
20428                            ...
20429                            ...
20430                            ...

      p_group_criteria_other  p_group_criteria_alphabet  \
id_questionnaire
1                               False  False
2                               False  False
3                               False  False
4                               False  False

```

| | | |
|------------------|---|----------|
| 5 | False | False |
| ... | ... | ... |
| 20426 | False | False |
| 20427 | False | False |
| 20428 | False | False |
| 20429 | False | False |
| 20430 | False | False |
| | p_group_criteria_gender ... \ | |
| id_questionnaire | ... | |
| 1 | False ... | |
| 2 | False ... | |
| 3 | False ... | |
| 4 | False ... | |
| 5 | False ... | |
| ... | | |
| 20426 | False ... | |
| 20427 | False ... | |
| 20428 | False ... | |
| 20429 | False ... | |
| 20430 | False ... | |
| | p_extent_of_factors_limiting_effectiveness \ | |
| id_questionnaire | | |
| 1 | 0.666667 | |
| 2 | 0.375000 | |
| 3 | 0.500000 | |
| 4 | 0.625000 | |
| 5 | 0.458333 | |
| ... | ... | |
| 20426 | 0.583333 | |
| 20427 | 0.333333 | |
| 20428 | 0.458333 | |
| 20429 | 0.083333 | |
| 20430 | 0.583333 | |
| | p_extent_of_inconveniences p_extent_of_management \ | |
| id_questionnaire | | |
| 1 | 0.750000 | 0.666667 |
| 2 | 0.305556 | 0.857143 |
| 3 | 0.606061 | 0.666667 |
| 4 | 0.666667 | 0.809524 |
| 5 | 0.333333 | 0.714286 |
| ... | ... | ... |
| 20426 | 0.555556 | 0.952381 |
| 20427 | 0.416667 | 0.761905 |
| 20428 | 0.388889 | 0.809524 |

| | | | |
|------------------|-----------------------|-----------------------------------|-----------|
| 20429 | | 0.000000 | 1.000000 |
| 20430 | | 0.777778 | 0.666667 |
| | p_extent_of_problems | p_extent_of_satisfaction | \ |
| id_questionnaire | | | |
| 1 | 0.314815 | 0.611111 | |
| 2 | 0.074074 | 0.888889 | |
| 3 | 0.314815 | 0.666667 | |
| 4 | 0.129630 | 0.555556 | |
| 5 | 0.055556 | 0.722222 | |
| ... | ... | ... | |
| 20426 | 0.129630 | 0.666667 | |
| 20427 | 0.055556 | 0.777778 | |
| 20428 | 0.156863 | 0.888889 | |
| 20429 | 0.025641 | 1.000000 | |
| 20430 | 0.129630 | 0.555556 | |
| | p_island | p_number_of_school_tech_resources | \ |
| id_questionnaire | | | |
| 1 | TENERIFE_CAPITAL | 196.0 | |
| 2 | GRAN_CANARIA_CAPITAL | 157.0 | |
| 3 | GRAN_CANARIA_CAPITAL | 62.0 | |
| 4 | TENERIFE_CAPITAL | 131.0 | |
| 5 | TENERIFE_CAPITAL | 118.0 | |
| ... | ... | ... | |
| 20426 | GRAN_CANARIA_PROVINCE | 264.0 | |
| 20427 | TENERIFE_CAPITAL | 178.0 | |
| 20428 | GRAN_CANARIA_CAPITAL | 311.0 | |
| 20429 | TENERIFE_CAPITAL | 30.0 | |
| 20430 | TENERIFE_CAPITAL | 54.0 | |
| | p_public_or_private | level_MAT | level_LEN |
| id_questionnaire | | | |
| 1 | PUBLIC | 3.0 | 3.0 |
| 2 | PUBLIC | 1.0 | 1.0 |
| 3 | PRIVATE | 1.0 | 3.0 |
| 4 | PUBLIC | 2.0 | 2.0 |
| 5 | PRIVATE | 4.0 | 3.0 |
| ... | ... | ... | ... |
| 20426 | PUBLIC | 1.0 | 1.0 |
| 20427 | PUBLIC | 2.0 | 3.0 |
| 20428 | PUBLIC | 2.0 | 2.0 |
| 20429 | PRIVATE | 3.0 | 3.0 |
| 20430 | PUBLIC | 2.0 | 3.0 |

[17806 rows x 34 columns]

6 Feature Importance

```
[87]: target_feature = "level_MAT"
```

6.1 Utils

```
[88]: get_features = lambda curr_df: [col for col in curr_df.columns if not col.  
    ↪startswith("level_")]
```

6.2 Core

```
[89]: get_features = lambda curr_df: [col for col in curr_df.columns if not col.  
    ↪startswith("level_")]  
concatenated_df = pd.concat(  
    [  
        df_sel_gen[["id_class_group", "id_school", target_feature]],  
        df_sel_students[get_features(df_sel_students)],  
        df_sel_families[get_features(df_sel_families)],  
        df_sel_teachers[get_features(df_sel_teachers)],  
        df_sel_principals[get_features(df_sel_principals)]  
    ],  
    axis=1  
)  
X, y = concatenated_df[get_features(concatenated_df)],  
    ↪concatenated_df[target_feature]  
X
```

```
[89]:      id_class_group  id_school s_gender  s_birth_year  \  
id_questionnaire  
1                  A      2415.0   FEMALE      2007.0  
2                  A      1842.0   MALE       2007.0  
3                 NaN      1432.0   FEMALE      2007.0  
4                  A      2280.0   MALE       2007.0  
5                  A      2040.0   FEMALE      2007.0  
...                ...     ...     ...     ...  
20426                 NaN      1863.0   FEMALE      2001.0  
20427                 A      2203.0   FEMALE      2007.0  
20428                 B      1368.0   MALE       2001.0  
20429                 A      2373.0   MALE       2007.0  
20430                 NaN      1907.0   FEMALE      2007.0  
  
      s_is_living_with_mother  s_has_repeated  s_frequency_of_skips  \  
id_questionnaire  
1                  True      False      1.000000  
2                  True      True      1.000000  
3                  True      False      1.000000  
4                  True      False      1.000000
```

| | | | |
|--|----------|----------|----------|
| 5 | True | False | 1.000000 |
| ... | ... | ... | ... |
| 20426 | True | NaN | 0.000000 |
| 20427 | True | False | 1.000000 |
| 20428 | True | NaN | 0.333333 |
| 20429 | True | False | 1.000000 |
| 20430 | True | False | 1.000000 |
| s_homeworks_day_per_week s_extent_of_teachers_affinity \ | | | |
| id_questionnaire | | | |
| 1 | 0.0 | | 1.0 |
| 2 | 3.0 | | 1.0 |
| 3 | 2.0 | | NaN |
| 4 | 3.0 | | 1.0 |
| 5 | 1.0 | | 1.0 |
| ... | ... | ... | ... |
| 20426 | 2.0 | | NaN |
| 20427 | 3.0 | | 1.0 |
| 20428 | 4.0 | | NaN |
| 20429 | 3.0 | | 1.0 |
| 20430 | 2.0 | | 1.0 |
| s_frequency_of_computer_usage ... \ | | | |
| id_questionnaire | | | |
| 1 | 0.111111 | ... | |
| 2 | 0.333333 | ... | |
| 3 | 0.666667 | ... | |
| 4 | 0.333333 | ... | |
| 5 | 0.000000 | ... | |
| ... | ... | ... | |
| 20426 | NaN | ... | |
| 20427 | 0.000000 | ... | |
| 20428 | 0.222222 | ... | |
| 20429 | 0.000000 | ... | |
| 20430 | 0.111111 | ... | |
| p_number_of_primary_groups p_extent_of_agreement \ | | | |
| id_questionnaire | | | |
| 1 | 10.0 | 0.611111 | |
| 2 | 12.0 | 0.666667 | |
| 3 | 12.0 | 0.666667 | |
| 4 | 6.0 | 0.444444 | |
| 5 | 6.0 | 0.722222 | |
| ... | ... | ... | |
| 20426 | 10.0 | 0.444444 | |
| 20427 | 6.0 | 0.611111 | |
| 20428 | 12.0 | 0.722222 | |

| | | |
|---|----------|----------|
| 20429 | 6.0 | 0.888889 |
| 20430 | 6.0 | 0.666667 |
| p_extent_of_factors_limiting_effectiveness \ | | |
| id_questionnaire | | |
| 1 | 0.666667 | |
| 2 | 0.375000 | |
| 3 | 0.500000 | |
| 4 | 0.625000 | |
| 5 | 0.458333 | |
| ... | ... | |
| 20426 | 0.583333 | |
| 20427 | 0.333333 | |
| 20428 | 0.458333 | |
| 20429 | 0.083333 | |
| 20430 | 0.583333 | |
| p_extent_of_inconveniences p_extent_of_management \ | | |
| id_questionnaire | | |
| 1 | 0.750000 | 0.666667 |
| 2 | 0.305556 | 0.857143 |
| 3 | 0.606061 | 0.666667 |
| 4 | 0.666667 | 0.809524 |
| 5 | 0.333333 | 0.714286 |
| ... | ... | ... |
| 20426 | 0.555556 | 0.952381 |
| 20427 | 0.416667 | 0.761905 |
| 20428 | 0.388889 | 0.809524 |
| 20429 | 0.000000 | 1.000000 |
| 20430 | 0.777778 | 0.666667 |
| p_extent_of_problems p_extent_of_satisfaction \ | | |
| id_questionnaire | | |
| 1 | 0.314815 | 0.611111 |
| 2 | 0.074074 | 0.888889 |
| 3 | 0.314815 | 0.666667 |
| 4 | 0.129630 | 0.555556 |
| 5 | 0.055556 | 0.722222 |
| ... | ... | ... |
| 20426 | 0.129630 | 0.666667 |
| 20427 | 0.055556 | 0.777778 |
| 20428 | 0.156863 | 0.888889 |
| 20429 | 0.025641 | 1.000000 |
| 20430 | 0.129630 | 0.555556 |
| p_island p_number_of_school_tech_resources \ | | |
| id_questionnaire | | |

```

1             TENERIFE_CAPITAL           196.0
2             GRAN_CANARIA_CAPITAL      157.0
3             GRAN_CANARIA_CAPITAL      62.0
4             TENERIFE_CAPITAL        131.0
5             TENERIFE_CAPITAL        118.0
...
...          ...
20426        GRAN_CANARIA_PROVINCE    264.0
20427        TENERIFE_CAPITAL       178.0
20428        GRAN_CANARIA_CAPITAL    311.0
20429        TENERIFE_CAPITAL       30.0
20430        TENERIFE_CAPITAL       54.0

p_public_or_private
id_questionnaire
1             PUBLIC
2             PUBLIC
3             PRIVATE
4             PUBLIC
5             PRIVATE
...
...          ...
20426        PUBLIC
20427        PUBLIC
20428        PUBLIC
20429        PRIVATE
20430        PUBLIC

```

[17806 rows x 100 columns]

```
[90]: forest = RandomForestClassifier(random_state=0)
forest.fit(discretize_columns(X), y)
```

```
[90]: RandomForestClassifier(random_state=0)
```

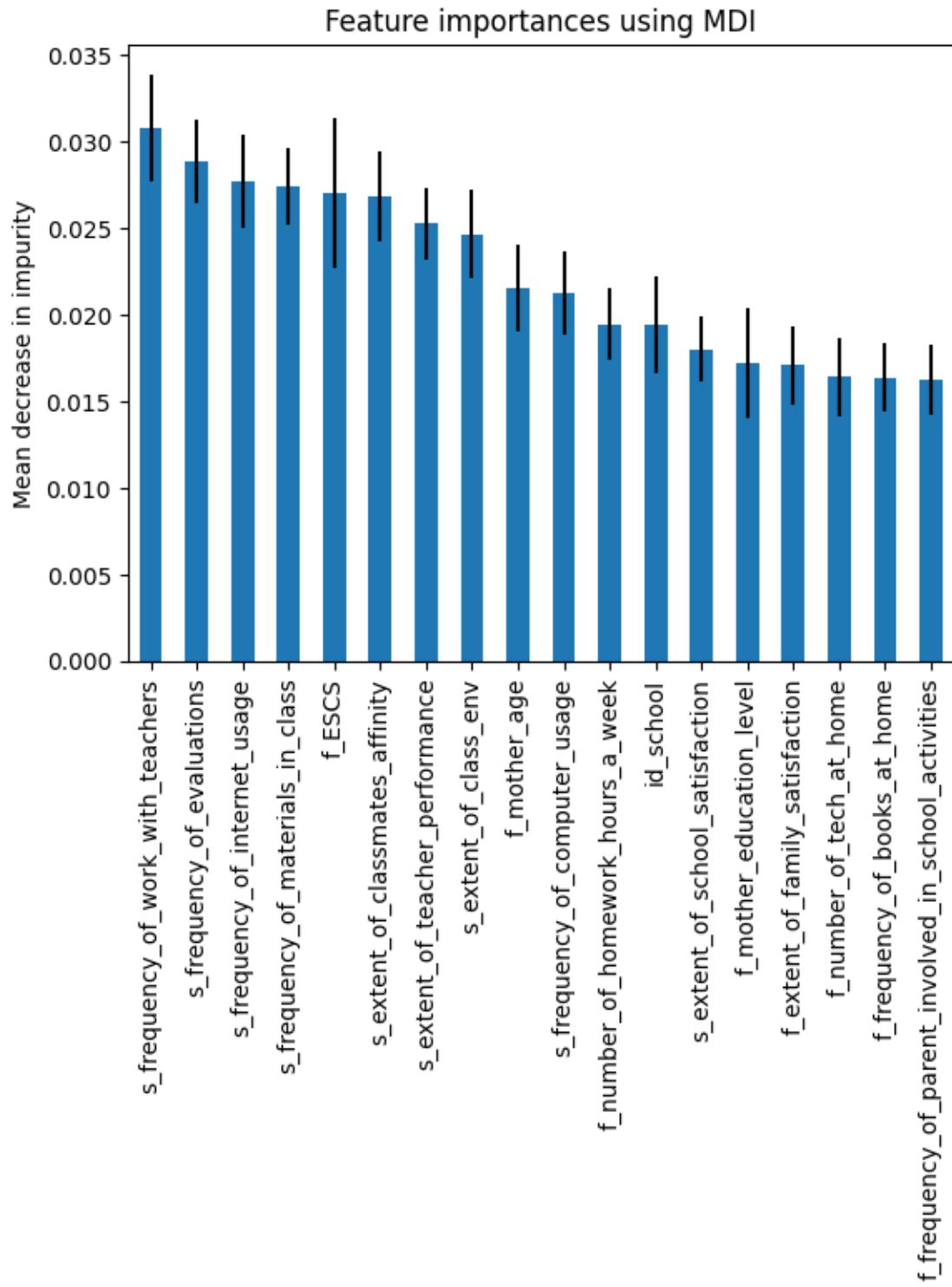
```
[91]: importances = forest.feature_importances_
std = np.std([tree.feature_importances_ for tree in forest.estimators_], axis=0)
```

```
[92]: forest_importances = pd.Series(importances, index=get_features(concatenated_df))
forest_std = pd.Series(std, index=get_features(concatenated_df))
forest_df = pd.concat([forest_importances, forest_std], axis=1)
forest_df.columns = ["importance", "std"]
forest_df = forest_df[forest_df["importance"] > 0.015]
forest_df = forest_df.sort_values("importance", ascending=False)
forest_importances = forest_df["importance"]
std = forest_df["std"].to_numpy()

fig, ax = plt.subplots()
forest_importances.plot.bar(yerr=std, ax=ax)
```

```
ax.set_title("Feature importances using MDI")
ax.set_ylabel("Mean decrease in impurity")
# fig.tight_layout()
```

[92]: Text(0, 0.5, 'Mean decrease in impurity')



```
[93]: final_features = [col for col in list(forest_importances.index) if col != "id_school"] + ["s_gender"]
final_features
```

```
[93]: ['s_frequency_of_work_with_teachers',
's_frequency_of_evaluations',
's_frequency_of_internet_usage',
's_frequency_of_materials_in_class',
'f_ESCS',
's_extent_of_classmates_affinity',
's_extent_of_teacher_performance',
's_extent_of_class_env',
'f_mother_age',
's_frequency_of_computer_usage',
'f_number_of_homework_hours_a_week',
's_extent_of_school_satisfaction',
'f_mother_education_level',
'f_extent_of_family_satisfaction',
'f_number_of_tech_at_home',
'f_frequency_of_books_at_home',
'f_frequency_of_parent_involved_in_school_activities',
's_gender']
```

7 Bias detection

```
[94]: final_df = concatenated_df[final_features + [target_feature]]
final_df
```

```
[94]:          s_frequency_of_work_with_teachers \
id_questionnaire
1                  0.733333
2                  0.533333
3                  0.833333
4                  0.400000
5                  0.566667
...
20426             ...
20427             0.333333
20428             0.666667
20429             0.518519
20429             0.633333
20430             0.629630

          s_frequency_of_evaluations  s_frequency_of_internet_usage \
id_questionnaire
```

| | | |
|----------------------|----------|-----------|
| 1 | 0.740741 | 0.066667 |
| 2 | 0.888889 | 0.600000 |
| 3 | 0.750000 | 0.666667 |
| 4 | 0.541667 | 0.266667 |
| 5 | 0.888889 | 0.133333 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.740741 | 0.133333 |
| 20428 | 0.740741 | 0.933333 |
| 20429 | 0.740741 | 0.533333 |
| 20430 | 0.481481 | 0.400000 |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 2 | 0.714286 | NaN |
| 3 | 1.000000 | 0.261451 |
| 4 | NaN | 0.787122 |
| 5 | 0.666667 | 3.151773 |
| ... | ... | ... |
| 20426 | NaN | -1.627731 |
| 20427 | 0.476190 | 1.372627 |
| 20428 | 0.777778 | NaN |
| 20429 | 0.142857 | NaN |
| 20430 | 0.476190 | NaN |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 2 | 0.714286 | |
| 3 | 0.833333 | |
| 4 | 0.857143 | |
| 5 | 0.952381 | |
| ... | ... | |
| 20426 | 0.333333 | |
| 20427 | 0.857143 | |
| 20428 | 0.666667 | |
| 20429 | 0.714286 | |
| 20430 | 0.619048 | |
| id_questionnaire | | |
| 1 | 0.833333 | 0.791667 |
| 2 | 0.800000 | 0.791667 |
| 3 | 0.800000 | 0.833333 |
| 4 | 0.800000 | 0.750000 |
| 5 | 1.000000 | 1.000000 |

| | | |
|--|----------|----------|
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.900000 | 0.916667 |
| 20428 | 0.566667 | 0.958333 |
| 20429 | 1.000000 | 0.875000 |
| 20430 | 0.733333 | 0.708333 |
| f_mother_age s_frequency_of_computer_usage \ | | |
| id_questionnaire | | |
| 1 | 43.0 | 0.111111 |
| 2 | NaN | 0.333333 |
| 3 | 45.0 | 0.666667 |
| 4 | 39.0 | 0.333333 |
| 5 | 39.0 | 0.000000 |
| ... | ... | ... |
| 20426 | 31.0 | NaN |
| 20427 | 37.0 | 0.000000 |
| 20428 | NaN | 0.222222 |
| 20429 | NaN | 0.000000 |
| 20430 | NaN | 0.111111 |
| f_number_of_homework_hours_a_week \ | | |
| id_questionnaire | | |
| 1 | 14.0 | |
| 2 | NaN | |
| 3 | 9.0 | |
| 4 | 9.0 | |
| 5 | 6.0 | |
| ... | ... | ... |
| 20426 | 4.0 | |
| 20427 | 1.0 | |
| 20428 | NaN | |
| 20429 | NaN | |
| 20430 | NaN | |
| s_extent_of_school_satisfaction f_mother_education_level \ | | |
| id_questionnaire | | |
| 1 | 0.944444 | 7.0 |
| 2 | 1.000000 | NaN |
| 3 | 0.888889 | 3.0 |
| 4 | 0.722222 | 5.0 |
| 5 | 1.000000 | 9.0 |
| ... | ... | ... |
| 20426 | 1.000000 | 3.0 |
| 20427 | 1.000000 | 5.0 |
| 20428 | 0.833333 | NaN |
| 20429 | 1.000000 | NaN |

| | | | |
|------------------|---|--------------------------|-----|
| 20430 | | 0.722222 | NaN |
| | f_extent_of_family_satisfaction | f_number_of_tech_at_home | \ |
| id_questionnaire | | | |
| 1 | 0.700000 | | 3.0 |
| 2 | NaN | | NaN |
| 3 | 0.291667 | | 4.0 |
| 4 | 1.000000 | | 3.0 |
| 5 | 0.833333 | | 7.0 |
| ... | ... | ... | ... |
| 20426 | 0.791667 | | 4.0 |
| 20427 | 0.291667 | | 5.0 |
| 20428 | NaN | | NaN |
| 20429 | NaN | | NaN |
| 20430 | NaN | | NaN |
| | f_frequency_of_books_at_home | \ | |
| id_questionnaire | | | |
| 1 | 1.000000 | | |
| 2 | NaN | | |
| 3 | 0.444444 | | |
| 4 | 0.333333 | | |
| 5 | 0.555556 | | |
| ... | ... | ... | ... |
| 20426 | 0.333333 | | |
| 20427 | 0.444444 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | f_frequency_of_parent_involved_in_school_activities | \ | |
| id_questionnaire | | | |
| 1 | 0.333333 | | |
| 2 | NaN | | |
| 3 | 0.166667 | | |
| 4 | 0.250000 | | |
| 5 | 0.250000 | | |
| ... | ... | ... | ... |
| 20426 | 0.000000 | | |
| 20427 | 0.000000 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | s_gender | level_MAT | |
| id_questionnaire | | | |
| 1 | FEMALE | 3.0 | |

```

2           MALE    1.0
3       FEMALE    1.0
4           MALE    2.0
5       FEMALE    4.0
...
...     ...
20426      FEMALE    1.0
20427      FEMALE    2.0
20428      MALE     2.0
20429      MALE     3.0
20430      FEMALE    2.0

```

[17806 rows x 19 columns]

```

[187]: sensitive_feature = "s_gender"

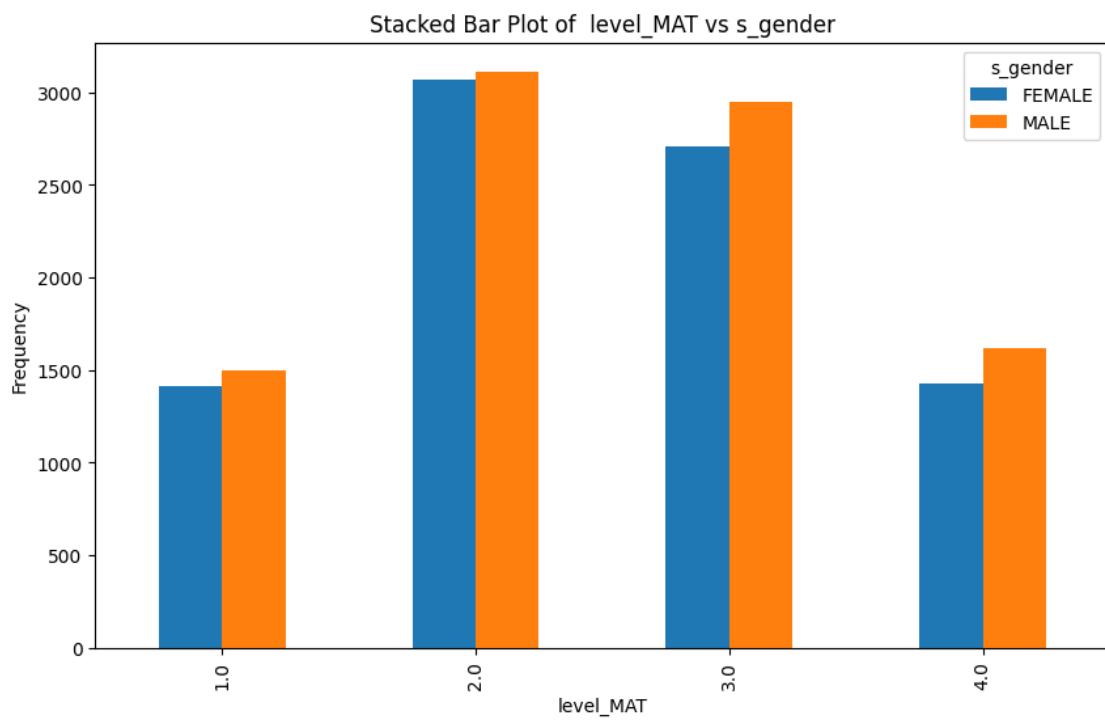
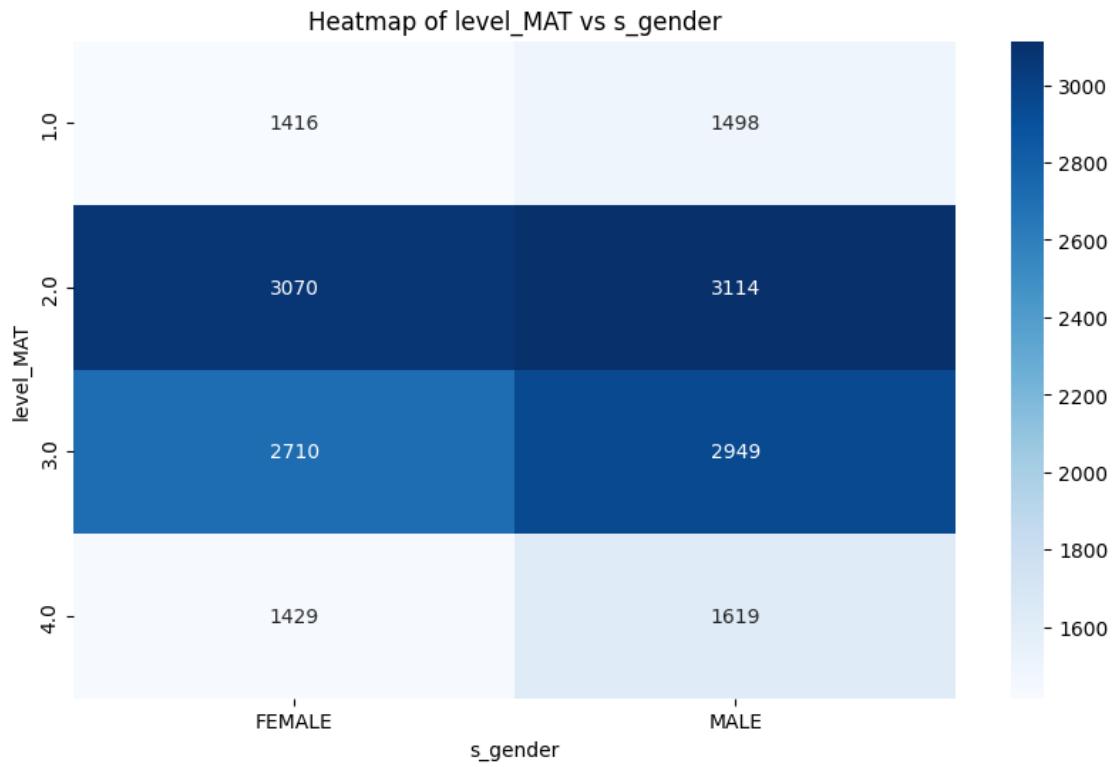
trial_df = final_df[[target_feature, sensitive_feature]]
trial_df = trial_df.dropna()
col_a = trial_df[target_feature]
col_b = trial_df[sensitive_feature]

crosstab = pd.crosstab(col_a, col_b)

# Heatmap of Frequency
plt.figure(figsize=(10, 6))
sns.heatmap(crosstab, annot=True, fmt='d', cmap='Blues')
plt.title(f'Heatmap of {target_feature} vs {sensitive_feature}')
plt.xlabel(sensitive_feature)
plt.ylabel(target_feature)
plt.show()

# Clustered Bar Plot
crosstab.plot(kind='bar', stacked=False, figsize=(10, 6))
plt.title(f'Stacked Bar Plot of {target_feature} vs {sensitive_feature}')
plt.xlabel(target_feature)
plt.ylabel('Frequency')
plt.legend(title=sensitive_feature)
plt.show()

```



```
[101]: sensitive_feature = "f_ESCS"
favorable_sensitive_label = "ADVANTAGED"
unfavorable_sensitive_label = "DISADVANTAGED"
favorable_class_label = "PASSED"
unfavorable_class_label = "NOT PASSED"

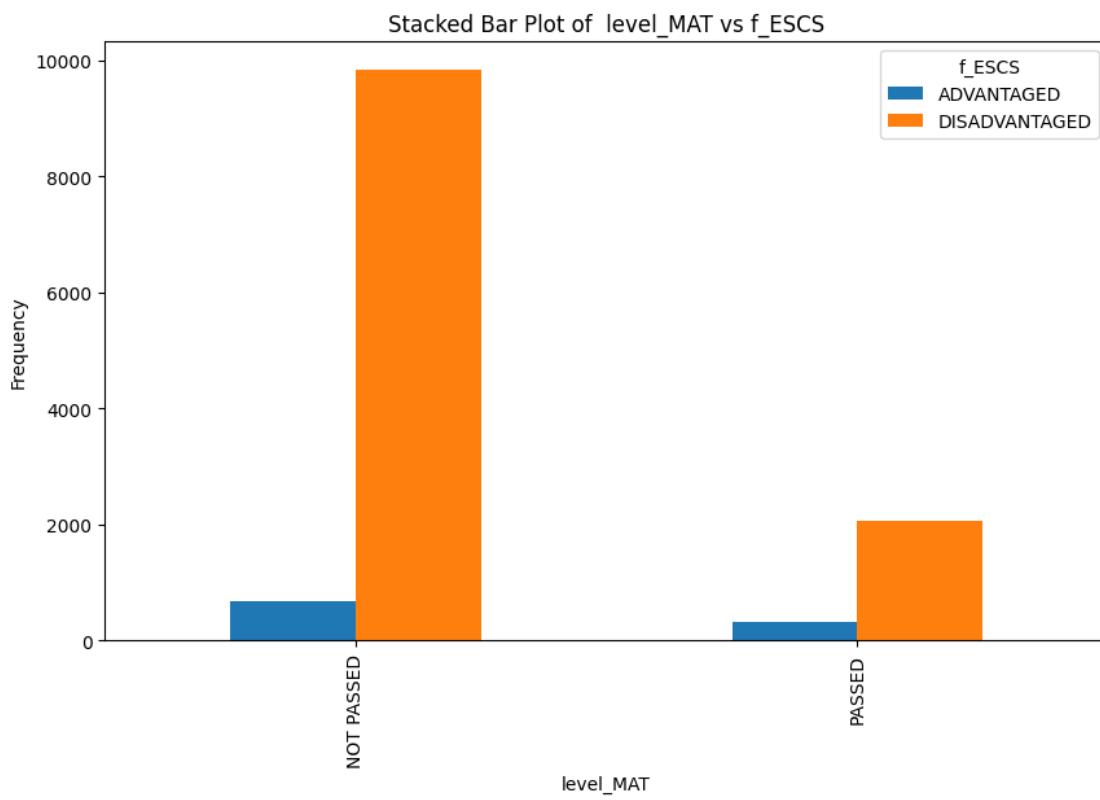
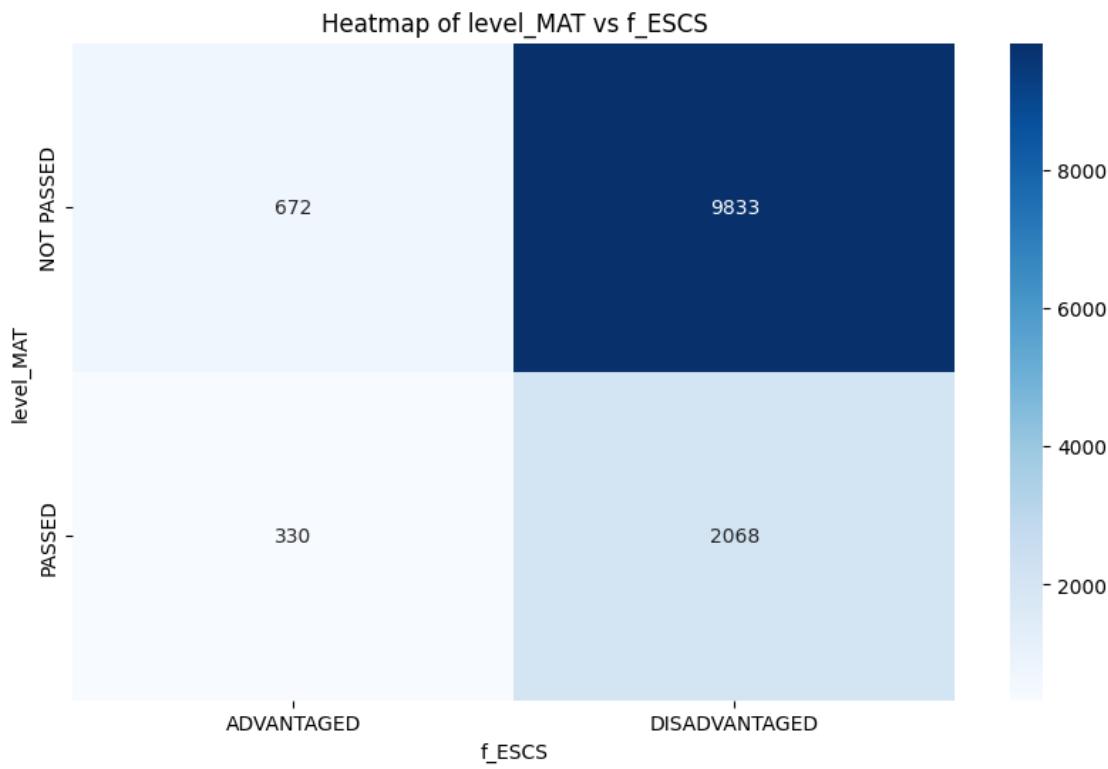
trial_df = final_df[[target_feature, sensitive_feature]]
trial_df = trial_df.dropna()
trial_df[sensitive_feature] = trial_df[sensitive_feature].apply(lambda elem:
    ↪ favorable_sensitive_label if elem > 1.5 else unfavorable_sensitive_label)
trial_df[target_feature] = trial_df[target_feature].apply(lambda elem:
    ↪ favorable_class_label if elem >= 3.5 else unfavorable_class_label)

col_a = trial_df[target_feature]
col_b = trial_df[sensitive_feature]

crosstab = pd.crosstab(col_a, col_b)

# Heatmap of Frequency
plt.figure(figsize=(10, 6))
sns.heatmap(crosstab, annot=True, fmt='d', cmap='Blues')
plt.title(f'Heatmap of {target_feature} vs {sensitive_feature}')
plt.xlabel(sensitive_feature)
plt.ylabel(target_feature)
plt.show()

# Clustered Bar Plot
crosstab.plot(kind='bar', stacked=False, figsize=(10, 6))
plt.title(f'Stacked Bar Plot of {target_feature} vs {sensitive_feature}')
plt.xlabel(target_feature)
plt.ylabel('Frequency')
plt.legend(title=sensitive_feature)
plt.show()
```



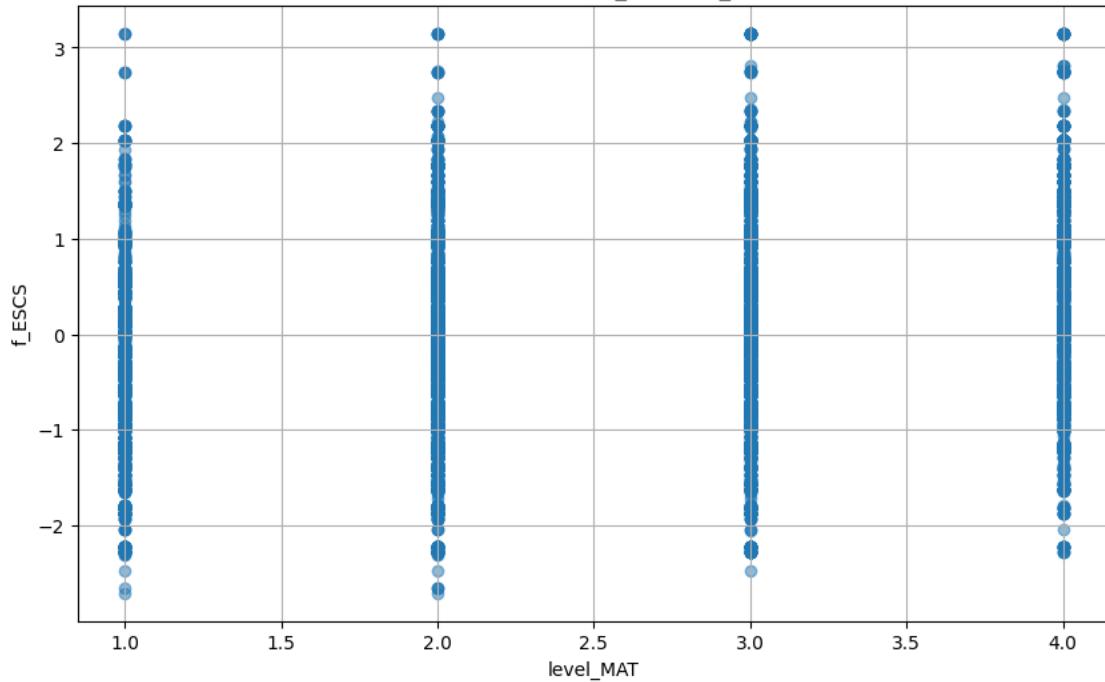
```
[97]: sensitive_feature = "f_ESCS"

trial_df = final_df[[target_feature, sensitive_feature]]
trial_df = trial_df.dropna()
col_a = trial_df[target_feature]
col_b = trial_df[sensitive_feature]

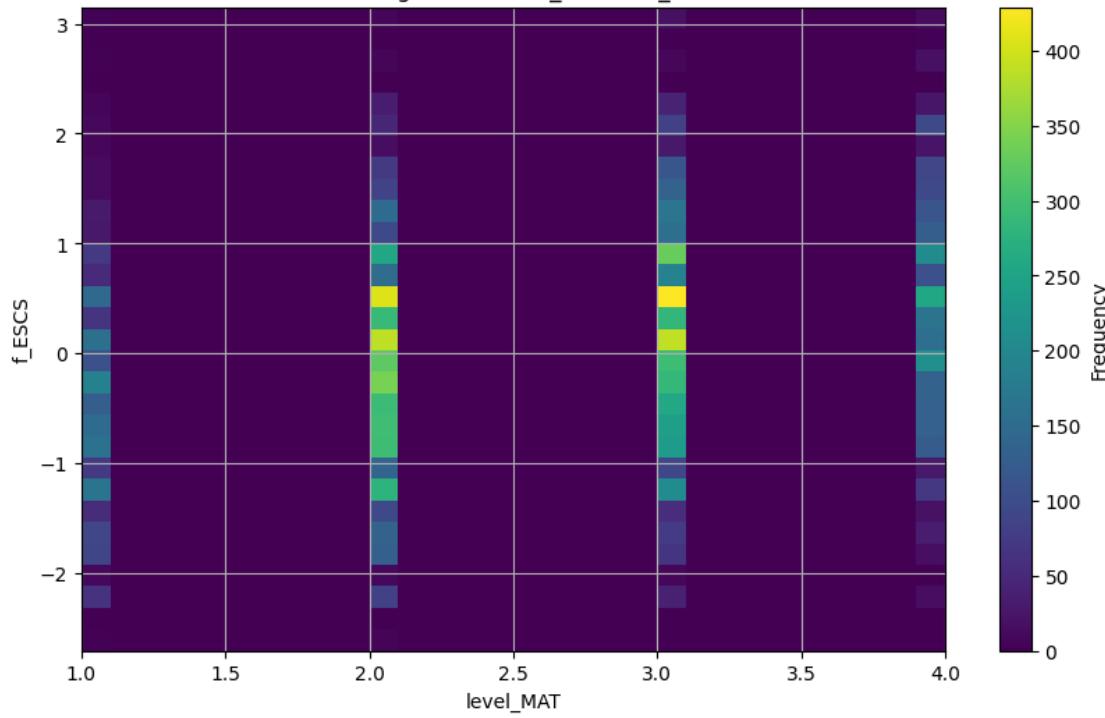
# Scatter Plot
plt.figure(figsize=(10, 6))
plt.scatter(col_a, col_b, alpha=0.5)
plt.title(f"Scatter Plot of {target_feature} vs {sensitive_feature}")
plt.xlabel(target_feature)
plt.ylabel(sensitive_feature)
plt.grid()
plt.show()

# 2D Histogram (Heatmap)
plt.figure(figsize=(10, 6))
plt.hist2d(col_a, col_b, bins=(30, 30), cmap=plt.cm.viridis)
plt.colorbar(label='Frequency')
plt.title(f"2D Histogram of {target_feature} vs {sensitive_feature}")
plt.xlabel(target_feature)
plt.ylabel(sensitive_feature)
plt.grid()
plt.show()
```

Scatter Plot of level_MAT vs f_ESCS



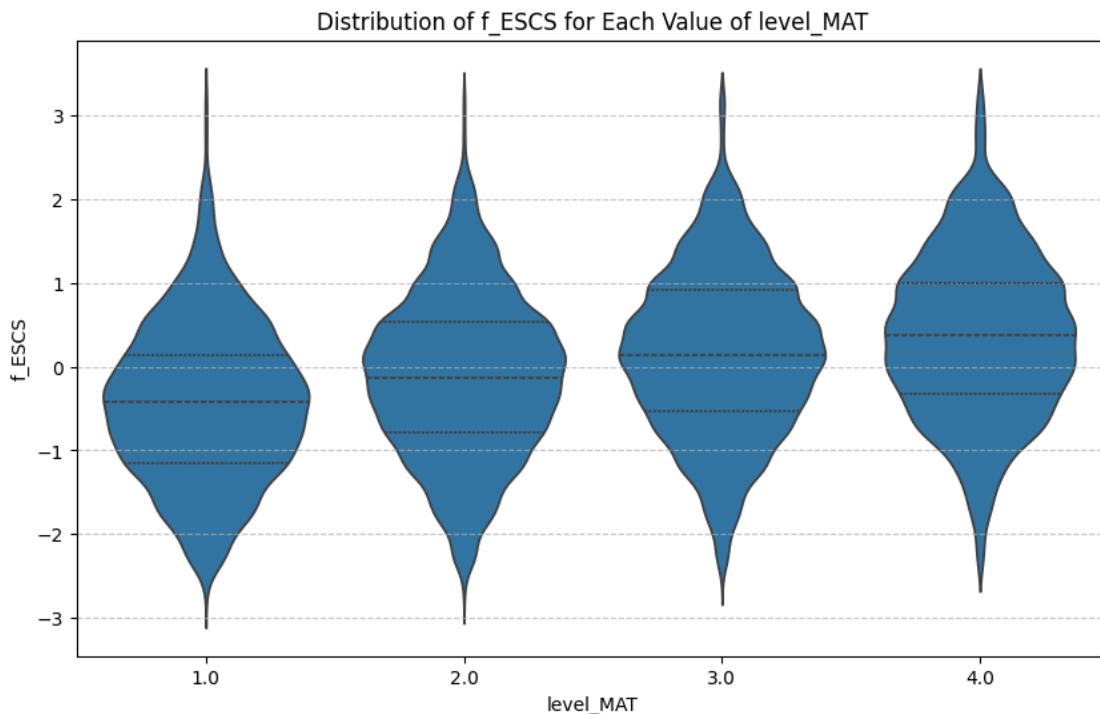
2D Histogram of level_MAT vs f_ESCS

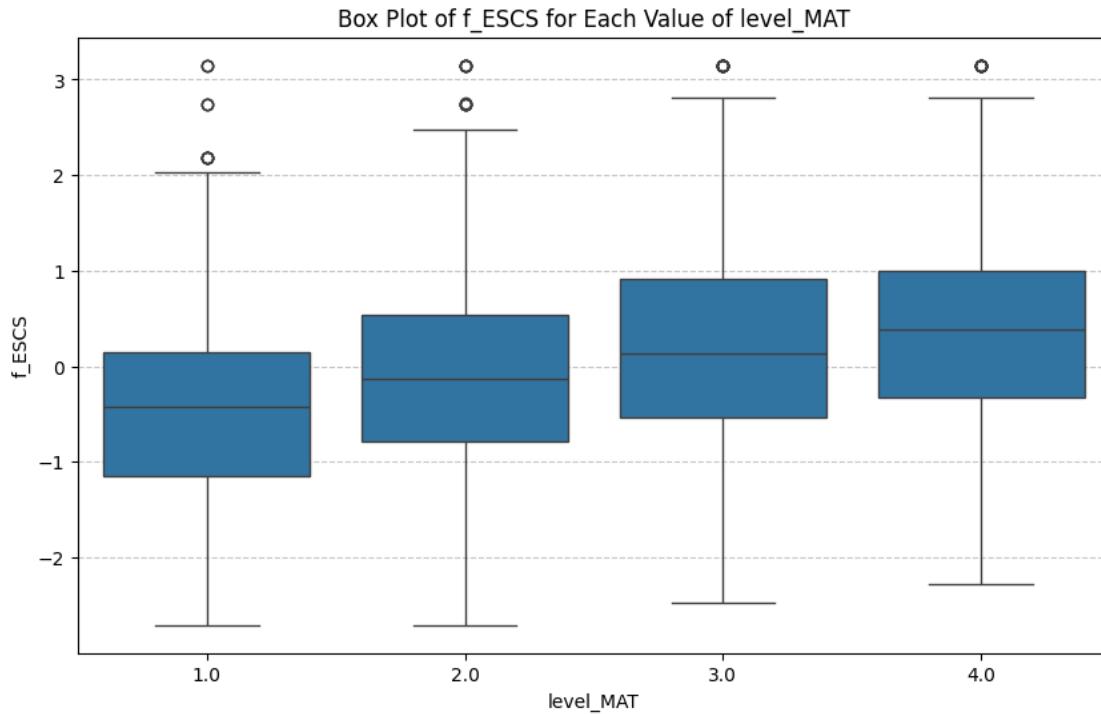


```
[189]: sensitive_feature = "f_ESCS"

plt.figure(figsize=(10, 6))
sns.violinplot(x=target_feature, y=sensitive_feature, data=trial_df, inner="quartile")
plt.title(f'Distribution of {sensitive_feature} for Each Value of {target_feature}')
plt.xlabel(target_feature)
plt.ylabel(sensitive_feature)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()

# Box Plot
plt.figure(figsize=(10, 6))
sns.boxplot(x=target_feature, y=sensitive_feature, data=trial_df)
plt.title(f'Box Plot of {sensitive_feature} for Each Value of {target_feature}')
plt.xlabel(target_feature)
plt.ylabel(sensitive_feature)
plt.grid(axis='y', linestyle='--', alpha=0.7)
plt.show()
```





8 Processing

```
[283]: sensitive_feature = "s_gender"
favorable_sensitive_label = "MALE"
unfavorable_sensitive_label = "FEMALE"

class_feature = target_feature
favorable_class_label = "PASSED"
unfavorable_class_label = "NOT PASSED"

metric = "balanced_accuracy"
fair_metric = "demographic_parity_ratio"
```

8.1 Utils

```
[340]: def encode_feature(df, feature, favorable_label):

    df_encoded = df.copy()

    # Encode class
    if feature in df_encoded.columns:
        df_encoded[feature] = df_encoded[
            feature
```

```
    ].apply(lambda x: 1 if x == favorable_label else 0)
return df_encoded
```

```
[339]: def decode_feature(df, feature, favorable_label, unfavorable_label):
    df_decoded = df.copy()

    # Encode class
    if feature in df_decoded.columns:
        df_decoded[feature] = df_decoded[
            feature
        ].apply(lambda x: favorable_label if x == 1 else unfavorable_label)
    return df_decoded
```

8.1.1 Estimator

```
[341]: from sklearn.base import BaseEstimator, ClassifierMixin
from sklearn.preprocessing import OneHotEncoder, OrdinalEncoder
from aif360.datasets import BinaryLabelDataset
from aif360.metrics import BinaryLabelDatasetMetric
import pandas as pd

class AIF360SklearnWrapper(BaseEstimator, ClassifierMixin):
    def __init__(
        self,
        aif360_model,
        sensitive_feature,
        favorable_class_label,
        unfavorable_class_label,
        favorable_sens_group,
    ):
        self.aif360_model = aif360_model

        self.sensitive_feature = sensitive_feature
        self.favorable_sens_group = favorable_sens_group

        self.class_feature = "label"
        self.favorable_class_label = favorable_class_label
        self.unfavorable_class_label = unfavorable_class_label

        self.ordinal_encoder = None

    def _encode_features(self, df, fit):
        df_encoded = df.copy()

        # Encode class
```

```

    if self.class_feature in df_encoded.columns:
        df_encoded[self.class_feature] = df_encoded[
            self.class_feature
        ].apply(lambda x: 1 if x == self.favorable_class_label else 0)
    else:
        df_encoded[self.class_feature] = 0 # or any constant value

    # Encode sensitive feature
    if self.sensitive_feature in df_encoded.
    ↪select_dtypes(include=['object', 'category']).columns:
        df_encoded[self.sensitive_feature] = df_encoded[
            self.sensitive_feature
        ].apply(lambda x: 1 if x == self.favorable_sens_group else 0)

    # # Encode other columns
    # categorical_cols = df_encoded.select_dtypes(include=['object', ↪
    ↪'category']).columns
    # numeric_cols = df_encoded.select_dtypes(exclude=['object', ↪
    ↪'category']).columns

    # if fit:
    #     self.ordinal_encoder = OrdinalEncoder()
    #     self.ordinal_encoder.fit(df_encoded[categorical_cols])

    # if len(categorical_cols) > 0:
    #     df_encoded[categorical_cols] = self.ordinal_encoder.
    ↪transform(df_encoded[categorical_cols])
    # if len(numeric_cols) > 0:
    #     df_encoded[numeric_cols] = df_encoded[numeric_cols]

    # # Check missing values
    # print(df_encoded.isna().sum())
    # df_encoded = df_encoded.set_index(self.sensitive_feature)
    # print(df_encoded.isna().sum())

    return df_encoded

def fit(self, X, y, **kwargs):
    if not self.sensitive_feature:
        raise ValueError("Protected attribute name must be specified.")

    df_encoded = self._encode_features(df=X.assign(label=y), fit=True)
    # print(df_encoded)
    dataset = BinaryLabelDataset(
        df=df_encoded,
        label_names=[self.class_feature],

```

```

        # sensitive_features=[self.sensitive_feature],
        protected_attribute_names=[self.sensitive_feature],
        favorable_label=1,
        unfavorable_label=0
    )
    self.aif360_model = self.aif360_model.fit(dataset, **kwargs)
    return self

def predict(self, X, decode=False):
    X_encoded = self._encode_features(df=X, fit=False)
    dataset = BinaryLabelDataset(
        df=X_encoded,
        label_names=[self.class_feature],
        # sensitive_features=[self.sensitive_feature],
        protected_attribute_names=[self.sensitive_feature],
        favorable_label=1,
        unfavorable_label=0
    )
    predictions = self.aif360_model.predict(dataset).
    ↪convert_to_dataframe()[0][self.class_feature]
    predictions = predictions.apply(lambda x: self.favorable_class_label if
    ↪x == 1 else self.unfavorable_class_label) if decode else predictions
    return predictions

def predict_proba(self, X):
    if hasattr(self.aif360_model, "predict_proba"):
        X_encoded = self._encode_features(df=X, fit=False)
        dataset = BinaryLabelDataset(
            df=X_encoded,
            label_names=[self.class_feature],
            # sensitive_features=[self.sensitive_feature],
            protected_attribute_names=[self.sensitive_feature],
            favorable_label=1,
            unfavorable_label=0
        )
        probabilities = self.aif360_model.predict_proba(dataset)
        return probabilities
    else:
        raise NotImplementedError("The wrapped model does not support
    ↪probability prediction.")

def score(self, X, y):
    y_pred = self.predict(X)
    return (y_pred == y).mean()

```

8.1.2 Transformers

```
[ ]: import pandas as pd

from sklearn.base import BaseEstimator, TransformerMixin
from sklearn.preprocessing import OrdinalEncoder

from aif360.sklearn.preprocessing import LearnedFairRepresentations


class LFR_wrapper(BaseEstimator, TransformerMixin):
    """
    Wrapper class for LearnedFairRepresentations that allows it to be used with
    numpy arrays.
    """

    feature_names = []
    enc = None

    def __init__(self, prot_attr, feature_names, **kwargs):
        """
        Initialize the LFR_wrapper.

        Args:
            X: The numpy array of input data.
            y: The numpy array of target labels.
            feature_names: The list of feature names.
            **kwargs: Additional keyword arguments to pass to the
        ↪LearnedFairRepresentations constructor.
        """

        self.prot_attr = prot_attr
        self.feature_names = feature_names
        self.lfr = LearnedFairRepresentations(
            prot_attr=prot_attr if len(prot_attr) == 1 else "mixin", **kwargs
        )

    def _prepare_dataset(self, X, y=None):
        df = pd.DataFrame(X, columns=self.feature_names)

        if len(self.prot_attr) == 0:
            raise Exception("No sensitive features to mitigate")

        if len(self.prot_attr) > 1:
            df["mixin"] = df[self.prot_attr[0]].astype(str) + df[
                self.prot_attr[1]
            ].astype(str)
            df = df.drop(columns=self.prot_attr)
```

```

        self.enc = OrdinalEncoder()
        df[["mixin"]] = self.enc.fit_transform(df[["mixin"]].to_numpy() .
reshape(-1, 1))
        df = df.set_index("mixin")
    else:
        df = df.set_index(self.prot_attr)

    if y is not None:
        df[("target")] = y
        df_X, df_y = df.drop(columns=[("target")]), df[("target")]
    else:
        df_X, df_y = df, None

    return df_X, df_y

def fit(self, X, y):
    df_X, df_y = self._prepare_dataset(X, y)
    self.lfr.fit(df_X, df_y)
    return self

def transform(self, X):
    df_X, _ = self._prepare_dataset(X, None)
    transformed_df = self.lfr.transform(df_X)
    return transformed_df.values

def fit_transform(self, X, y=None):
    df_X, df_y = self._prepare_dataset(X, y)
    transformed_df = self.lfr.fit_transform(df_X, df_y)
    return transformed_df.values

```

8.1.3 Metrics

Platform

```

[ ]: detection_results = {
    "disparate_impact": [],
    "statistical_parity_difference": []
}

for sens_col, priv_group in sensitive_groups:
    # print(f"{sens_col}: {priv_group}")

    current_df = copy.deepcopy(df)
    current_df[sens_col] = current_df[sens_col].apply(lambda x: 1 if x ==_
priv_group else 0)

```

```

for out_col, out_group in outcome_groups:
    # print(f"{out_col}: {out_group}")

    current_df[out_col] = current_df[out_col].apply(lambda x: 1 if x == out_group else 0)

    current_dataset = BinaryLabelDataset(
        favorable_label=1,
        unfavorable_label=0,
        df=current_df[[sens_col, out_col]],
        label_names=[out_col],
        sensitive_features=[sens_col]
    )

    # Step 2: Compute metrics
    metric = BinaryLabelDatasetMetric(
        current_dataset,
        privileged_groups=[{sens_col: 1}],
        unprivileged_groups=[{sens_col: 0}],
    )

    # Disparate Impact
    disparate_impact = metric.disparate_impact()
    # print(f"Disparate Impact: {disparate_impact}")
    detection_results["disparate_impact"] += [
        {
            "when": {
                sens_col: priv_group,
                out_col: out_group
            },
            "value": "NaN" if np.isnan(disparate_impact) else
disparate_impact
        }
    ]

    # Statistical Parity Difference
    statistical_parity_difference = metric.statistical_parity_difference()
    # print(f"Statistical Parity Difference: {statistical_parity_difference}")
    detection_results["statistical_parity_difference"] += [
        {
            "when": {
                sens_col: priv_group,
                out_col: out_group
            },
            "value": "NaN" if np.isnan(statistical_parity_difference) else
statistical_parity_difference
        }
    ]

```

```

        }
    ]

    # print()
detection_results

```

[342]:

```

def compute_fair_metric(
    fair_metric_name, sensitive_feature, X, y_true, y_pred
):

    # metrics_module = __import__("metrics")
    metrics_module = globals()["metrics"]
    fair_metric = getattr(metrics_module, fair_metric_name)

    X_sensitive = encode_feature(X, sensitive_feature, ↴
        favorable_label=favorable_sensitive_label)
    X_sensitive = X_sensitive[sensitive_feature]

    return fair_metric(
        y_true=y_true,
        y_pred=y_pred,
        sensitive_features=X_sensitive,
    )

```

8.2 Analysis

[357]:

| | s_frequency_of_work_with_teachers |
|------------------|-----------------------------------|
| id_questionnaire | |
| 1 | 0.733333 |
| 3 | 0.833333 |
| 5 | 0.566667 |
| 6 | 0.533333 |
| 8 | 0.633333 |
| ... | ... |
| 20421 | 0.566667 |
| 20422 | 0.700000 |
| 20423 | 0.400000 |
| 20424 | 0.500000 |
| 20427 | 0.666667 |

| | s_frequency_of_evaluations | s_frequency_of_internet_usage |
|------------------|----------------------------|-------------------------------|
| | | |
| id_questionnaire | | |
| 1 | 0.740741 | 0.066667 |
| 3 | 0.750000 | 0.666667 |
| 5 | 0.888889 | 0.133333 |

| | | |
|---|----------|-----------|
| 6 | 0.851852 | 0.133333 |
| 8 | 0.703704 | 0.266667 |
| ... | ... | ... |
| 20421 | 0.777778 | 0.600000 |
| 20422 | 0.518519 | 0.266667 |
| 20423 | 0.555556 | 0.400000 |
| 20424 | 0.555556 | 0.200000 |
| 20427 | 0.740741 | 0.133333 |
| s_frequency_of_materials_in_class \ | | |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 3 | 1.000000 | 0.261451 |
| 5 | 0.666667 | 3.151773 |
| 6 | 0.380952 | -1.627731 |
| 8 | 0.666667 | -0.358498 |
| ... | ... | ... |
| 20421 | 0.476190 | -0.764891 |
| 20422 | 0.380952 | -0.048524 |
| 20423 | 0.571429 | 0.072922 |
| 20424 | 0.523810 | 2.755881 |
| 20427 | 0.476190 | 1.372627 |
| s_extent_of_classmates_affinity \ | | |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 3 | 0.833333 | |
| 5 | 0.952381 | |
| 6 | 0.761905 | |
| 8 | 0.857143 | |
| ... | ... | ... |
| 20421 | 0.904762 | |
| 20422 | 0.952381 | |
| 20423 | 0.809524 | |
| 20424 | 0.904762 | |
| 20427 | 0.857143 | |
| s_extent_of_teacher_performance s_extent_of_class_env \ | | |
| id_questionnaire | | |
| 1 | 0.833333 | 0.791667 |
| 3 | 0.800000 | 0.833333 |
| 5 | 1.000000 | 1.000000 |
| 6 | 0.866667 | 1.000000 |
| 8 | 0.966667 | 0.833333 |
| ... | ... | ... |
| 20421 | 1.000000 | 1.000000 |
| 20422 | 0.888889 | 0.916667 |

| | | | |
|------------------|-----------------------------------|-------------------------------|----------|
| 20423 | | 1.000000 | 0.666667 |
| 20424 | | 0.766667 | 0.791667 |
| 20427 | | 0.900000 | 0.916667 |
| | f_mother_age | s_frequency_of_computer_usage | \ |
| id_questionnaire | | | |
| 1 | 43.0 | 0.111111 | |
| 3 | 45.0 | 0.666667 | |
| 5 | 39.0 | 0.000000 | |
| 6 | 25.0 | 0.222222 | |
| 8 | 37.0 | 0.333333 | |
| ... | ... | ... | |
| 20421 | 41.0 | 0.111111 | |
| 20422 | 36.0 | 0.222222 | |
| 20423 | 46.0 | 0.111111 | |
| 20424 | 41.0 | 0.111111 | |
| 20427 | 37.0 | 0.000000 | |
| | f_number_of_homework_hours_a_week | \ | |
| id_questionnaire | | | |
| 1 | 14.0 | | |
| 3 | 9.0 | | |
| 5 | 6.0 | | |
| 6 | 5.0 | | |
| 8 | 10.0 | | |
| ... | ... | ... | |
| 20421 | 14.0 | | |
| 20422 | 2.0 | | |
| 20423 | 8.0 | | |
| 20424 | 2.0 | | |
| 20427 | 1.0 | | |
| | s_extent_of_school_satisfaction | f_mother_education_level | \ |
| id_questionnaire | | | |
| 1 | 0.944444 | 7.0 | |
| 3 | 0.888889 | 3.0 | |
| 5 | 1.000000 | 9.0 | |
| 6 | 1.000000 | 3.0 | |
| 8 | 0.833333 | 7.0 | |
| ... | ... | ... | |
| 20421 | 1.000000 | 5.0 | |
| 20422 | 0.944444 | 4.0 | |
| 20423 | 1.000000 | 3.0 | |
| 20424 | 0.833333 | 9.0 | |
| 20427 | 1.000000 | 5.0 | |
| | f_extent_of_family_satisfaction | f_number_of_tech_at_home | \ |

```

id_questionnaire
1                      0.700000          3.0
3                      0.291667          4.0
5                      0.833333          7.0
6                      0.833333          3.0
8                      1.000000          3.0
...
20421                  ...
20422                  1.000000          4.0
20423                  0.708333          5.0
20423                  0.833333          10.0
20424                 0.666667         10.0
20427                 0.291667          5.0

f_frequency_of_books_at_home \
id_questionnaire
1                      1.000000
3                      0.444444
5                      0.555556
6                      0.333333
8                      0.555556
...
20421                  ...
20422                  0.555556
20423                  0.444444
20424                  0.555556
20427                  0.444444

f_frequency_of_parent_involved_in_school_activities \
id_questionnaire
1                      0.333333
3                      0.166667
5                      0.250000
6                      0.083333
8                      0.333333
...
20421                  ...
20422                  0.000000
20423                  0.000000
20424                  0.416667
20427                  0.000000

s_gender  level_MAT
id_questionnaire
1           FEMALE      3.0
3           FEMALE      1.0
5           FEMALE      4.0
6           FEMALE      1.0

```

```
8          MALE    2.0
...
20421      MALE    2.0
20422      FEMALE  3.0
20423      MALE    2.0
20424      MALE    3.0
20427      FEMALE  2.0
```

[10735 rows x 19 columns]

```
[199]: compute_exploratory_analysis(df=final_df, column_pattern=None, ↴
missing_threshold=0.3, annot=False)
```

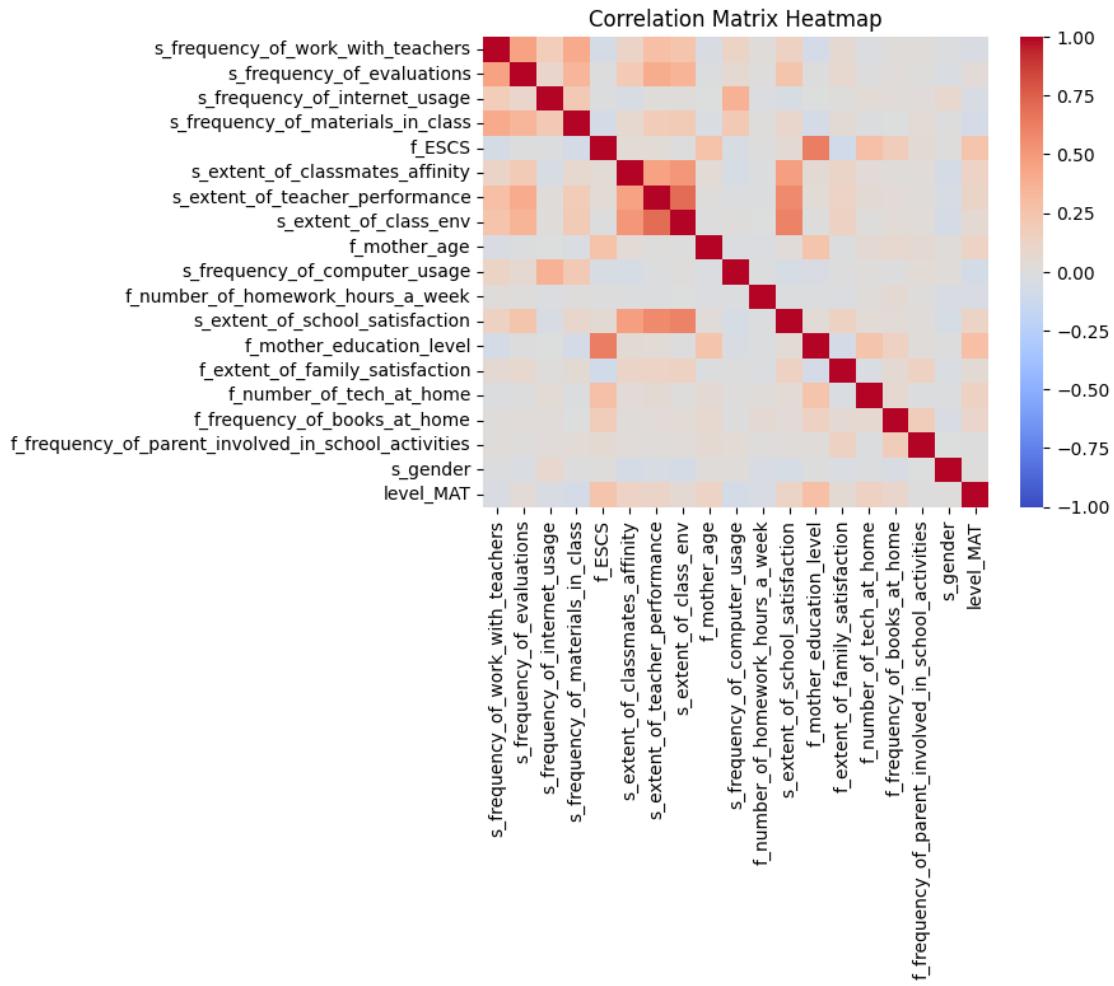
GOOD FEATURES: 19

| | |
|---|----------|
| s_frequency_of_work_with_teachers | 0.056329 |
| s_frequency_of_evaluations | 0.058632 |
| s_frequency_of_internet_usage | 0.055824 |
| s_frequency_of_materials_in_class | 0.059811 |
| f_ESCS | 0.275357 |
| s_extent_of_classmates_affinity | 0.060036 |
| s_extent_of_teacher_performance | 0.059025 |
| s_extent_of_class_env | 0.059250 |
| f_mother_age | 0.281534 |
| s_frequency_of_computer_usage | 0.056049 |
| f_number_of_homework_hours_a_week | 0.278445 |
| s_extent_of_school_satisfaction | 0.057396 |
| f_mother_education_level | 0.291082 |
| f_extent_of_family_satisfaction | 0.277547 |
| f_number_of_tech_at_home | 0.281984 |
| f_frequency_of_books_at_home | 0.290295 |
| f_frequency_of_parent_involved_in_school_activities | 0.278502 |
| s_gender | 0.000056 |
| level_MAT | 0.000000 |

dtype: float64

BAD FEATURES

Series([], dtype: float64)



| | s_frequency_of_work_with_teachers \ id_questionnaire |
|-------|--|
| 1 | 0.733333 |
| 2 | 0.533333 |
| 3 | 0.833333 |
| 4 | 0.400000 |
| 5 | 0.566667 |
| ... | ... |
| 20426 | 0.333333 |
| 20427 | 0.666667 |
| 20428 | 0.518519 |
| 20429 | 0.633333 |
| 20430 | 0.629630 |

| | s_frequency_of_evaluations | s_frequency_of_internet_usage | \ |
|------------------|----------------------------|-------------------------------|----------|
| id_questionnaire | | | |
| 1 | 0.740741 | | 0.066667 |

| | | |
|---|----------|-----------|
| 2 | 0.888889 | 0.600000 |
| 3 | 0.750000 | 0.666667 |
| 4 | 0.541667 | 0.266667 |
| 5 | 0.888889 | 0.133333 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.740741 | 0.133333 |
| 20428 | 0.740741 | 0.933333 |
| 20429 | 0.740741 | 0.533333 |
| 20430 | 0.481481 | 0.400000 |
| s_frequency_of_materials_in_class \ | | |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 2 | 0.714286 | NaN |
| 3 | 1.000000 | 0.261451 |
| 4 | NaN | 0.787122 |
| 5 | 0.666667 | 3.151773 |
| ... | ... | ... |
| 20426 | NaN | -1.627731 |
| 20427 | 0.476190 | 1.372627 |
| 20428 | 0.777778 | NaN |
| 20429 | 0.142857 | NaN |
| 20430 | 0.476190 | NaN |
| s_extent_of_classmates_affinity \ | | |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 2 | 0.714286 | |
| 3 | 0.833333 | |
| 4 | 0.857143 | |
| 5 | 0.952381 | |
| ... | ... | ... |
| 20426 | 0.333333 | |
| 20427 | 0.857143 | |
| 20428 | 0.666667 | |
| 20429 | 0.714286 | |
| 20430 | 0.619048 | |
| s_extent_of_teacher_performance s_extent_of_class_env \ | | |
| id_questionnaire | | |
| 1 | 0.833333 | 0.791667 |
| 2 | 0.800000 | 0.791667 |
| 3 | 0.800000 | 0.833333 |
| 4 | 0.800000 | 0.750000 |
| 5 | 1.000000 | 1.000000 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |

| | | | |
|--|----------|----------|----------|
| 20427 | | 0.900000 | 0.916667 |
| 20428 | | 0.566667 | 0.958333 |
| 20429 | | 1.000000 | 0.875000 |
| 20430 | | 0.733333 | 0.708333 |
| | | | |
| f_mother_age s_frequency_of_computer_usage \ | | | |
| id_questionnaire | | | |
| 1 | 43.0 | 0.111111 | |
| 2 | NaN | 0.333333 | |
| 3 | 45.0 | 0.666667 | |
| 4 | 39.0 | 0.333333 | |
| 5 | 39.0 | 0.000000 | |
| ... | ... | ... | |
| 20426 | 31.0 | NaN | |
| 20427 | 37.0 | 0.000000 | |
| 20428 | NaN | 0.222222 | |
| 20429 | NaN | 0.000000 | |
| 20430 | NaN | 0.111111 | |
| | | | |
| f_number_of_homework_hours_a_week \ | | | |
| id_questionnaire | | | |
| 1 | 14.0 | | |
| 2 | NaN | | |
| 3 | 9.0 | | |
| 4 | 9.0 | | |
| 5 | 6.0 | | |
| ... | ... | | |
| 20426 | 4.0 | | |
| 20427 | 1.0 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | | | |
| s_extent_of_school_satisfaction f_mother_education_level \ | | | |
| id_questionnaire | | | |
| 1 | 0.944444 | 7.0 | |
| 2 | 1.000000 | NaN | |
| 3 | 0.888889 | 3.0 | |
| 4 | 0.722222 | 5.0 | |
| 5 | 1.000000 | 9.0 | |
| ... | ... | ... | |
| 20426 | 1.000000 | 3.0 | |
| 20427 | 1.000000 | 5.0 | |
| 20428 | 0.833333 | NaN | |
| 20429 | 1.000000 | NaN | |
| 20430 | 0.722222 | NaN | |
| | | | |
| f_extent_of_family_satisfaction f_number_of_tech_at_home \ | | | |

```

id_questionnaire
1                      0.700000          3.0
2                         NaN           NaN
3                      0.291667          4.0
4                      1.000000          3.0
5                      0.833333          7.0
...
...                     ...
20426                  0.791667          4.0
20427                  0.291667          5.0
20428                      NaN           NaN
20429                      NaN           NaN
20430                      NaN           NaN

f_frequency_of_books_at_home \
id_questionnaire
1                      1.000000
2                         NaN
3                      0.444444
4                      0.333333
5                      0.555556
...
...                     ...
20426                  0.333333
20427                  0.444444
20428                      NaN
20429                      NaN
20430                      NaN

f_frequency_of_parent_involved_in_school_activities \
id_questionnaire
1                      0.333333
2                         NaN
3                      0.166667
4                      0.250000
5                      0.250000
...
...                     ...
20426                  0.000000
20427                  0.000000
20428                      NaN
20429                      NaN
20430                      NaN

s_gender  level_MAT
id_questionnaire
1        FEMALE      3.0
2        MALE       1.0
3        FEMALE      1.0
4        MALE       2.0
5        FEMALE      4.0

```

| | | | ... |
|-------|--------|-----|-----|
| 20426 | FEMALE | 1.0 | |
| 20427 | FEMALE | 2.0 | |
| 20428 | MALE | 2.0 | |
| 20429 | MALE | 3.0 | |
| 20430 | FEMALE | 2.0 | |

[17806 rows x 19 columns]

| | | | ... |
|--|---------------|-----|-----|
| s_frequency_of_work_with_teachers | \ | 1. | |
| s_frequency_of_work_with_teachers | <u>000000</u> | 0. | |
| s_frequency_of_evaluations | <u>459210</u> | 0. | |
| s_frequency_of_internet_usage | <u>184811</u> | 0. | |
| s_frequency_of_materials_in_class | <u>407241</u> | 0. | |
| f_ESCS | <u>056927</u> | -0. | |
| s_extent_of_classmates_affinity | <u>115582</u> | 0. | |
| s_extent_of_teacher_performance | <u>284243</u> | 0. | |
| s_extent_of_class_env | <u>253826</u> | 0. | |
| f_mother_age | <u>033653</u> | -0. | |
| s_frequency_of_computer_usage | <u>120296</u> | 0. | |
| f_number_of_homework_hours_a_week | <u>023143</u> | 0. | |
| s_extent_of_school_satisfaction | <u>140080</u> | 0. | |
| f_mother_education_level | <u>066000</u> | -0. | |
| f_extent_of_family_satisfaction | <u>057850</u> | 0. | |
| f_number_of_tech_at_home | <u>016357</u> | -0. | |
| f_frequency_of_books_at_home | <u>017840</u> | 0. | |
| f_frequency_of_parent_involved_in_school_activi... | <u>016874</u> | 0. | |
| s_gender | <u>013262</u> | -0. | |

| | |
|--|------------------------------|
| level_MAT | -0. |
| ↳038320 | |
| | s_frequency_of_evaluations \ |
| | 0.459210 |
| s_frequency_of_work_with_teachers | 1.000000 |
| s_frequency_of_evaluations | 0.097839 |
| s_frequency_of_internet_usage | 0.346366 |
| s_frequency_of_materials_in_class | 0.000752 |
| f_ESCS | 0.208706 |
| s_extent_of_classmates_affinity | 0.405473 |
| s_extent_of_teacher_performance | 0.353524 |
| s_extent_of_class_env | -0.010146 |
| f_mother_age | 0.064127 |
| s_frequency_of_computer_usage | 0.013561 |
| f_number_of_homework_hours_a_week | 0.246491 |
| s_extent_of_school_satisfaction | 0.002241 |
| f_mother_education_level | 0.076432 |
| f_extent_of_family_satisfaction | 0.004816 |
| f_number_of_tech_at_home | 0.024959 |
| f_frequency_of_books_at_home | 0.012819 |
| f_frequency_of_parent_involved_in_school_activi... | -0.028531 |
| s_gender | 0.033004 |
| level_MAT | |
| | □ |
| ↳s_frequency_of_internet_usage \ | 0.184811 |
| s_frequency_of_work_with_teachers | 0.097839 |
| s_frequency_of_evaluations | 1.000000 |
| s_frequency_of_internet_usage | 0.215844 |
| s_frequency_of_materials_in_class | -0.015618 |
| f_ESCS | -0.043809 |
| s_extent_of_classmates_affinity | 0.020481 |
| s_extent_of_teacher_performance | 0.022687 |
| s_extent_of_class_env | -0.006085 |
| f_mother_age | 0.371735 |
| s_frequency_of_computer_usage | -0.020469 |
| f_number_of_homework_hours_a_week | -0.039423 |
| s_extent_of_school_satisfaction | -0.004143 |
| f_mother_education_level | 0.008416 |
| f_extent_of_family_satisfaction | 0.040167 |
| f_number_of_tech_at_home | 0.023850 |
| f_frequency_of_books_at_home | 0.025514 |
| f_frequency_of_parent_involved_in_school_activi... | 0.084017 |
| s_gender | -0.036665 |
| level_MAT | |

| | □ |
|--|-----------|
| ↳ s_frequency_of_materials_in_class \ | 0. |
| s_frequency_of_work_with_teachers | 0. |
| ↳ 407241 | |
| s_frequency_of_evaluations | 0. |
| ↳ 346366 | |
| s_frequency_of_internet_usage | 0. |
| ↳ 215844 | |
| s_frequency_of_materials_in_class | 1. |
| ↳ 000000 | |
| f_ESCS | -0. |
| ↳ 068230 | |
| s_extent_of_classmates_affinity | 0. |
| ↳ 075477 | |
| s_extent_of_teacher_performance | 0. |
| ↳ 192643 | |
| s_extent_of_class_env | 0. |
| ↳ 198315 | |
| f_mother_age | -0. |
| ↳ 030786 | |
| s_frequency_of_computer_usage | 0. |
| ↳ 215274 | |
| f_number_of_homework_hours_a_week | 0. |
| ↳ 013483 | |
| s_extent_of_school_satisfaction | 0. |
| ↳ 088556 | |
| f_mother_education_level | -0. |
| ↳ 068052 | |
| f_extent_of_family_satisfaction | 0. |
| ↳ 050423 | |
| f_number_of_tech_at_home | -0. |
| ↳ 014722 | |
| f_frequency_of_books_at_home | -0. |
| ↳ 004838 | |
| f_frequency_of_parent_involved_in_school_activi... | 0. |
| ↳ 039642 | |
| s_gender | 0. |
| ↳ 000793 | |
| level_MAT | -0. |
| ↳ 066594 | |
| f_ESCS \ | |
| s_frequency_of_work_with_teachers | -0.056927 |
| s_frequency_of_evaluations | 0.000752 |
| s_frequency_of_internet_usage | -0.015618 |
| s_frequency_of_materials_in_class | -0.068230 |

| | |
|--|-----------|
| f_ESCS | 1.000000 |
| s_extent_of_classmates_affinity | 0.040619 |
| s_extent_of_teacher_performance | 0.039800 |
| s_extent_of_class_env | 0.005268 |
| f_mother_age | 0.261448 |
| s_frequency_of_computer_usage | -0.044139 |
| f_number_of_homework_hours_a_week | 0.007309 |
| s_extent_of_school_satisfaction | 0.049781 |
| f_mother_education_level | 0.627503 |
| f_extent_of_family_satisfaction | -0.087052 |
| f_number_of_tech_at_home | 0.278867 |
| f_frequency_of_books_at_home | 0.175323 |
| f_frequency_of_parent_involved_in_school_activi... | 0.047424 |
| s_gender | 0.009554 |
| level_MAT | 0.250165 |

□

| | |
|------------------------------------|-----|
| ~s_extent_of_classmates_affinity \ | 0. |
| s_frequency_of_work_with_teachers | 0. |
| ~115582 | |
| s_frequency_of_evaluations | 0. |
| ~208706 | |
| s_frequency_of_internet_usage | -0. |
| ~043809 | |
| s_frequency_of_materials_in_class | 0. |
| ~075477 | |
| f_ESCS | 0. |
| ~040619 | |
| s_extent_of_classmates_affinity | 1. |
| ~000000 | |
| s_extent_of_teacher_performance | 0. |
| ~455324 | |
| s_extent_of_class_env | 0. |
| ~512753 | |
| f_mother_age | 0. |
| ~040068 | |
| s_frequency_of_computer_usage | -0. |
| ~052212 | |
| f_number_of_homework_hours_a_week | -0. |
| ~008666 | |
| s_extent_of_school_satisfaction | 0. |
| ~471544 | |
| f_mother_education_level | 0. |
| ~048646 | |
| f_extent_of_family_satisfaction | 0. |
| ~115887 | |

| | |
|--|----------|
| f_number_of_tech_at_home | 0. |
| ↳037754 | |
| f_frequency_of_books_at_home | 0. |
| ↳021444 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.030362 |
| s_gender | -0. |
| ↳055421 | |
| level_MAT | 0. |
| ↳132252 | |
| □ | |
| ↳s_extent_of_teacher_performance \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳284243 | |
| s_frequency_of_evaluations | 0. |
| ↳405473 | |
| s_frequency_of_internet_usage | 0. |
| ↳020481 | |
| s_frequency_of_materials_in_class | 0. |
| ↳192643 | |
| f_ESCS | 0. |
| ↳039800 | |
| s_extent_of_classmates_affinity | 0. |
| ↳455324 | |
| s_extent_of_teacher_performance | 1. |
| ↳000000 | |
| s_extent_of_class_env | 0. |
| ↳699774 | |
| f_mother_age | 0. |
| ↳011708 | |
| s_frequency_of_computer_usage | -0. |
| ↳011863 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳008315 | |
| s_extent_of_school_satisfaction | 0. |
| ↳572676 | |
| f_mother_education_level | 0. |
| ↳039756 | |
| f_extent_of_family_satisfaction | 0. |
| ↳132071 | |
| f_number_of_tech_at_home | 0. |
| ↳047904 | |
| f_frequency_of_books_at_home | 0. |
| ↳033481 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.015670 |

| | |
|--|-------------------------|
| s_gender | -0. |
| ↳044767 | |
| level_MAT | 0. |
| ↳110412 | |
| | |
| s_frequency_of_work_with_teachers | s_extent_of_class_env \ |
| s_frequency_of_evaluations | 0.253826 |
| s_frequency_of_internet_usage | 0.353524 |
| s_frequency_of_materials_in_class | 0.022687 |
| f_ESCS | 0.198315 |
| s_extent_of_classmates_affinity | 0.005268 |
| s_extent_of_teacher_performance | 0.512753 |
| s_extent_of_class_env | 0.699774 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | 0.000189 |
| f_number_of_homework_hours_a_week | 0.014833 |
| s_extent_of_school_satisfaction | -0.004051 |
| f_mother_education_level | 0.603268 |
| f_extent_of_family_satisfaction | 0.000608 |
| f_number_of_tech_at_home | 0.135805 |
| f_frequency_of_books_at_home | 0.014492 |
| f_frequency_of_parent_involved_in_school_activi... | 0.039548 |
| s_gender | 0.026473 |
| level_MAT | -0.055349 |
| | 0.059059 |
| | |
| | f_mother_age \ |
| s_frequency_of_work_with_teachers | -0.033653 |
| s_frequency_of_evaluations | -0.010146 |
| s_frequency_of_internet_usage | -0.006085 |
| s_frequency_of_materials_in_class | -0.030786 |
| f_ESCS | 0.261448 |
| s_extent_of_classmates_affinity | 0.040068 |
| s_extent_of_teacher_performance | 0.011708 |
| s_extent_of_class_env | 0.000189 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | -0.018088 |
| f_number_of_homework_hours_a_week | -0.019828 |
| s_extent_of_school_satisfaction | 0.024990 |
| f_mother_education_level | 0.250886 |
| f_extent_of_family_satisfaction | 0.013724 |
| f_number_of_tech_at_home | 0.058864 |
| f_frequency_of_books_at_home | 0.072558 |
| f_frequency_of_parent_involved_in_school_activi... | 0.060719 |
| s_gender | 0.021320 |
| level_MAT | 0.126018 |

| | |
|--|-----------|
| s_frequency_of_computer_usage \ | |
| s_frequency_of_work_with_teachers | 0.120296 |
| s_frequency_of_evaluations | 0.064127 |
| s_frequency_of_internet_usage | 0.371735 |
| s_frequency_of_materials_in_class | 0.215274 |
| f_ESCS | -0.044139 |
| s_extent_of_classmates_affinity | -0.052212 |
| s_extent_of_teacher_performance | -0.011863 |
| s_extent_of_class_env | 0.014833 |
| f_mother_age | -0.018088 |
| s_frequency_of_computer_usage | 1.000000 |
| f_number_of_homework_hours_a_week | -0.011977 |
| s_extent_of_school_satisfaction | -0.051609 |
| f_mother_education_level | -0.035688 |
| f_extent_of_family_satisfaction | 0.007575 |
| f_number_of_tech_at_home | 0.012460 |
| f_frequency_of_books_at_home | 0.004609 |
| f_frequency_of_parent_involved_in_school_activi... | 0.040685 |
| s_gender | 0.019260 |
| level_MAT | -0.072532 |

| | |
|-------------------------------------|-----|
| f_number_of_homework_hours_a_week \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳023143 | |
| s_frequency_of_evaluations | 0. |
| ↳013561 | |
| s_frequency_of_internet_usage | -0. |
| ↳020469 | |
| s_frequency_of_materials_in_class | 0. |
| ↳013483 | |
| f_ESCS | 0. |
| ↳007309 | |
| s_extent_of_classmates_affinity | -0. |
| ↳008666 | |
| s_extent_of_teacher_performance | -0. |
| ↳008315 | |
| s_extent_of_class_env | -0. |
| ↳004051 | |
| f_mother_age | -0. |
| ↳019828 | |
| s_frequency_of_computer_usage | -0. |
| ↳011977 | |
| f_number_of_homework_hours_a_week | 1. |
| ↳000000 | |

| | |
|--|-----|
| s_extent_of_school_satisfaction | -0. |
| ↳009182 | |
| f_mother_education_level | -0. |
| ↳008756 | |
| f_extent_of_family_satisfaction | -0. |
| ↳019991 | |
| f_number_of_tech_at_home | 0. |
| ↳020601 | |
| f_frequency_of_books_at_home | 0. |
| ↳057714 | |
| f_frequency_of_parent_involved_in_school_activi... | 0. |
| ↳015347 | |
| s_gender | -0. |
| ↳033709 | |
| level_MAT | -0. |
| ↳035409 | |

| | |
|------------------------------------|-----|
| ↳s_extent_of_school_satisfaction \ | □ |
| s_frequency_of_work_with_teachers | 0. |
| ↳140080 | |
| s_frequency_of_evaluations | 0. |
| ↳246491 | |
| s_frequency_of_internet_usage | -0. |
| ↳039423 | |
| s_frequency_of_materials_in_class | 0. |
| ↳088556 | |
| f_ESCS | 0. |
| ↳049781 | |
| s_extent_of_classmates_affinity | 0. |
| ↳471544 | |
| s_extent_of_teacher_performance | 0. |
| ↳572676 | |
| s_extent_of_class_env | 0. |
| ↳603268 | |
| f_mother_age | 0. |
| ↳024990 | |
| s_frequency_of_computer_usage | -0. |
| ↳051609 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳009182 | |
| s_extent_of_school_satisfaction | 1. |
| ↳000000 | |
| f_mother_education_level | 0. |
| ↳042832 | |

| | |
|--|-----------|
| f_extent_of_family_satisfaction | 0. |
| ↳136325 | |
| f_number_of_tech_at_home | 0. |
| ↳039812 | |
| f_frequency_of_books_at_home | 0. |
| ↳036158 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.016555 |
| s_gender | -0. |
| ↳054659 | |
| level_MAT | 0. |
| ↳123259 | |
| f_mother_education_level \ | |
| s_frequency_of_work_with_teachers | -0.066000 |
| s_frequency_of_evaluations | 0.002241 |
| s_frequency_of_internet_usage | -0.004143 |
| s_frequency_of_materials_in_class | -0.068052 |
| f_ESCS | 0.627503 |
| s_extent_of_classmates_affinity | 0.048646 |
| s_extent_of_teacher_performance | 0.039756 |
| s_extent_of_class_env | 0.000608 |
| f_mother_age | 0.250886 |
| s_frequency_of_computer_usage | -0.035688 |
| f_number_of_homework_hours_a_week | -0.008756 |
| s_extent_of_school_satisfaction | 0.042832 |
| f_mother_education_level | 1.000000 |
| f_extent_of_family_satisfaction | -0.065329 |
| f_number_of_tech_at_home | 0.254568 |
| f_frequency_of_books_at_home | 0.146603 |
| f_frequency_of_parent_involved_in_school_activi... | 0.020266 |
| s_gender | 0.006079 |
| level_MAT | 0.284138 |

| | |
|------------------------------------|-----|
| ↳f_extent_of_family_satisfaction \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳057850 | |
| s_frequency_of_evaluations | 0. |
| ↳076432 | |
| s_frequency_of_internet_usage | 0. |
| ↳008416 | |
| s_frequency_of_materials_in_class | 0. |
| ↳050423 | |
| f_ESCS | -0. |
| ↳087052 | |
| s_extent_of_classmates_affinity | 0. |
| ↳115887 | |

| | |
|--|----------|
| s_extent_of_teacher_performance | 0. |
| ↳132071 | |
| s_extent_of_class_env | 0. |
| ↳135805 | |
| f_mother_age | -0. |
| ↳013724 | |
| s_frequency_of_computer_usage | 0. |
| ↳007575 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳019991 | |
| s_extent_of_school_satisfaction | 0. |
| ↳136325 | |
| f_mother_education_level | -0. |
| ↳065329 | |
| f_extent_of_family_satisfaction | 1. |
| ↳000000 | |
| f_number_of_tech_at_home | -0. |
| ↳030832 | |
| f_frequency_of_books_at_home | 0. |
| ↳057873 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.136940 |
| s_gender | -0. |
| ↳024137 | |
| level_MAT | 0. |
| ↳050280 | |

| | |
|--|-----------|
| f_number_of_tech_at_home | \ |
| s_frequency_of_work_with_teachers | -0.016357 |
| s_frequency_of_evaluations | 0.004816 |
| s_frequency_of_internet_usage | 0.040167 |
| s_frequency_of_materials_in_class | -0.014722 |
| f_ESCS | 0.278867 |
| s_extent_of_classmates_affinity | 0.037754 |
| s_extent_of_teacher_performance | 0.047904 |
| s_extent_of_class_env | 0.014492 |
| f_mother_age | 0.058864 |
| s_frequency_of_computer_usage | 0.012460 |
| f_number_of_homework_hours_a_week | 0.020601 |
| s_extent_of_school_satisfaction | 0.039812 |
| f_mother_education_level | 0.254568 |
| f_extent_of_family_satisfaction | -0.030832 |
| f_number_of_tech_at_home | 1.000000 |
| f_frequency_of_books_at_home | 0.063726 |
| f_frequency_of_parent_involved_in_school_activi... | -0.011387 |
| s_gender | -0.009508 |
| level_MAT | 0.143473 |

| | f_frequency_of_books_at_home |
|--|------------------------------|
| ↳ \ | |
| s_frequency_of_work_with_teachers | 0.017840 |
| s_frequency_of_evaluations | 0.024959 |
| s_frequency_of_internet_usage | 0.023850 |
| s_frequency_of_materials_in_class | -0.004838 |
| f_ESCS | 0.175323 |
| s_extent_of_classmates_affinity | 0.021444 |
| s_extent_of_teacher_performance | 0.033481 |
| s_extent_of_class_env | 0.039548 |
| f_mother_age | 0.072558 |
| s_frequency_of_computer_usage | 0.004609 |
| f_number_of_homework_hours_a_week | 0.057714 |
| s_extent_of_school_satisfaction | 0.036158 |
| f_mother_education_level | 0.146603 |
| f_extent_of_family_satisfaction | 0.057873 |
| f_number_of_tech_at_home | 0.063726 |
| f_frequency_of_books_at_home | 1.000000 |
| f_frequency_of_parent_involved_in_school_activi... | 0.179154 |
| s_gender | -0.037040 |
| level_MAT | 0.097342 |

| ↳ f_frequency_of_parent_involved_in_school_activities | \ |
|---|---|
| s_frequency_of_work_with_teachers | |
| ↳ 0.016874 | |
| s_frequency_of_evaluations | |
| ↳ 0.012819 | |
| s_frequency_of_internet_usage | |
| ↳ 0.025514 | |
| s_frequency_of_materials_in_class | |
| ↳ 0.039642 | |
| f_ESCS | |
| ↳ 0.047424 | |
| s_extent_of_classmates_affinity | |
| ↳ 0.030362 | |
| s_extent_of_teacher_performance | |
| ↳ 0.015670 | |
| s_extent_of_class_env | |
| ↳ 0.026473 | |
| f_mother_age | |
| ↳ 0.060719 | |
| s_frequency_of_computer_usage | |
| ↳ 0.040685 | |
| f_number_of_homework_hours_a_week | |
| ↳ 0.015347 | |

| | | |
|--|-----------|---|
| s_extent_of_school_satisfaction | 0.016555 | □ |
| f_mother_education_level | 0.020266 | □ |
| f_extent_of_family_satisfaction | 0.136940 | □ |
| f_number_of_tech_at_home | -0.011387 | □ |
| f_frequency_of_books_at_home | 0.179154 | □ |
| f_frequency_of_parent_involved_in_school_activi... | 1.000000 | □ |
| s_gender | -0.007350 | □ |
| level_MAT | 0.002740 | □ |

| | s_gender | level_MAT |
|--|-----------|-----------|
| s_frequency_of_work_with_teachers | -0.013262 | -0.038320 |
| s_frequency_of_evaluations | -0.028531 | 0.033004 |
| s_frequency_of_internet_usage | 0.084017 | -0.036665 |
| s_frequency_of_materials_in_class | 0.000793 | -0.066594 |
| f_ESCS | 0.009554 | 0.250165 |
| s_extent_of_classmates_affinity | -0.055421 | 0.132252 |
| s_extent_of_teacher_performance | -0.044767 | 0.110412 |
| s_extent_of_class_env | -0.055349 | 0.059059 |
| f_mother_age | 0.021320 | 0.126018 |
| s_frequency_of_computer_usage | 0.019260 | -0.072532 |
| f_number_of_homework_hours_a_week | -0.033709 | -0.035409 |
| s_extent_of_school_satisfaction | -0.054659 | 0.123259 |
| f_mother_education_level | 0.006079 | 0.284138 |
| f_extent_of_family_satisfaction | -0.024137 | 0.050280 |
| f_number_of_tech_at_home | -0.009508 | 0.143473 |
| f_frequency_of_books_at_home | -0.037040 | 0.097342 |
| f_frequency_of_parent_involved_in_school_activi... | -0.007350 | 0.002740 |
| s_gender | 1.000000 | 0.015317 |
| level_MAT | 0.015317 | 1.000000 |

```
[199]: ( s_frequency_of_work_with_teachers \
    id_questionnaire
    1
    2
    3
    4
    5
    ...
    20426
    0.733333
    0.533333
    0.833333
    0.400000
    0.566667
    ...
    0.333333
```

| | | |
|------------------|-----------------------------------|---------------------------------|
| 20427 | | 0.666667 |
| 20428 | | 0.518519 |
| 20429 | | 0.633333 |
| 20430 | | 0.629630 |
| | s_frequency_of_evaluations | s_frequency_of_internet_usage \ |
| id_questionnaire | | |
| 1 | 0.740741 | 0.066667 |
| 2 | 0.888889 | 0.600000 |
| 3 | 0.750000 | 0.666667 |
| 4 | 0.541667 | 0.266667 |
| 5 | 0.888889 | 0.133333 |
| ... | ... | ... |
| 20426 | 0.333333 | 0.333333 |
| 20427 | 0.740741 | 0.133333 |
| 20428 | 0.740741 | 0.933333 |
| 20429 | 0.740741 | 0.533333 |
| 20430 | 0.481481 | 0.400000 |
| | s_frequency_of_materials_in_class | f_ESCS \ |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 2 | 0.714286 | NaN |
| 3 | 1.000000 | 0.261451 |
| 4 | NaN | 0.787122 |
| 5 | 0.666667 | 3.151773 |
| ... | ... | ... |
| 20426 | NaN | -1.627731 |
| 20427 | 0.476190 | 1.372627 |
| 20428 | 0.777778 | NaN |
| 20429 | 0.142857 | NaN |
| 20430 | 0.476190 | NaN |
| | s_extent_of_classmates_affinity \ | |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 2 | 0.714286 | |
| 3 | 0.833333 | |
| 4 | 0.857143 | |
| 5 | 0.952381 | |
| ... | ... | |
| 20426 | 0.333333 | |
| 20427 | 0.857143 | |
| 20428 | 0.666667 | |
| 20429 | 0.714286 | |
| 20430 | 0.619048 | |

| | s_extent_of_teacher_performance | s_extent_of_class_env | \ |
|------------------|-----------------------------------|-------------------------------|---|
| id_questionnaire | | | |
| 1 | 0.833333 | 0.791667 | |
| 2 | 0.800000 | 0.791667 | |
| 3 | 0.800000 | 0.833333 | |
| 4 | 0.800000 | 0.750000 | |
| 5 | 1.000000 | 1.000000 | |
| ... | ... | ... | |
| 20426 | 0.333333 | 0.333333 | |
| 20427 | 0.900000 | 0.916667 | |
| 20428 | 0.566667 | 0.958333 | |
| 20429 | 1.000000 | 0.875000 | |
| 20430 | 0.733333 | 0.708333 | |
| | | | |
| | f_mother_age | s_frequency_of_computer_usage | \ |
| id_questionnaire | | | |
| 1 | 43.0 | 0.111111 | |
| 2 | NaN | 0.333333 | |
| 3 | 45.0 | 0.666667 | |
| 4 | 39.0 | 0.333333 | |
| 5 | 39.0 | 0.000000 | |
| ... | ... | ... | |
| 20426 | 31.0 | NaN | |
| 20427 | 37.0 | 0.000000 | |
| 20428 | NaN | 0.222222 | |
| 20429 | NaN | 0.000000 | |
| 20430 | NaN | 0.111111 | |
| | | | |
| | f_number_of_homework_hours_a_week | \ | |
| id_questionnaire | | | |
| 1 | 14.0 | | |
| 2 | NaN | | |
| 3 | 9.0 | | |
| 4 | 9.0 | | |
| 5 | 6.0 | | |
| ... | ... | | |
| 20426 | 4.0 | | |
| 20427 | 1.0 | | |
| 20428 | NaN | | |
| 20429 | NaN | | |
| 20430 | NaN | | |
| | | | |
| | s_extent_of_school_satisfaction | f_mother_education_level | \ |
| id_questionnaire | | | |
| 1 | 0.944444 | 7.0 | |
| 2 | 1.000000 | NaN | |
| 3 | 0.888889 | 3.0 | |

| | | |
|--|----------|-----|
| 4 | 0.722222 | 5.0 |
| 5 | 1.000000 | 9.0 |
| ... | ... | ... |
| 20426 | 1.000000 | 3.0 |
| 20427 | 1.000000 | 5.0 |
| 20428 | 0.833333 | NaN |
| 20429 | 1.000000 | NaN |
| 20430 | 0.722222 | NaN |
| | | |
| f_extent_of_family_satisfaction f_number_of_tech_at_home \ | | |
| id_questionnaire | | |
| 1 | 0.700000 | 3.0 |
| 2 | NaN | NaN |
| 3 | 0.291667 | 4.0 |
| 4 | 1.000000 | 3.0 |
| 5 | 0.833333 | 7.0 |
| ... | ... | ... |
| 20426 | 0.791667 | 4.0 |
| 20427 | 0.291667 | 5.0 |
| 20428 | NaN | NaN |
| 20429 | NaN | NaN |
| 20430 | NaN | NaN |
| | | |
| f_frequency_of_books_at_home \ | | |
| id_questionnaire | | |
| 1 | 1.000000 | |
| 2 | NaN | |
| 3 | 0.444444 | |
| 4 | 0.333333 | |
| 5 | 0.555556 | |
| ... | ... | |
| 20426 | 0.333333 | |
| 20427 | 0.444444 | |
| 20428 | NaN | |
| 20429 | NaN | |
| 20430 | NaN | |
| | | |
| f_frequency_of_parent_involved_in_school_activities \ | | |
| id_questionnaire | | |
| 1 | 0.333333 | |
| 2 | NaN | |
| 3 | 0.166667 | |
| 4 | 0.250000 | |
| 5 | 0.250000 | |
| ... | ... | |
| 20426 | 0.000000 | |
| 20427 | 0.000000 | |

| | | |
|------------------|----------|-----------|
| 20428 | | NaN |
| 20429 | | NaN |
| 20430 | | NaN |
| | s_gender | level_MAT |
| id_questionnaire | | |
| 1 | FEMALE | 3.0 |
| 2 | MALE | 1.0 |
| 3 | FEMALE | 1.0 |
| 4 | MALE | 2.0 |
| 5 | FEMALE | 4.0 |
| ... | ... | ... |
| 20426 | FEMALE | 1.0 |
| 20427 | FEMALE | 2.0 |
| 20428 | MALE | 2.0 |
| 20429 | MALE | 3.0 |
| 20430 | FEMALE | 2.0 |

[17806 rows x 19 columns],
 s_frequency_of_work_with_teachers \
 s_frequency_of_work_with_teachers
 1.000000
 s_frequency_of_evaluations
 0.459210
 s_frequency_of_internet_usage
 0.184811
 s_frequency_of_materials_in_class
 0.407241
 f_ESCS
 -0.056927
 s_extent_of_classmates_affinity
 0.115582
 s_extent_of_teacher_performance
 0.284243
 s_extent_of_class_env
 0.253826
 f_mother_age
 -0.033653
 s_frequency_of_computer_usage
 0.120296
 f_number_of_homework_hours_a_week
 0.023143
 s_extent_of_school_satisfaction
 0.140080
 f_mother_education_level
 -0.066000
 f_extent_of_family_satisfaction

```

0.057850
f_number_of_tech_at_home
-0.016357
f_frequency_of_books_at_home
0.017840
f_frequency_of_parent_involved_in_school_activi...
0.016874
s_gender
-0.013262
level_MAT
-0.038320

s_frequency_of_evaluations
\

s_frequency_of_work_with_teachers          0.459210
s_frequency_of_evaluations                1.000000
s_frequency_of_internet_usage             0.097839
s_frequency_of_materials_in_class         0.346366
f_ESCS                                    0.000752
s_extent_of_classmates_affinity          0.208706
s_extent_of_teacher_performance          0.405473
s_extent_of_class_env                   0.353524
f_mother_age                            -0.010146
s_frequency_of_computer_usage           0.064127
f_number_of_homework_hours_a_week       0.013561
s_extent_of_school_satisfaction        0.246491
f_mother_education_level                0.002241
f_extent_of_family_satisfaction        0.076432
f_number_of_tech_at_home                0.004816
f_frequency_of_books_at_home            0.024959
f_frequency_of_parent_involved_in_school_activi...
0.012819
s_gender                                  -0.028531
level_MAT                                0.033004

s_frequency_of_internet_usage  \
s_frequency_of_work_with_teachers
0.184811
s_frequency_of_evaluations
0.097839
s_frequency_of_internet_usage
1.000000
s_frequency_of_materials_in_class
0.215844
f_ESCS
-0.015618
s_extent_of_classmates_affinity
-0.043809

```

```

s_extent_of_teacher_performance
0.020481
s_extent_of_class_env
0.022687
f_mother_age
-0.006085
s_frequency_of_computer_usage
0.371735
f_number_of_homework_hours_a_week
-0.020469
s_extent_of_school_satisfaction
-0.039423
f_mother_education_level
-0.004143
f_extent_of_family_satisfaction
0.008416
f_number_of_tech_at_home
0.040167
f_frequency_of_books_at_home
0.023850
f_frequency_of_parent_involved_in_school_activi...
0.025514
s_gender
0.084017
level_MAT
-0.036665

s_frequency_of_materials_in_class \
s_frequency_of_work_with_teachers
0.407241
s_frequency_of_evaluations
0.346366
s_frequency_of_internet_usage
0.215844
s_frequency_of_materials_in_class
1.000000
f_ESCS
-0.068230
s_extent_of_classmates_affinity
0.075477
s_extent_of_teacher_performance
0.192643
s_extent_of_class_env
0.198315
f_mother_age
-0.030786
s_frequency_of_computer_usage

```

```

0.215274
  f_number_of_homework_hours_a_week
0.013483
  s_extent_of_school_satisfaction
0.088556
  f_mother_education_level
-0.068052
  f_extent_of_family_satisfaction
0.050423
  f_number_of_tech_at_home
-0.014722
  f_frequency_of_books_at_home
-0.004838
  f_frequency_of_parent_involved_in_school_activi...
0.039642
  s_gender
0.000793
  level_MAT
-0.066594

```

| | f_ESCS \ |
|--|-----------|
| s_frequency_of_work_with_teachers | -0.056927 |
| s_frequency_of_evaluations | 0.000752 |
| s_frequency_of_internet_usage | -0.015618 |
| s_frequency_of_materials_in_class | -0.068230 |
| f_ESCS | 1.000000 |
| s_extent_of_classmates_affinity | 0.040619 |
| s_extent_of_teacher_performance | 0.039800 |
| s_extent_of_class_env | 0.005268 |
| f_mother_age | 0.261448 |
| s_frequency_of_computer_usage | -0.044139 |
| f_number_of_homework_hours_a_week | 0.007309 |
| s_extent_of_school_satisfaction | 0.049781 |
| f_mother_education_level | 0.627503 |
| f_extent_of_family_satisfaction | -0.087052 |
| f_number_of_tech_at_home | 0.278867 |
| f_frequency_of_books_at_home | 0.175323 |
| f_frequency_of_parent_involved_in_school_activi... | 0.047424 |
| s_gender | 0.009554 |
| level_MAT | 0.250165 |

```

s_extent_of_classmates_affinity \
s_frequency_of_work_with_teachers
0.115582
  s_frequency_of_evaluations
0.208706
  s_frequency_of_internet_usage

```

```

-0.043809
  s_frequency_of_materials_in_class
0.075477
  f_ESCS
0.040619
  s_extent_of_classmates_affinity
1.000000
  s_extent_of_teacher_performance
0.455324
  s_extent_of_class_env
0.512753
  f_mother_age
0.040068
  s_frequency_of_computer_usage
-0.052212
  f_number_of_homework_hours_a_week
-0.008666
  s_extent_of_school_satisfaction
0.471544
  f_mother_education_level
0.048646
  f_extent_of_family_satisfaction
0.115887
  f_number_of_tech_at_home
0.037754
  f_frequency_of_books_at_home
0.021444
  f_frequency_of_parent_involved_in_school_activi...
0.030362
  s_gender
-0.055421
  level_MAT
0.132252

  s_extent_of_teacher_performance \
  s_frequency_of_work_with_teachers
0.284243
  s_frequency_of_evaluations
0.405473
  s_frequency_of_internet_usage
0.020481
  s_frequency_of_materials_in_class
0.192643
  f_ESCS
0.039800
  s_extent_of_classmates_affinity
0.455324

```

| | |
|--|-----------|
| s_extent_of_teacher_performance | |
| 1.000000 | |
| s_extent_of_class_env | |
| 0.699774 | |
| f_mother_age | |
| 0.011708 | |
| s_frequency_of_computer_usage | |
| -0.011863 | |
| f_number_of_homework_hours_a_week | |
| -0.008315 | |
| s_extent_of_school_satisfaction | |
| 0.572676 | |
| f_mother_education_level | |
| 0.039756 | |
| f_extent_of_family_satisfaction | |
| 0.132071 | |
| f_number_of_tech_at_home | |
| 0.047904 | |
| f_frequency_of_books_at_home | |
| 0.033481 | |
| f_frequency_of_parent_involved_in_school_activi... | |
| 0.015670 | |
| s_gender | |
| -0.044767 | |
| level_MAT | |
| 0.110412 | |
| s_extent_of_class_env \ | |
| s_frequency_of_work_with_teachers | 0.253826 |
| s_frequency_of_evaluations | 0.353524 |
| s_frequency_of_internet_usage | 0.022687 |
| s_frequency_of_materials_in_class | 0.198315 |
| f_ESCS | 0.005268 |
| s_extent_of_classmates_affinity | 0.512753 |
| s_extent_of_teacher_performance | 0.699774 |
| s_extent_of_class_env | 1.000000 |
| f_mother_age | 0.000189 |
| s_frequency_of_computer_usage | 0.014833 |
| f_number_of_homework_hours_a_week | -0.004051 |
| s_extent_of_school_satisfaction | 0.603268 |
| f_mother_education_level | 0.000608 |
| f_extent_of_family_satisfaction | 0.135805 |
| f_number_of_tech_at_home | 0.014492 |
| f_frequency_of_books_at_home | 0.039548 |
| f_frequency_of_parent_involved_in_school_activi... | 0.026473 |
| s_gender | -0.055349 |
| level_MAT | 0.059059 |

| | |
|--|----------------|
| | f_mother_age \ |
| s_frequency_of_work_with_teachers | -0.033653 |
| s_frequency_of_evaluations | -0.010146 |
| s_frequency_of_internet_usage | -0.006085 |
| s_frequency_of_materials_in_class | -0.030786 |
| f_ESCS | 0.261448 |
| s_extent_of_classmates_affinity | 0.040068 |
| s_extent_of_teacher_performance | 0.011708 |
| s_extent_of_class_env | 0.000189 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | -0.018088 |
| f_number_of_homework_hours_a_week | -0.019828 |
| s_extent_of_school_satisfaction | 0.024990 |
| f_mother_education_level | 0.250886 |
| f_extent_of_family_satisfaction | -0.013724 |
| f_number_of_tech_at_home | 0.058864 |
| f_frequency_of_books_at_home | 0.072558 |
| f_frequency_of_parent_involved_in_school_activi... | 0.060719 |
| s_gender | 0.021320 |
| level_MAT | 0.126018 |
| | |
| s_frequency_of_computer_usage \ | |
| s_frequency_of_work_with_teachers | |
| 0.120296 | |
| s_frequency_of_evaluations | |
| 0.064127 | |
| s_frequency_of_internet_usage | |
| 0.371735 | |
| s_frequency_of_materials_in_class | |
| 0.215274 | |
| f_ESCS | |
| -0.044139 | |
| s_extent_of_classmates_affinity | |
| -0.052212 | |
| s_extent_of_teacher_performance | |
| -0.011863 | |
| s_extent_of_class_env | |
| 0.014833 | |
| f_mother_age | |
| -0.018088 | |
| s_frequency_of_computer_usage | |
| 1.000000 | |
| f_number_of_homework_hours_a_week | |
| -0.011977 | |
| s_extent_of_school_satisfaction | |
| -0.051609 | |

```

f_mother_education_level
-0.035688
f_extent_of_family_satisfaction
0.007575
f_number_of_tech_at_home
0.012460
f_frequency_of_books_at_home
0.004609
f_frequency_of_parent_involved_in_school_activi...
0.040685
s_gender
0.019260
level_MAT
-0.072532

f_number_of_homework_hours_a_week \
s_frequency_of_work_with_teachers
0.023143
s_frequency_of_evaluations
0.013561
s_frequency_of_internet_usage
-0.020469
s_frequency_of_materials_in_class
0.013483
f_ESCS
0.007309
s_extent_of_classmates_affinity
-0.008666
s_extent_of_teacher_performance
-0.008315
s_extent_of_class_env
-0.004051
f_mother_age
-0.019828
s_frequency_of_computer_usage
-0.011977
f_number_of_homework_hours_a_week
1.000000
s_extent_of_school_satisfaction
-0.009182
f_mother_education_level
-0.008756
f_extent_of_family_satisfaction
-0.019991
f_number_of_tech_at_home
0.020601
f_frequency_of_books_at_home

```

```

0.057714
  f_frequency_of_parent_involved_in_school_activi...
0.015347
  s_gender
-0.033709
  level_MAT
-0.035409

s_extent_of_school_satisfaction \
  s_frequency_of_work_with_teachers
0.140080
  s_frequency_of_evaluations
0.246491
  s_frequency_of_internet_usage
-0.039423
  s_frequency_of_materials_in_class
0.088556
  f_ESCS
0.049781
  s_extent_of_classmates_affinity
0.471544
  s_extent_of_teacher_performance
0.572676
  s_extent_of_class_env
0.603268
  f_mother_age
0.024990
  s_frequency_of_computer_usage
-0.051609
  f_number_of_homework_hours_a_week
-0.009182
  s_extent_of_school_satisfaction
1.000000
  f_mother_education_level
0.042832
  f_extent_of_family_satisfaction
0.136325
  f_number_of_tech_at_home
0.039812
  f_frequency_of_books_at_home
0.036158
  f_frequency_of_parent_involved_in_school_activi...
0.016555
  s_gender
-0.054659
  level_MAT
0.123259

```

| | |
|--|-----------|
| f_mother_education_level | \ |
| s_frequency_of_work_with_teachers | -0.066000 |
| s_frequency_of_evaluations | 0.002241 |
| s_frequency_of_internet_usage | -0.004143 |
| s_frequency_of_materials_in_class | -0.068052 |
| f_ESCS | 0.627503 |
| s_extent_of_classmates_affinity | 0.048646 |
| s_extent_of_teacher_performance | 0.039756 |
| s_extent_of_class_env | 0.000608 |
| f_mother_age | 0.250886 |
| s_frequency_of_computer_usage | -0.035688 |
| f_number_of_homework_hours_a_week | -0.008756 |
| s_extent_of_school_satisfaction | 0.042832 |
| f_mother_education_level | 1.000000 |
| f_extent_of_family_satisfaction | -0.065329 |
| f_number_of_tech_at_home | 0.254568 |
| f_frequency_of_books_at_home | 0.146603 |
| f_frequency_of_parent_involved_in_school_activi... | 0.020266 |
| s_gender | 0.006079 |
| level_MAT | 0.284138 |
| f_extent_of_family_satisfaction | \ |
| s_frequency_of_work_with_teachers | |
| 0.057850 | |
| s_frequency_of_evaluations | |
| 0.076432 | |
| s_frequency_of_internet_usage | |
| 0.008416 | |
| s_frequency_of_materials_in_class | |
| 0.050423 | |
| f_ESCS | |
| -0.087052 | |
| s_extent_of_classmates_affinity | |
| 0.115887 | |
| s_extent_of_teacher_performance | |
| 0.132071 | |
| s_extent_of_class_env | |
| 0.135805 | |
| f_mother_age | |
| -0.013724 | |
| s_frequency_of_computer_usage | |
| 0.007575 | |
| f_number_of_homework_hours_a_week | |
| -0.019991 | |
| s_extent_of_school_satisfaction | |
| 0.136325 | |

| | |
|--|-----------|
| f_mother_education_level | |
| -0.065329 | |
| f_extent_of_family_satisfaction | |
| 1.000000 | |
| f_number_of_tech_at_home | |
| -0.030832 | |
| f_frequency_of_books_at_home | |
| 0.057873 | |
| f_frequency_of_parent_involved_in_school_activi... | |
| 0.136940 | |
| s_gender | |
| -0.024137 | |
| level_MAT | |
| 0.050280 | |
| f_number_of_tech_at_home \ | |
| s_frequency_of_work_with_teachers | -0.016357 |
| s_frequency_of_evaluations | 0.004816 |
| s_frequency_of_internet_usage | 0.040167 |
| s_frequency_of_materials_in_class | -0.014722 |
| f_ESCS | 0.278867 |
| s_extent_of_classmates_affinity | 0.037754 |
| s_extent_of_teacher_performance | 0.047904 |
| s_extent_of_class_env | 0.014492 |
| f_mother_age | 0.058864 |
| s_frequency_of_computer_usage | 0.012460 |
| f_number_of_homework_hours_a_week | 0.020601 |
| s_extent_of_school_satisfaction | 0.039812 |
| f_mother_education_level | 0.254568 |
| f_extent_of_family_satisfaction | -0.030832 |
| f_number_of_tech_at_home | 1.000000 |
| f_frequency_of_books_at_home | 0.063726 |
| f_frequency_of_parent_involved_in_school_activi... | -0.011387 |
| s_gender | -0.009508 |
| level_MAT | 0.143473 |
| f_frequency_of_books_at_home \ | |
| s_frequency_of_work_with_teachers | |
| 0.017840 | |
| s_frequency_of_evaluations | |
| 0.024959 | |
| s_frequency_of_internet_usage | |
| 0.023850 | |
| s_frequency_of_materials_in_class | |
| -0.004838 | |
| f_ESCS | |
| 0.175323 | |

```

s_extent_of_classmates_affinity
0.021444
s_extent_of_teacher_performance
0.033481
s_extent_of_class_env
0.039548
f_mother_age
0.072558
s_frequency_of_computer_usage
0.004609
f_number_of_homework_hours_a_week
0.057714
s_extent_of_school_satisfaction
0.036158
f_mother_education_level
0.146603
f_extent_of_family_satisfaction
0.057873
f_number_of_tech_at_home
0.063726
f_frequency_of_books_at_home
1.000000
f_frequency_of_parent_involved_in_school_activi...
0.179154
s_gender
-0.037040
level_MAT
0.097342

f_frequency_of_parent_involved_in_school_activities \
s_frequency_of_work_with_teachers
0.016874
s_frequency_of_evaluations
0.012819
s_frequency_of_internet_usage
0.025514
s_frequency_of_materials_in_class
0.039642
f_ESCS
0.047424
s_extent_of_classmates_affinity
0.030362
s_extent_of_teacher_performance
0.015670
s_extent_of_class_env
0.026473
f_mother_age

```

```

0.060719
    s_frequency_of_computer_usage
0.040685
    f_number_of_homework_hours_a_week
0.015347
    s_extent_of_school_satisfaction
0.016555
    f_mother_education_level
0.020266
    f_extent_of_family_satisfaction
0.136940
    f_number_of_tech_at_home
-0.011387
    f_frequency_of_books_at_home
0.179154
    f_frequency_of_parent_involved_in_school_activi...
1.000000
    s_gender
-0.007350
    level_MAT
0.002740

```

| | s_gender | level_MAT |
|--|-----------|------------|
| s_frequency_of_work_with_teachers | -0.013262 | -0.038320 |
| s_frequency_of_evaluations | -0.028531 | 0.033004 |
| s_frequency_of_internet_usage | 0.084017 | -0.036665 |
| s_frequency_of_materials_in_class | 0.000793 | -0.066594 |
| f_ESCS | 0.009554 | 0.250165 |
| s_extent_of_classmates_affinity | -0.055421 | 0.132252 |
| s_extent_of_teacher_performance | -0.044767 | 0.110412 |
| s_extent_of_class_env | -0.055349 | 0.059059 |
| f_mother_age | 0.021320 | 0.126018 |
| s_frequency_of_computer_usage | 0.019260 | -0.072532 |
| f_number_of_homework_hours_a_week | -0.033709 | -0.035409 |
| s_extent_of_school_satisfaction | -0.054659 | 0.123259 |
| f_mother_education_level | 0.006079 | 0.284138 |
| f_extent_of_family_satisfaction | -0.024137 | 0.050280 |
| f_number_of_tech_at_home | -0.009508 | 0.143473 |
| f_frequency_of_books_at_home | -0.037040 | 0.097342 |
| f_frequency_of_parent_involved_in_school_activi... | -0.007350 | 0.002740 |
| s_gender | 1.000000 | 0.015317 |
| level_MAT | 0.015317 | 1.000000) |

```
[203]: final_df = final_df[~final_df.isnull().any(axis=1)]
```

```
[204]: compute_exploratory_analysis(df=final_df, column_pattern=None, ↴
    ↴missing_threshold=0.3, annot=False)
```

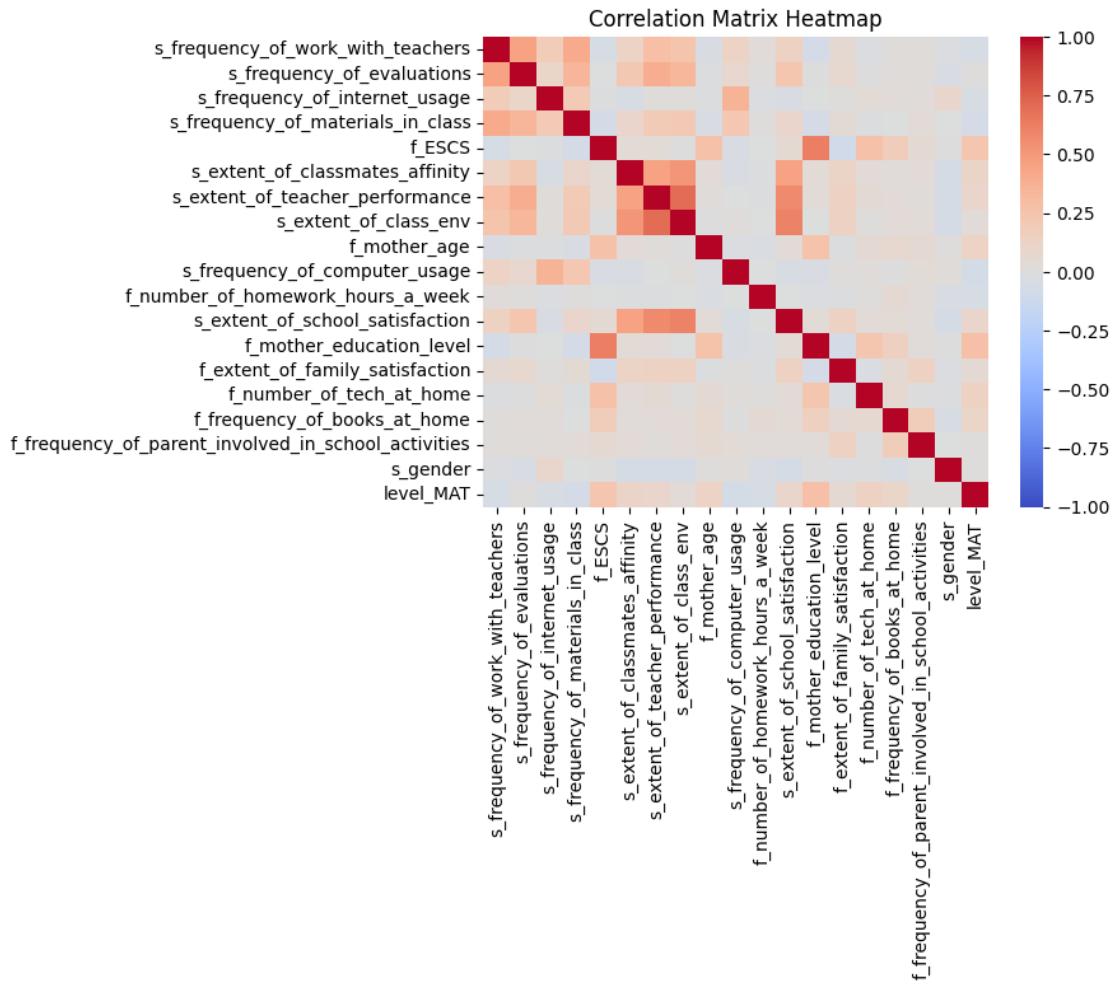
GOOD FEATURES: 19

| | |
|---|-----|
| s_frequency_of_work_with_teachers | 0.0 |
| s_frequency_of_evaluations | 0.0 |
| s_frequency_of_internet_usage | 0.0 |
| s_frequency_of_materials_in_class | 0.0 |
| f_ESCS | 0.0 |
| s_extent_of_classmates_affinity | 0.0 |
| s_extent_of_teacher_performance | 0.0 |
| s_extent_of_class_env | 0.0 |
| f_mother_age | 0.0 |
| s_frequency_of_computer_usage | 0.0 |
| f_number_of_homework_hours_a_week | 0.0 |
| s_extent_of_school_satisfaction | 0.0 |
| f_mother_education_level | 0.0 |
| f_extent_of_family_satisfaction | 0.0 |
| f_number_of_tech_at_home | 0.0 |
| f_frequency_of_books_at_home | 0.0 |
| f_frequency_of_parent_involved_in_school_activities | 0.0 |
| s_gender | 0.0 |
| level_MAT | 0.0 |

dtype: float64

BAD FEATURES

Series([], dtype: float64)



| | s_frequency_of_work_with_teachers \ id_questionnaire |
|-------|---|
| 1 | 0.733333 |
| 3 | 0.833333 |
| 5 | 0.566667 |
| 6 | 0.533333 |
| 8 | 0.633333 |
| ... | ... |
| 20421 | 0.566667 |
| 20422 | 0.700000 |
| 20423 | 0.400000 |
| 20424 | 0.500000 |
| 20427 | 0.666667 |
| | s_frequency_of_evaluations s_frequency_of_internet_usage \ id_questionnaire |
| 1 | 0.740741 0.066667 |

| | | |
|---|----------|-----------|
| 3 | 0.750000 | 0.666667 |
| 5 | 0.888889 | 0.133333 |
| 6 | 0.851852 | 0.133333 |
| 8 | 0.703704 | 0.266667 |
| ... | ... | ... |
| 20421 | 0.777778 | 0.600000 |
| 20422 | 0.518519 | 0.266667 |
| 20423 | 0.555556 | 0.400000 |
| 20424 | 0.555556 | 0.200000 |
| 20427 | 0.740741 | 0.133333 |
| s_frequency_of_materials_in_class \ | | |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 3 | 1.000000 | 0.261451 |
| 5 | 0.666667 | 3.151773 |
| 6 | 0.380952 | -1.627731 |
| 8 | 0.666667 | -0.358498 |
| ... | ... | ... |
| 20421 | 0.476190 | -0.764891 |
| 20422 | 0.380952 | -0.048524 |
| 20423 | 0.571429 | 0.072922 |
| 20424 | 0.523810 | 2.755881 |
| 20427 | 0.476190 | 1.372627 |
| s_extent_of_classmates_affinity \ | | |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 3 | 0.833333 | |
| 5 | 0.952381 | |
| 6 | 0.761905 | |
| 8 | 0.857143 | |
| ... | ... | ... |
| 20421 | 0.904762 | |
| 20422 | 0.952381 | |
| 20423 | 0.809524 | |
| 20424 | 0.904762 | |
| 20427 | 0.857143 | |
| s_extent_of_teacher_performance s_extent_of_class_env \ | | |
| id_questionnaire | | |
| 1 | 0.833333 | 0.791667 |
| 3 | 0.800000 | 0.833333 |
| 5 | 1.000000 | 1.000000 |
| 6 | 0.866667 | 1.000000 |
| 8 | 0.966667 | 0.833333 |
| ... | ... | ... |
| 20421 | 1.000000 | 1.000000 |

| | | | |
|------------------|-----------------------------------|-------------------------------|----------|
| 20422 | | 0.888889 | 0.916667 |
| 20423 | | 1.000000 | 0.666667 |
| 20424 | | 0.766667 | 0.791667 |
| 20427 | | 0.900000 | 0.916667 |
| | f_mother_age | s_frequency_of_computer_usage | \ |
| id_questionnaire | | | |
| 1 | 43.0 | 0.111111 | |
| 3 | 45.0 | 0.666667 | |
| 5 | 39.0 | 0.000000 | |
| 6 | 25.0 | 0.222222 | |
| 8 | 37.0 | 0.333333 | |
| ... | ... | ... | |
| 20421 | 41.0 | 0.111111 | |
| 20422 | 36.0 | 0.222222 | |
| 20423 | 46.0 | 0.111111 | |
| 20424 | 41.0 | 0.111111 | |
| 20427 | 37.0 | 0.000000 | |
| | f_number_of_homework_hours_a_week | \ | |
| id_questionnaire | | | |
| 1 | 14.0 | | |
| 3 | 9.0 | | |
| 5 | 6.0 | | |
| 6 | 5.0 | | |
| 8 | 10.0 | | |
| ... | ... | ... | |
| 20421 | 14.0 | | |
| 20422 | 2.0 | | |
| 20423 | 8.0 | | |
| 20424 | 2.0 | | |
| 20427 | 1.0 | | |
| | s_extent_of_school_satisfaction | f_mother_education_level | \ |
| id_questionnaire | | | |
| 1 | 0.944444 | 7.0 | |
| 3 | 0.888889 | 3.0 | |
| 5 | 1.000000 | 9.0 | |
| 6 | 1.000000 | 3.0 | |
| 8 | 0.833333 | 7.0 | |
| ... | ... | ... | |
| 20421 | 1.000000 | 5.0 | |
| 20422 | 0.944444 | 4.0 | |
| 20423 | 1.000000 | 3.0 | |
| 20424 | 0.833333 | 9.0 | |
| 20427 | 1.000000 | 5.0 | |
| | f_extent_of_family_satisfaction | f_number_of_tech_at_home | \ |

```

id_questionnaire
1                      0.700000          3.0
3                      0.291667          4.0
5                      0.833333          7.0
6                      0.833333          3.0
8                      1.000000          3.0
...
...                   ...
20421                  1.000000          4.0
20422                  0.708333          5.0
20423                  0.833333         10.0
20424                  0.666667         10.0
20427                  0.291667          5.0

f_frequency_of_books_at_home \
id_questionnaire
1                      1.000000
3                      0.444444
5                      0.555556
6                      0.333333
8                      0.555556
...
...                   ...
20421                  0.222222
20422                  0.555556
20423                  0.444444
20424                  0.555556
20427                  0.444444

f_frequency_of_parent_involved_in_school_activities \
id_questionnaire
1                      0.333333
3                      0.166667
5                      0.250000
6                      0.083333
8                      0.333333
...
...                   ...
20421                  0.333333
20422                  0.000000
20423                  0.000000
20424                  0.416667
20427                  0.000000

s_gender  level_MAT
id_questionnaire
1           FEMALE    3.0
3           FEMALE    1.0
5           FEMALE    4.0
6           FEMALE    1.0
8            MALE     2.0

```

| 20421 | MALE | ... | 2.0 |
|-------|--------|-----|-----|
| 20422 | FEMALE | ... | 3.0 |
| 20423 | MALE | ... | 2.0 |
| 20424 | MALE | ... | 3.0 |
| 20427 | FEMALE | ... | 2.0 |

[10735 rows x 19 columns]

| s_frequency_of_work_with_teachers | \ | | 1. |
|--|---------|--|-----|
| s_frequency_of_work_with_teachers | ~000000 | | |
| s_frequency_of_evaluations | ~454881 | | 0. |
| s_frequency_of_internet_usage | ~194741 | | 0. |
| s_frequency_of_materials_in_class | ~409276 | | 0. |
| f_ESCS | ~054629 | | -0. |
| s_extent_of_classmates_affinity | ~125635 | | 0. |
| s_extent_of_teacher_performance | ~284706 | | 0. |
| s_extent_of_class_env | ~256114 | | 0. |
| f_mother_age | ~037594 | | -0. |
| s_frequency_of_computer_usage | ~126924 | | 0. |
| f_number_of_homework_hours_a_week | ~024993 | | 0. |
| s_extent_of_school_satisfaction | ~136178 | | 0. |
| f_mother_education_level | ~068564 | | -0. |
| f_extent_of_family_satisfaction | ~056726 | | 0. |
| f_number_of_tech_at_home | ~017440 | | -0. |
| f_frequency_of_books_at_home | ~023068 | | 0. |
| f_frequency_of_parent_involved_in_school_activi... | ~017585 | | 0. |
| s_gender | ~018127 | | -0. |

| | |
|--|------------------------------|
| level_MAT | -0. |
| ↳052970 | |
| | s_frequency_of_evaluations \ |
| | 0.454881 |
| s_frequency_of_work_with_teachers | 1.000000 |
| s_frequency_of_evaluations | 0.106232 |
| s_frequency_of_internet_usage | 0.351169 |
| s_frequency_of_materials_in_class | -0.000939 |
| f_ESCS | 0.221110 |
| s_extent_of_classmates_affinity | 0.397563 |
| s_extent_of_teacher_performance | 0.342555 |
| s_extent_of_class_env | -0.012102 |
| f_mother_age | 0.080795 |
| s_frequency_of_computer_usage | 0.014494 |
| f_number_of_homework_hours_a_week | 0.237172 |
| s_extent_of_school_satisfaction | 0.003207 |
| f_mother_education_level | 0.077667 |
| f_extent_of_family_satisfaction | 0.000708 |
| f_number_of_tech_at_home | 0.028708 |
| f_frequency_of_books_at_home | 0.017756 |
| f_frequency_of_parent_involved_in_school_activi... | -0.035529 |
| s_gender | 0.014032 |
| level_MAT | |
| | □ |
| ↳s_frequency_of_internet_usage \ | 0.194741 |
| s_frequency_of_work_with_teachers | 0.106232 |
| s_frequency_of_evaluations | 1.000000 |
| s_frequency_of_internet_usage | 0.206295 |
| s_frequency_of_materials_in_class | -0.012901 |
| f_ESCS | -0.043188 |
| s_extent_of_classmates_affinity | 0.022901 |
| s_extent_of_teacher_performance | 0.018326 |
| s_extent_of_class_env | -0.008697 |
| f_mother_age | 0.366037 |
| s_frequency_of_computer_usage | -0.019355 |
| f_number_of_homework_hours_a_week | -0.033456 |
| s_extent_of_school_satisfaction | -0.005847 |
| f_mother_education_level | 0.015617 |
| f_extent_of_family_satisfaction | 0.045162 |
| f_number_of_tech_at_home | 0.025437 |
| f_frequency_of_books_at_home | 0.026814 |
| f_frequency_of_parent_involved_in_school_activi... | 0.086346 |
| s_gender | -0.039068 |
| level_MAT | |

| | □ |
|--|-----------|
| s_frequency_of_materials_in_class \ | 0. |
| s_frequency_of_work_with_teachers | 0. |
| ↳409276 | |
| s_frequency_of_evaluations | 0. |
| ↳351169 | |
| s_frequency_of_internet_usage | 0. |
| ↳206295 | |
| s_frequency_of_materials_in_class | 1. |
| ↳000000 | |
| f_ESCS | -0. |
| ↳068555 | |
| s_extent_of_classmates_affinity | 0. |
| ↳099953 | |
| s_extent_of_teacher_performance | 0. |
| ↳201062 | |
| s_extent_of_class_env | 0. |
| ↳211431 | |
| f_mother_age | -0. |
| ↳033654 | |
| s_frequency_of_computer_usage | 0. |
| ↳229184 | |
| f_number_of_homework_hours_a_week | 0. |
| ↳013167 | |
| s_extent_of_school_satisfaction | 0. |
| ↳099923 | |
| f_mother_education_level | -0. |
| ↳069164 | |
| f_extent_of_family_satisfaction | 0. |
| ↳051873 | |
| f_number_of_tech_at_home | -0. |
| ↳014363 | |
| f_frequency_of_books_at_home | -0. |
| ↳007351 | |
| f_frequency_of_parent_involved_in_school_activi... | 0. |
| ↳038761 | |
| s_gender | -0. |
| ↳002908 | |
| level_MAT | -0. |
| ↳065283 | |
| f_ESCS \ | |
| s_frequency_of_work_with_teachers | -0.054629 |
| s_frequency_of_evaluations | -0.000939 |
| s_frequency_of_internet_usage | -0.012901 |
| s_frequency_of_materials_in_class | -0.068555 |

| | |
|--|-----------|
| f_ESCS | 1.000000 |
| s_extent_of_classmates_affinity | 0.039126 |
| s_extent_of_teacher_performance | 0.042015 |
| s_extent_of_class_env | 0.006251 |
| f_mother_age | 0.266225 |
| s_frequency_of_computer_usage | -0.037662 |
| f_number_of_homework_hours_a_week | -0.003042 |
| s_extent_of_school_satisfaction | 0.056717 |
| f_mother_education_level | 0.621918 |
| f_extent_of_family_satisfaction | -0.086076 |
| f_number_of_tech_at_home | 0.268389 |
| f_frequency_of_books_at_home | 0.177241 |
| f_frequency_of_parent_involved_in_school_activi... | 0.058164 |
| s_gender | 0.006280 |
| level_MAT | 0.241087 |

| | |
|-------------------------------------|-----|
| □ | |
| ↳ s_extent_of_classmates_affinity \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳ 125635 | |
| s_frequency_of_evaluations | 0. |
| ↳ 221110 | |
| s_frequency_of_internet_usage | -0. |
| ↳ 043188 | |
| s_frequency_of_materials_in_class | 0. |
| ↳ 099953 | |
| f_ESCS | 0. |
| ↳ 039126 | |
| s_extent_of_classmates_affinity | 1. |
| ↳ 000000 | |
| s_extent_of_teacher_performance | 0. |
| ↳ 457112 | |
| s_extent_of_class_env | 0. |
| ↳ 518564 | |
| f_mother_age | 0. |
| ↳ 038003 | |
| s_frequency_of_computer_usage | -0. |
| ↳ 035870 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳ 010784 | |
| s_extent_of_school_satisfaction | 0. |
| ↳ 459867 | |
| f_mother_education_level | 0. |
| ↳ 045788 | |
| f_extent_of_family_satisfaction | 0. |
| ↳ 123810 | |

| | |
|--|----------|
| f_number_of_tech_at_home | 0. |
| ↳033261 | |
| f_frequency_of_books_at_home | 0. |
| ↳024182 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.034539 |
| s_gender | -0. |
| ↳056301 | |
| level_MAT | 0. |
| ↳113418 | |
| □ | |
| ↳s_extent_of_teacher_performance \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳284706 | |
| s_frequency_of_evaluations | 0. |
| ↳397563 | |
| s_frequency_of_internet_usage | 0. |
| ↳022901 | |
| s_frequency_of_materials_in_class | 0. |
| ↳201062 | |
| f_ESCS | 0. |
| ↳042015 | |
| s_extent_of_classmates_affinity | 0. |
| ↳457112 | |
| s_extent_of_teacher_performance | 1. |
| ↳000000 | |
| s_extent_of_class_env | 0. |
| ↳700419 | |
| f_mother_age | 0. |
| ↳017997 | |
| s_frequency_of_computer_usage | -0. |
| ↳001503 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳010408 | |
| s_extent_of_school_satisfaction | 0. |
| ↳572681 | |
| f_mother_education_level | 0. |
| ↳036255 | |
| f_extent_of_family_satisfaction | 0. |
| ↳136448 | |
| f_number_of_tech_at_home | 0. |
| ↳047870 | |
| f_frequency_of_books_at_home | 0. |
| ↳036880 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.023407 |

| | |
|--|-------------------------|
| s_gender | -0. |
| ↳054769 | |
| level_MAT | 0. |
| ↳094313 | |
| | |
| s_frequency_of_work_with_teachers | s_extent_of_class_env \ |
| s_frequency_of_evaluations | 0.256114 |
| s_frequency_of_internet_usage | 0.342555 |
| s_frequency_of_materials_in_class | 0.018326 |
| f_ESCS | 0.211431 |
| s_extent_of_classmates_affinity | 0.006251 |
| s_extent_of_teacher_performance | 0.518564 |
| s_extent_of_class_env | 0.700419 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | 0.002250 |
| f_number_of_homework_hours_a_week | 0.021759 |
| s_extent_of_school_satisfaction | -0.003077 |
| f_mother_education_level | 0.605949 |
| f_extent_of_family_satisfaction | -0.002109 |
| f_number_of_tech_at_home | 0.140228 |
| f_frequency_of_books_at_home | 0.014887 |
| f_frequency_of_parent_involved_in_school_activi... | 0.038779 |
| s_gender | 0.035032 |
| level_MAT | -0.059657 |
| | 0.035256 |
| | |
| | f_mother_age \ |
| s_frequency_of_work_with_teachers | -0.037594 |
| s_frequency_of_evaluations | -0.012102 |
| s_frequency_of_internet_usage | -0.008697 |
| s_frequency_of_materials_in_class | -0.033654 |
| f_ESCS | 0.266225 |
| s_extent_of_classmates_affinity | 0.038003 |
| s_extent_of_teacher_performance | 0.017997 |
| s_extent_of_class_env | 0.002250 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | -0.021918 |
| f_number_of_homework_hours_a_week | -0.027460 |
| s_extent_of_school_satisfaction | 0.031414 |
| f_mother_education_level | 0.257911 |
| f_extent_of_family_satisfaction | -0.014695 |
| f_number_of_tech_at_home | 0.056860 |
| f_frequency_of_books_at_home | 0.073622 |
| f_frequency_of_parent_involved_in_school_activi... | 0.060336 |
| s_gender | 0.014927 |
| level_MAT | 0.127296 |

| | |
|--|-----------|
| s_frequency_of_computer_usage \ | 0.126924 |
| s_frequency_of_work_with_teachers | 0.080795 |
| s_frequency_of_evaluations | 0.366037 |
| s_frequency_of_internet_usage | 0.229184 |
| s_frequency_of_materials_in_class | -0.037662 |
| f_ESCS | -0.035870 |
| s_extent_of_classmates_affinity | -0.001503 |
| s_extent_of_teacher_performance | 0.021759 |
| s_extent_of_class_env | -0.021918 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | -0.007628 |
| f_number_of_homework_hours_a_week | -0.040981 |
| s_extent_of_school_satisfaction | -0.034161 |
| f_mother_education_level | 0.015375 |
| f_extent_of_family_satisfaction | 0.020655 |
| f_number_of_tech_at_home | 0.001636 |
| f_frequency_of_books_at_home | 0.043040 |
| f_frequency_of_parent_involved_in_school_activi... | 0.021234 |
| s_gender | -0.072849 |
| level_MAT | |

| | |
|-------------------------------------|-----|
| f_number_of_homework_hours_a_week \ | 0. |
| s_frequency_of_work_with_teachers | 0. |
| s_frequency_of_evaluations | 0. |
| s_frequency_of_internet_usage | -0. |
| s_frequency_of_materials_in_class | 0. |
| f_ESCS | -0. |
| s_extent_of_classmates_affinity | -0. |
| s_extent_of_teacher_performance | -0. |
| s_extent_of_class_env | -0. |
| f_mother_age | -0. |
| s_frequency_of_computer_usage | -0. |
| f_number_of_homework_hours_a_week | 1. |

| | |
|--|-----|
| s_extent_of_school_satisfaction | -0. |
| ↳007675 | |
| f_mother_education_level | -0. |
| ↳021123 | |
| f_extent_of_family_satisfaction | -0. |
| ↳014983 | |
| f_number_of_tech_at_home | 0. |
| ↳013894 | |
| f_frequency_of_books_at_home | 0. |
| ↳060948 | |
| f_frequency_of_parent_involved_in_school_activi... | 0. |
| ↳025651 | |
| s_gender | -0. |
| ↳035562 | |
| level_MAT | -0. |
| ↳049336 | |

| | |
|------------------------------------|-----|
| ↳s_extent_of_school_satisfaction \ | □ |
| s_frequency_of_work_with_teachers | 0. |
| ↳136178 | |
| s_frequency_of_evaluations | 0. |
| ↳237172 | |
| s_frequency_of_internet_usage | -0. |
| ↳033456 | |
| s_frequency_of_materials_in_class | 0. |
| ↳099923 | |
| f_ESCS | 0. |
| ↳056717 | |
| s_extent_of_classmates_affinity | 0. |
| ↳459867 | |
| s_extent_of_teacher_performance | 0. |
| ↳572681 | |
| s_extent_of_class_env | 0. |
| ↳605949 | |
| f_mother_age | 0. |
| ↳031414 | |
| s_frequency_of_computer_usage | -0. |
| ↳040981 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳007675 | |
| s_extent_of_school_satisfaction | 1. |
| ↳000000 | |
| f_mother_education_level | 0. |
| ↳046073 | |

| | |
|--|-----------|
| f_extent_of_family_satisfaction | 0. |
| ↳144083 | |
| f_number_of_tech_at_home | 0. |
| ↳035594 | |
| f_frequency_of_books_at_home | 0. |
| ↳042360 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.024147 |
| s_gender | -0. |
| ↳057120 | |
| level_MAT | 0. |
| ↳099471 | |
| f_mother_education_level \ | |
| s_frequency_of_work_with_teachers | -0.068564 |
| s_frequency_of_evaluations | 0.003207 |
| s_frequency_of_internet_usage | -0.005847 |
| s_frequency_of_materials_in_class | -0.069164 |
| f_ESCS | 0.621918 |
| s_extent_of_classmates_affinity | 0.045788 |
| s_extent_of_teacher_performance | 0.036255 |
| s_extent_of_class_env | -0.002109 |
| f_mother_age | 0.257911 |
| s_frequency_of_computer_usage | -0.034161 |
| f_number_of_homework_hours_a_week | -0.021123 |
| s_extent_of_school_satisfaction | 0.046073 |
| f_mother_education_level | 1.000000 |
| f_extent_of_family_satisfaction | -0.067264 |
| f_number_of_tech_at_home | 0.239962 |
| f_frequency_of_books_at_home | 0.151003 |
| f_frequency_of_parent_involved_in_school_activi... | 0.027669 |
| s_gender | 0.002725 |
| level_MAT | 0.278425 |

| | |
|------------------------------------|-----|
| ↳f_extent_of_family_satisfaction \ | |
| s_frequency_of_work_with_teachers | 0. |
| ↳056726 | |
| s_frequency_of_evaluations | 0. |
| ↳077667 | |
| s_frequency_of_internet_usage | 0. |
| ↳015617 | |
| s_frequency_of_materials_in_class | 0. |
| ↳051873 | |
| f_ESCS | -0. |
| ↳086076 | |
| s_extent_of_classmates_affinity | 0. |
| ↳123810 | |

| | |
|--|----------|
| s_extent_of_teacher_performance | 0. |
| ↳136448 | |
| s_extent_of_class_env | 0. |
| ↳140228 | |
| f_mother_age | -0. |
| ↳014695 | |
| s_frequency_of_computer_usage | 0. |
| ↳015375 | |
| f_number_of_homework_hours_a_week | -0. |
| ↳014983 | |
| s_extent_of_school_satisfaction | 0. |
| ↳144083 | |
| f_mother_education_level | -0. |
| ↳067264 | |
| f_extent_of_family_satisfaction | 1. |
| ↳000000 | |
| f_number_of_tech_at_home | -0. |
| ↳029384 | |
| f_frequency_of_books_at_home | 0. |
| ↳061662 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.137134 |
| s_gender | -0. |
| ↳017418 | |
| level_MAT | 0. |
| ↳056351 | |

| | |
|--|-----------|
| f_number_of_tech_at_home | \ |
| s_frequency_of_work_with_teachers | -0.017440 |
| s_frequency_of_evaluations | 0.000708 |
| s_frequency_of_internet_usage | 0.045162 |
| s_frequency_of_materials_in_class | -0.014363 |
| f_ESCS | 0.268389 |
| s_extent_of_classmates_affinity | 0.033261 |
| s_extent_of_teacher_performance | 0.047870 |
| s_extent_of_class_env | 0.014887 |
| f_mother_age | 0.056860 |
| s_frequency_of_computer_usage | 0.020655 |
| f_number_of_homework_hours_a_week | 0.013894 |
| s_extent_of_school_satisfaction | 0.035594 |
| f_mother_education_level | 0.239962 |
| f_extent_of_family_satisfaction | -0.029384 |
| f_number_of_tech_at_home | 1.000000 |
| f_frequency_of_books_at_home | 0.066989 |
| f_frequency_of_parent_involved_in_school_activi... | 0.000961 |
| s_gender | -0.013463 |
| level_MAT | 0.136941 |

| | | |
|--|------------------------------|---|
| | f_frequency_of_books_at_home | □ |
| ↳ \ | | |
| s_frequency_of_work_with_teachers | 0.023068 | |
| s_frequency_of_evaluations | 0.028708 | |
| s_frequency_of_internet_usage | 0.025437 | |
| s_frequency_of_materials_in_class | -0.007351 | |
| f_ESCS | 0.177241 | |
| s_extent_of_classmates_affinity | 0.024182 | |
| s_extent_of_teacher_performance | 0.036880 | |
| s_extent_of_class_env | 0.038779 | |
| f_mother_age | 0.073622 | |
| s_frequency_of_computer_usage | 0.001636 | |
| f_number_of_homework_hours_a_week | 0.060948 | |
| s_extent_of_school_satisfaction | 0.042360 | |
| f_mother_education_level | 0.151003 | |
| f_extent_of_family_satisfaction | 0.061662 | |
| f_number_of_tech_at_home | 0.066989 | |
| f_frequency_of_books_at_home | 1.000000 | |
| f_frequency_of_parent_involved_in_school_activi... | 0.175514 | |
| s_gender | -0.039330 | |
| level_MAT | 0.105491 | |

| | | |
|-----------------------------------|---|---|
| | f_frequency_of_parent_involved_in_school_activities | □ |
| ↳ \ | | |
| s_frequency_of_work_with_teachers | 0.017585 | □ |
| ↳ | 0.017585 | |
| s_frequency_of_evaluations | 0.017756 | □ |
| ↳ | 0.017756 | |
| s_frequency_of_internet_usage | 0.026814 | □ |
| ↳ | 0.026814 | |
| s_frequency_of_materials_in_class | 0.038761 | □ |
| ↳ | 0.038761 | |
| f_ESCS | 0.058164 | □ |
| ↳ | 0.058164 | |
| s_extent_of_classmates_affinity | 0.034539 | □ |
| ↳ | 0.034539 | |
| s_extent_of_teacher_performance | 0.023407 | □ |
| ↳ | 0.023407 | |
| s_extent_of_class_env | 0.035032 | □ |
| ↳ | 0.035032 | |
| f_mother_age | 0.060336 | □ |
| ↳ | 0.060336 | |
| s_frequency_of_computer_usage | 0.043040 | □ |
| ↳ | 0.043040 | |
| f_number_of_homework_hours_a_week | 0.025651 | □ |
| ↳ | 0.025651 | |

```

s_extent_of_school_satisfaction          □
  ↳          0.024147
f_mother_education_level                □
  ↳          0.027669
f_extent_of_family_satisfaction         □
  ↳          0.137134
f_number_of_tech_at_home                □
  ↳          0.000961
f_frequency_of_books_at_home            □
  ↳          0.175514
f_frequency_of_parent_involved_in_school_activi... □
  ↳          1.000000
s_gender                                □
  ↳          -0.002085
level_MAT                               □
  ↳          0.009686

s_frequency_of_work_with_teachers        s_gender   level_MAT
s_frequency_of_evaluations               -0.018127  -0.052970
s_frequency_of_internet_usage            -0.035529  0.014032
s_frequency_of_materials_in_class       0.086346  -0.039068
f_ESCS                                  -0.002908  -0.065283
f_mother_age                            0.006280  0.241087
s_extent_of_classmates_affinity         -0.056301  0.113418
s_extent_of_teacher_performance         -0.054769  0.094313
s_extent_of_class_env                  -0.059657  0.035256
f_mother_age                            0.014927  0.127296
s_frequency_of_computer_usage          0.021234  -0.072849
f_number_of_homework_hours_a_week      -0.035562  -0.049336
s_extent_of_school_satisfaction        -0.057120  0.099471
f_mother_education_level              0.002725  0.278425
f_extent_of_family_satisfaction       -0.017418  0.056351
f_number_of_tech_at_home              -0.013463  0.136941
f_frequency_of_books_at_home          -0.039330  0.105491
f_frequency_of_parent_involved_in_school_activi... -0.002085  0.009686
s_gender                                1.000000  0.013750
level_MAT                               0.013750  1.000000

```

```
[204]: (           s_frequency_of_work_with_teachers  \
    id_questionnaire
    1                      0.733333
    3                      0.833333
    5                      0.566667
    6                      0.533333
    8                      0.633333
    ...
    20421                 0.566667
```

| | | |
|------------------|-----------------------------------|---------------------------------|
| 20422 | | 0.700000 |
| 20423 | | 0.400000 |
| 20424 | | 0.500000 |
| 20427 | | 0.666667 |
| | s_frequency_of_evaluations | s_frequency_of_internet_usage \ |
| id_questionnaire | | |
| 1 | 0.740741 | 0.066667 |
| 3 | 0.750000 | 0.666667 |
| 5 | 0.888889 | 0.133333 |
| 6 | 0.851852 | 0.133333 |
| 8 | 0.703704 | 0.266667 |
| ... | ... | ... |
| 20421 | 0.777778 | 0.600000 |
| 20422 | 0.518519 | 0.266667 |
| 20423 | 0.555556 | 0.400000 |
| 20424 | 0.555556 | 0.200000 |
| 20427 | 0.740741 | 0.133333 |
| | s_frequency_of_materials_in_class | f_ESCS \ |
| id_questionnaire | | |
| 1 | 0.380952 | 0.235340 |
| 3 | 1.000000 | 0.261451 |
| 5 | 0.666667 | 3.151773 |
| 6 | 0.380952 | -1.627731 |
| 8 | 0.666667 | -0.358498 |
| ... | ... | ... |
| 20421 | 0.476190 | -0.764891 |
| 20422 | 0.380952 | -0.048524 |
| 20423 | 0.571429 | 0.072922 |
| 20424 | 0.523810 | 2.755881 |
| 20427 | 0.476190 | 1.372627 |
| | s_extent_of_classmates_affinity \ | |
| id_questionnaire | | |
| 1 | 0.714286 | |
| 3 | 0.833333 | |
| 5 | 0.952381 | |
| 6 | 0.761905 | |
| 8 | 0.857143 | |
| ... | ... | |
| 20421 | 0.904762 | |
| 20422 | 0.952381 | |
| 20423 | 0.809524 | |
| 20424 | 0.904762 | |
| 20427 | 0.857143 | |

| | s_extent_of_teacher_performance | s_extent_of_class_env | \ |
|-------------------------|-----------------------------------|-------------------------------|---|
| id_questionnaire | | | |
| 1 | 0.833333 | 0.791667 | |
| 3 | 0.800000 | 0.833333 | |
| 5 | 1.000000 | 1.000000 | |
| 6 | 0.866667 | 1.000000 | |
| 8 | 0.966667 | 0.833333 | |
| ... | ... | ... | |
| 20421 | 1.000000 | 1.000000 | |
| 20422 | 0.888889 | 0.916667 | |
| 20423 | 1.000000 | 0.666667 | |
| 20424 | 0.766667 | 0.791667 | |
| 20427 | 0.900000 | 0.916667 | |
| | | | |
| | f_mother_age | s_frequency_of_computer_usage | \ |
| id_questionnaire | | | |
| 1 | 43.0 | 0.111111 | |
| 3 | 45.0 | 0.666667 | |
| 5 | 39.0 | 0.000000 | |
| 6 | 25.0 | 0.222222 | |
| 8 | 37.0 | 0.333333 | |
| ... | ... | ... | |
| 20421 | 41.0 | 0.111111 | |
| 20422 | 36.0 | 0.222222 | |
| 20423 | 46.0 | 0.111111 | |
| 20424 | 41.0 | 0.111111 | |
| 20427 | 37.0 | 0.000000 | |
| | | | |
| | f_number_of_homework_hours_a_week | \ | |
| id_questionnaire | | | |
| 1 | 14.0 | | |
| 3 | 9.0 | | |
| 5 | 6.0 | | |
| 6 | 5.0 | | |
| 8 | 10.0 | | |
| ... | ... | ... | |
| 20421 | 14.0 | | |
| 20422 | 2.0 | | |
| 20423 | 8.0 | | |
| 20424 | 2.0 | | |
| 20427 | 1.0 | | |
| | | | |
| | s_extent_of_school_satisfaction | f_mother_education_level | \ |
| id_questionnaire | | | |
| 1 | 0.944444 | 7.0 | |
| 3 | 0.888889 | 3.0 | |
| 5 | 1.000000 | 9.0 | |

| | | |
|---|----------|------|
| 6 | 1.000000 | 3.0 |
| 8 | 0.833333 | 7.0 |
| ... | ... | ... |
| 20421 | 1.000000 | 5.0 |
| 20422 | 0.944444 | 4.0 |
| 20423 | 1.000000 | 3.0 |
| 20424 | 0.833333 | 9.0 |
| 20427 | 1.000000 | 5.0 |
| f_extent_of_family_satisfaction \ | | |
| id_questionnaire | | |
| 1 | 0.700000 | 3.0 |
| 3 | 0.291667 | 4.0 |
| 5 | 0.833333 | 7.0 |
| 6 | 0.833333 | 3.0 |
| 8 | 1.000000 | 3.0 |
| ... | ... | ... |
| 20421 | 1.000000 | 4.0 |
| 20422 | 0.708333 | 5.0 |
| 20423 | 0.833333 | 10.0 |
| 20424 | 0.666667 | 10.0 |
| 20427 | 0.291667 | 5.0 |
| f_frequency_of_books_at_home \ | | |
| id_questionnaire | | |
| 1 | 1.000000 | |
| 3 | 0.444444 | |
| 5 | 0.555556 | |
| 6 | 0.333333 | |
| 8 | 0.555556 | |
| ... | ... | |
| 20421 | 0.222222 | |
| 20422 | 0.555556 | |
| 20423 | 0.444444 | |
| 20424 | 0.555556 | |
| 20427 | 0.444444 | |
| f_frequency_of_parent_involved_in_school_activities \ | | |
| id_questionnaire | | |
| 1 | 0.333333 | |
| 3 | 0.166667 | |
| 5 | 0.250000 | |
| 6 | 0.083333 | |
| 8 | 0.333333 | |
| ... | ... | |
| 20421 | 0.333333 | |
| 20422 | 0.000000 | |

| | | |
|------------------|----------|-----------|
| 20423 | | 0.000000 |
| 20424 | | 0.416667 |
| 20427 | | 0.000000 |
| | s_gender | level_MAT |
| id_questionnaire | | |
| 1 | FEMALE | 3.0 |
| 3 | FEMALE | 1.0 |
| 5 | FEMALE | 4.0 |
| 6 | FEMALE | 1.0 |
| 8 | MALE | 2.0 |
| ... | ... | ... |
| 20421 | MALE | 2.0 |
| 20422 | FEMALE | 3.0 |
| 20423 | MALE | 2.0 |
| 20424 | MALE | 3.0 |
| 20427 | FEMALE | 2.0 |

[10735 rows x 19 columns],
 s_frequency_of_work_with_teachers \
 s_frequency_of_work_with_teachers
 1.000000
 s_frequency_of_evaluations
 0.454881
 s_frequency_of_internet_usage
 0.194741
 s_frequency_of_materials_in_class
 0.409276
 f_ESCS
 -0.054629
 s_extent_of_classmates_affinity
 0.125635
 s_extent_of_teacher_performance
 0.284706
 s_extent_of_class_env
 0.256114
 f_mother_age
 -0.037594
 s_frequency_of_computer_usage
 0.126924
 f_number_of_homework_hours_a_week
 0.024993
 s_extent_of_school_satisfaction
 0.136178
 f_mother_education_level
 -0.068564
 f_extent_of_family_satisfaction

```

0.056726
f_number_of_tech_at_home
-0.017440
f_frequency_of_books_at_home
0.023068
f_frequency_of_parent_involved_in_school_activi...
0.017585
s_gender
-0.018127
level_MAT
-0.052970

s_frequency_of_evaluations
\

s_frequency_of_work_with_teachers          0.454881
s_frequency_of_evaluations                1.000000
s_frequency_of_internet_usage             0.106232
s_frequency_of_materials_in_class         0.351169
f_ESCS                                    -0.000939
s_extent_of_classmates_affinity          0.221110
s_extent_of_teacher_performance          0.397563
s_extent_of_class_env                   0.342555
f_mother_age                            -0.012102
s_frequency_of_computer_usage           0.080795
f_number_of_homework_hours_a_week       0.014494
s_extent_of_school_satisfaction        0.237172
f_mother_education_level                0.003207
f_extent_of_family_satisfaction        0.077667
f_number_of_tech_at_home                0.000708
f_frequency_of_books_at_home            0.028708
f_frequency_of_parent_involved_in_school_activi...
0.017756
s_gender                                  -0.035529
level_MAT                                0.014032

s_frequency_of_internet_usage  \
s_frequency_of_work_with_teachers
0.194741
s_frequency_of_evaluations
0.106232
s_frequency_of_internet_usage
1.000000
s_frequency_of_materials_in_class
0.206295
f_ESCS
-0.012901
s_extent_of_classmates_affinity
-0.043188

```

```

s_extent_of_teacher_performance
0.022901
s_extent_of_class_env
0.018326
f_mother_age
-0.008697
s_frequency_of_computer_usage
0.366037
f_number_of_homework_hours_a_week
-0.019355
s_extent_of_school_satisfaction
-0.033456
f_mother_education_level
-0.005847
f_extent_of_family_satisfaction
0.015617
f_number_of_tech_at_home
0.045162
f_frequency_of_books_at_home
0.025437
f_frequency_of_parent_involved_in_school_activi...
0.026814
s_gender
0.086346
level_MAT
-0.039068

s_frequency_of_materials_in_class \
s_frequency_of_work_with_teachers
0.409276
s_frequency_of_evaluations
0.351169
s_frequency_of_internet_usage
0.206295
s_frequency_of_materials_in_class
1.000000
f_ESCS
-0.068555
s_extent_of_classmates_affinity
0.099953
s_extent_of_teacher_performance
0.201062
s_extent_of_class_env
0.211431
f_mother_age
-0.033654
s_frequency_of_computer_usage

```

```

0.229184
  f_number_of_homework_hours_a_week
0.013167
  s_extent_of_school_satisfaction
0.099923
  f_mother_education_level
-0.069164
  f_extent_of_family_satisfaction
0.051873
  f_number_of_tech_at_home
-0.014363
  f_frequency_of_books_at_home
-0.007351
  f_frequency_of_parent_involved_in_school_activi...
0.038761
  s_gender
-0.002908
  level_MAT
-0.065283

```

| | f_ESCS \ |
|--|-----------|
| s_frequency_of_work_with_teachers | -0.054629 |
| s_frequency_of_evaluations | -0.000939 |
| s_frequency_of_internet_usage | -0.012901 |
| s_frequency_of_materials_in_class | -0.068555 |
| f_ESCS | 1.000000 |
| s_extent_of_classmates_affinity | 0.039126 |
| s_extent_of_teacher_performance | 0.042015 |
| s_extent_of_class_env | 0.006251 |
| f_mother_age | 0.266225 |
| s_frequency_of_computer_usage | -0.037662 |
| f_number_of_homework_hours_a_week | -0.003042 |
| s_extent_of_school_satisfaction | 0.056717 |
| f_mother_education_level | 0.621918 |
| f_extent_of_family_satisfaction | -0.086076 |
| f_number_of_tech_at_home | 0.268389 |
| f_frequency_of_books_at_home | 0.177241 |
| f_frequency_of_parent_involved_in_school_activi... | 0.058164 |
| s_gender | 0.006280 |
| level_MAT | 0.241087 |
| s_extent_of_classmates_affinity \ | |
| s_frequency_of_work_with_teachers | |
| 0.125635 | |
| s_frequency_of_evaluations | |
| 0.221110 | |
| s_frequency_of_internet_usage | |

```

-0.043188
  s_frequency_of_materials_in_class
0.099953
  f_ESCS
0.039126
  s_extent_of_classmates_affinity
1.000000
  s_extent_of_teacher_performance
0.457112
  s_extent_of_class_env
0.518564
  f_mother_age
0.038003
  s_frequency_of_computer_usage
-0.035870
  f_number_of_homework_hours_a_week
-0.010784
  s_extent_of_school_satisfaction
0.459867
  f_mother_education_level
0.045788
  f_extent_of_family_satisfaction
0.123810
  f_number_of_tech_at_home
0.033261
  f_frequency_of_books_at_home
0.024182
  f_frequency_of_parent_involved_in_school_activi...
0.034539
  s_gender
-0.056301
  level_MAT
0.113418

  s_extent_of_teacher_performance \
  s_frequency_of_work_with_teachers
0.284706
  s_frequency_of_evaluations
0.397563
  s_frequency_of_internet_usage
0.022901
  s_frequency_of_materials_in_class
0.201062
  f_ESCS
0.042015
  s_extent_of_classmates_affinity
0.457112

```

| | |
|--|-----------|
| s_extent_of_teacher_performance | |
| 1.000000 | |
| s_extent_of_class_env | |
| 0.700419 | |
| f_mother_age | |
| 0.017997 | |
| s_frequency_of_computer_usage | |
| -0.001503 | |
| f_number_of_homework_hours_a_week | |
| -0.010408 | |
| s_extent_of_school_satisfaction | |
| 0.572681 | |
| f_mother_education_level | |
| 0.036255 | |
| f_extent_of_family_satisfaction | |
| 0.136448 | |
| f_number_of_tech_at_home | |
| 0.047870 | |
| f_frequency_of_books_at_home | |
| 0.036880 | |
| f_frequency_of_parent_involved_in_school_activi... | |
| 0.023407 | |
| s_gender | |
| -0.054769 | |
| level_MAT | |
| 0.094313 | |
| s_extent_of_class_env \ | |
| s_frequency_of_work_with_teachers | 0.256114 |
| s_frequency_of_evaluations | 0.342555 |
| s_frequency_of_internet_usage | 0.018326 |
| s_frequency_of_materials_in_class | 0.211431 |
| f_ESCS | 0.006251 |
| s_extent_of_classmates_affinity | 0.518564 |
| s_extent_of_teacher_performance | 0.700419 |
| s_extent_of_class_env | 1.000000 |
| f_mother_age | 0.002250 |
| s_frequency_of_computer_usage | 0.021759 |
| f_number_of_homework_hours_a_week | -0.003077 |
| s_extent_of_school_satisfaction | 0.605949 |
| f_mother_education_level | -0.002109 |
| f_extent_of_family_satisfaction | 0.140228 |
| f_number_of_tech_at_home | 0.014887 |
| f_frequency_of_books_at_home | 0.038779 |
| f_frequency_of_parent_involved_in_school_activi... | 0.035032 |
| s_gender | -0.059657 |
| level_MAT | 0.035256 |

| | |
|--|----------------|
| | f_mother_age \ |
| s_frequency_of_work_with_teachers | -0.037594 |
| s_frequency_of_evaluations | -0.012102 |
| s_frequency_of_internet_usage | -0.008697 |
| s_frequency_of_materials_in_class | -0.033654 |
| f_ESCS | 0.266225 |
| s_extent_of_classmates_affinity | 0.038003 |
| s_extent_of_teacher_performance | 0.017997 |
| s_extent_of_class_env | 0.002250 |
| f_mother_age | 1.000000 |
| s_frequency_of_computer_usage | -0.021918 |
| f_number_of_homework_hours_a_week | -0.027460 |
| s_extent_of_school_satisfaction | 0.031414 |
| f_mother_education_level | 0.257911 |
| f_extent_of_family_satisfaction | -0.014695 |
| f_number_of_tech_at_home | 0.056860 |
| f_frequency_of_books_at_home | 0.073622 |
| f_frequency_of_parent_involved_in_school_activi... | 0.060336 |
| s_gender | 0.014927 |
| level_MAT | 0.127296 |
| | |
| s_frequency_of_computer_usage \ | |
| s_frequency_of_work_with_teachers | |
| 0.126924 | |
| s_frequency_of_evaluations | |
| 0.080795 | |
| s_frequency_of_internet_usage | |
| 0.366037 | |
| s_frequency_of_materials_in_class | |
| 0.229184 | |
| f_ESCS | |
| -0.037662 | |
| s_extent_of_classmates_affinity | |
| -0.035870 | |
| s_extent_of_teacher_performance | |
| -0.001503 | |
| s_extent_of_class_env | |
| 0.021759 | |
| f_mother_age | |
| -0.021918 | |
| s_frequency_of_computer_usage | |
| 1.000000 | |
| f_number_of_homework_hours_a_week | |
| -0.007628 | |
| s_extent_of_school_satisfaction | |
| -0.040981 | |

```

f_mother_education_level
-0.034161
f_extent_of_family_satisfaction
0.015375
f_number_of_tech_at_home
0.020655
f_frequency_of_books_at_home
0.001636
f_frequency_of_parent_involved_in_school_activi...
0.043040
s_gender
0.021234
level_MAT
-0.072849

f_number_of_homework_hours_a_week \
s_frequency_of_work_with_teachers
0.024993
s_frequency_of_evaluations
0.014494
s_frequency_of_internet_usage
-0.019355
s_frequency_of_materials_in_class
0.013167
f_ESCS
-0.003042
s_extent_of_classmates_affinity
-0.010784
s_extent_of_teacher_performance
-0.010408
s_extent_of_class_env
-0.003077
f_mother_age
-0.027460
s_frequency_of_computer_usage
-0.007628
f_number_of_homework_hours_a_week
1.000000
s_extent_of_school_satisfaction
-0.007675
f_mother_education_level
-0.021123
f_extent_of_family_satisfaction
-0.014983
f_number_of_tech_at_home
0.013894
f_frequency_of_books_at_home

```

```

0.060948
  f_frequency_of_parent_involved_in_school_activi...
0.025651
  s_gender
-0.035562
  level_MAT
-0.049336

s_extent_of_school_satisfaction \
  s_frequency_of_work_with_teachers
0.136178
  s_frequency_of_evaluations
0.237172
  s_frequency_of_internet_usage
-0.033456
  s_frequency_of_materials_in_class
0.099923
  f_ESCS
0.056717
  s_extent_of_classmates_affinity
0.459867
  s_extent_of_teacher_performance
0.572681
  s_extent_of_class_env
0.605949
  f_mother_age
0.031414
  s_frequency_of_computer_usage
-0.040981
  f_number_of_homework_hours_a_week
-0.007675
  s_extent_of_school_satisfaction
1.000000
  f_mother_education_level
0.046073
  f_extent_of_family_satisfaction
0.144083
  f_number_of_tech_at_home
0.035594
  f_frequency_of_books_at_home
0.042360
  f_frequency_of_parent_involved_in_school_activi...
0.024147
  s_gender
-0.057120
  level_MAT
0.099471

```

| | |
|--|-----------|
| f_mother_education_level | \ |
| s_frequency_of_work_with_teachers | -0.068564 |
| s_frequency_of_evaluations | 0.003207 |
| s_frequency_of_internet_usage | -0.005847 |
| s_frequency_of_materials_in_class | -0.069164 |
| f_ESCS | 0.621918 |
| s_extent_of_classmates_affinity | 0.045788 |
| s_extent_of_teacher_performance | 0.036255 |
| s_extent_of_class_env | -0.002109 |
| f_mother_age | 0.257911 |
| s_frequency_of_computer_usage | -0.034161 |
| f_number_of_homework_hours_a_week | -0.021123 |
| s_extent_of_school_satisfaction | 0.046073 |
| f_mother_education_level | 1.000000 |
| f_extent_of_family_satisfaction | -0.067264 |
| f_number_of_tech_at_home | 0.239962 |
| f_frequency_of_books_at_home | 0.151003 |
| f_frequency_of_parent_involved_in_school_activi... | 0.027669 |
| s_gender | 0.002725 |
| level_MAT | 0.278425 |
| f_extent_of_family_satisfaction | \ |
| s_frequency_of_work_with_teachers | |
| 0.056726 | |
| s_frequency_of_evaluations | |
| 0.077667 | |
| s_frequency_of_internet_usage | |
| 0.015617 | |
| s_frequency_of_materials_in_class | |
| 0.051873 | |
| f_ESCS | |
| -0.086076 | |
| s_extent_of_classmates_affinity | |
| 0.123810 | |
| s_extent_of_teacher_performance | |
| 0.136448 | |
| s_extent_of_class_env | |
| 0.140228 | |
| f_mother_age | |
| -0.014695 | |
| s_frequency_of_computer_usage | |
| 0.015375 | |
| f_number_of_homework_hours_a_week | |
| -0.014983 | |
| s_extent_of_school_satisfaction | |
| 0.144083 | |

| | |
|--|-----------|
| f_mother_education_level | |
| -0.067264 | |
| f_extent_of_family_satisfaction | |
| 1.000000 | |
| f_number_of_tech_at_home | |
| -0.029384 | |
| f_frequency_of_books_at_home | |
| 0.061662 | |
| f_frequency_of_parent_involved_in_school_activi... | |
| 0.137134 | |
| s_gender | |
| -0.017418 | |
| level_MAT | |
| 0.056351 | |
| f_number_of_tech_at_home \ | |
| s_frequency_of_work_with_teachers | -0.017440 |
| s_frequency_of_evaluations | 0.000708 |
| s_frequency_of_internet_usage | 0.045162 |
| s_frequency_of_materials_in_class | -0.014363 |
| f_ESCS | 0.268389 |
| s_extent_of_classmates_affinity | 0.033261 |
| s_extent_of_teacher_performance | 0.047870 |
| s_extent_of_class_env | 0.014887 |
| f_mother_age | 0.056860 |
| s_frequency_of_computer_usage | 0.020655 |
| f_number_of_homework_hours_a_week | 0.013894 |
| s_extent_of_school_satisfaction | 0.035594 |
| f_mother_education_level | 0.239962 |
| f_extent_of_family_satisfaction | -0.029384 |
| f_number_of_tech_at_home | 1.000000 |
| f_frequency_of_books_at_home | 0.066989 |
| f_frequency_of_parent_involved_in_school_activi... | 0.000961 |
| s_gender | -0.013463 |
| level_MAT | 0.136941 |
| f_frequency_of_books_at_home \ | |
| s_frequency_of_work_with_teachers | |
| 0.023068 | |
| s_frequency_of_evaluations | |
| 0.028708 | |
| s_frequency_of_internet_usage | |
| 0.025437 | |
| s_frequency_of_materials_in_class | |
| -0.007351 | |
| f_ESCS | |
| 0.177241 | |

```

s_extent_of_classmates_affinity
0.024182
s_extent_of_teacher_performance
0.036880
s_extent_of_class_env
0.038779
f_mother_age
0.073622
s_frequency_of_computer_usage
0.001636
f_number_of_homework_hours_a_week
0.060948
s_extent_of_school_satisfaction
0.042360
f_mother_education_level
0.151003
f_extent_of_family_satisfaction
0.061662
f_number_of_tech_at_home
0.066989
f_frequency_of_books_at_home
1.000000
f_frequency_of_parent_involved_in_school_activi...
0.175514
s_gender
-0.039330
level_MAT
0.105491

f_frequency_of_parent_involved_in_school_activities \
s_frequency_of_work_with_teachers
0.017585
s_frequency_of_evaluations
0.017756
s_frequency_of_internet_usage
0.026814
s_frequency_of_materials_in_class
0.038761
f_ESCS
0.058164
s_extent_of_classmates_affinity
0.034539
s_extent_of_teacher_performance
0.023407
s_extent_of_class_env
0.035032
f_mother_age

```

```

0.060336
    s_frequency_of_computer_usage
0.043040
    f_number_of_homework_hours_a_week
0.025651
    s_extent_of_school_satisfaction
0.024147
    f_mother_education_level
0.027669
    f_extent_of_family_satisfaction
0.137134
    f_number_of_tech_at_home
0.000961
    f_frequency_of_books_at_home
0.175514
    f_frequency_of_parent_involved_in_school_activi...
1.000000
    s_gender
-0.002085
    level_MAT
0.009686

```

| | | |
|--|-----------|------------|
| | s_gender | level_MAT |
| s_frequency_of_work_with_teachers | -0.018127 | -0.052970 |
| s_frequency_of_evaluations | -0.035529 | 0.014032 |
| s_frequency_of_internet_usage | 0.086346 | -0.039068 |
| s_frequency_of_materials_in_class | -0.002908 | -0.065283 |
| f_ESCS | 0.006280 | 0.241087 |
| s_extent_of_classmates_affinity | -0.056301 | 0.113418 |
| s_extent_of_teacher_performance | -0.054769 | 0.094313 |
| s_extent_of_class_env | -0.059657 | 0.035256 |
| f_mother_age | 0.014927 | 0.127296 |
| s_frequency_of_computer_usage | 0.021234 | -0.072849 |
| f_number_of_homework_hours_a_week | -0.035562 | -0.049336 |
| s_extent_of_school_satisfaction | -0.057120 | 0.099471 |
| f_mother_education_level | 0.002725 | 0.278425 |
| f_extent_of_family_satisfaction | -0.017418 | 0.056351 |
| f_number_of_tech_at_home | -0.013463 | 0.136941 |
| f_frequency_of_books_at_home | -0.039330 | 0.105491 |
| f_frequency_of_parent_involved_in_school_activi... | -0.002085 | 0.009686 |
| s_gender | 1.000000 | 0.013750 |
| level_MAT | 0.013750 | 1.000000) |

```
[356]: final_df.to_csv(os.path.join(ull_final_path, "final_df_v1.csv"))
```