

# Summary of correlation analysis between participants' motivation and learning outcomes in the pilot empirical study

## 1 Difference of Scores and Motivation

Table 1: Correlation matrix of Difference of Scores and Motivation between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | -0.2140              | -0.1886            | -0.2246          | 0.1547           | 0.1548            |
| Intrinsic Motivation | -0.2140        | 1.0000               | 0.8341             | 0.7037           | -0.6693          | 0.3155            |
| Interest/Enjoyment   | -0.1886        | 0.8341               | 1.0000             | 0.3724           | -0.4591          | 0.2574            |
| Perceived Choice     | -0.2246        | 0.7037               | 0.3724             | 1.0000           | -0.4495          | 0.0958            |
| Pressure/Tension     | 0.1547         | -0.6693              | -0.4591            | -0.4495          | 1.0000           | 0.1162            |
| Effort/Importance    | 0.1548         | 0.3155               | 0.2574             | 0.0958           | 0.1162           | 1.0000            |

method: spearman

Table 2: Correlation matrix with p-values of Difference of Scores and Motivation between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.3790               | 0.4393             | 0.3553           | 0.5271           | 0.5268            |
| Intrinsic Motivation | 0.3790         | 0.0000               | 0.0000             | 0.0008           | 0.0017           | 0.1882            |
| Interest/Enjoyment   | 0.4393         | 0.0000               | 0.0000             | 0.1164           | 0.0480           | 0.2874            |
| Perceived Choice     | 0.3553         | 0.0008               | 0.1164             | 0.0000           | 0.0535           | 0.6966            |
| Pressure/Tension     | 0.5271         | 0.0017               | 0.0480             | 0.0535           | 0.0000           | 0.6357            |
| Effort/Importance    | 0.5268         | 0.1882               | 0.2874             | 0.6966           | 0.6357           | 0.0000            |

method: spearman

## 2 Difference of Scores and Motivation for the group non-gamified

Table 3: Correlation matrix of Difference of Scores and Motivation for the group non-gamified between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | 0.0541               | 0.4685             | 0.1193           | 0.1261           | 0.0545            |
| Intrinsic Motivation | 0.0541         | 1.0000               | 0.5357             | 0.7638           | -0.6071          | 0.0901            |
| Interest/Enjoyment   | 0.4685         | 0.5357               | 1.0000             | 0.0546           | 0.0000           | 0.1982            |
| Perceived Choice     | 0.1193         | 0.7638               | 0.0546             | 1.0000           | -0.5455          | -0.1376           |
| Pressure/Tension     | 0.1261         | -0.6071              | 0.0000             | -0.5455          | 1.0000           | 0.3243            |
| Effort/Importance    | 0.0545         | 0.0901               | 0.1982             | -0.1376          | 0.3243           | 1.0000            |

method: spearman

Table 4: Correlation matrix with p-values of Difference of Scores and Motivation for the group non-gamified between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.9084               | 0.2890             | 0.7990           | 0.7876           | 0.9075            |
| Intrinsic Motivation | 0.9084         | 0.0000               | 0.2357             | 0.0457           | 0.1667           | 0.8477            |
| Interest/Enjoyment   | 0.2890         | 0.2357               | 0.0000             | 0.9075           | 1.0000           | 0.6701            |
| Perceived Choice     | 0.7990         | 0.0457               | 0.9075             | 0.0000           | 0.2053           | 0.7686            |
| Pressure/Tension     | 0.7876         | 0.1667               | 1.0000             | 0.2053           | 0.0000           | 0.4779            |
| Effort/Importance    | 0.9075         | 0.8477               | 0.6701             | 0.7686           | 0.4779           | 0.0000            |

method: spearman

## 3 Difference of Scores and Motivation for the group ont-gamified

Table 5: Correlation matrix of Difference of Scores and Motivation for the group ont-gamified between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | -0.4140              | -0.4491            | -0.2769          | 0.3369           | 0.2661            |
| Intrinsic Motivation | -0.4140        | 1.0000               | 0.8182             | 0.7346           | -0.6856          | 0.4734            |
| Interest/Enjoyment   | -0.4491        | 0.8182               | 1.0000             | 0.4218           | -0.5336          | 0.3453            |
| Perceived Choice     | -0.2769        | 0.7346               | 0.4218             | 1.0000           | -0.3748          | 0.2934            |
| Pressure/Tension     | 0.3369         | -0.6856              | -0.5336            | -0.3748          | 1.0000           | -0.0540           |
| Effort/Importance    | 0.2661         | 0.4734               | 0.3453             | 0.2934           | -0.0540          | 1.0000            |

method: spearman

Table 6: Correlation matrix with p-values of Difference of Scores and Motivation for the group ont-gamified between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.1809               | 0.1430             | 0.3836           | 0.2843           | 0.4032            |
| Intrinsic Motivation | 0.1809         | 0.0000               | 0.0020             | 0.0065           | 0.0139           | 0.1201            |
| Interest/Enjoyment   | 0.1430         | 0.0020               | 0.0000             | 0.1720           | 0.0740           | 0.2717            |
| Perceived Choice     | 0.3836         | 0.0065               | 0.1720             | 0.0000           | 0.2300           | 0.3547            |
| Pressure/Tension     | 0.2843         | 0.0139               | 0.0740             | 0.2300           | 0.0000           | 0.8677            |
| Effort/Importance    | 0.4032         | 0.1201               | 0.2717             | 0.3547           | 0.8677           | 0.0000            |

method: spearman

## 4 Difference of Scores and Motivation for the group Apprentice

Table 7: Correlation matrix of Difference of Scores and Motivation for the group Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | 0.0110               | 0.1037             | -0.0737          | 0.1257           | 0.4670            |
| Intrinsic Motivation | 0.0110         | 1.0000               | 0.7703             | 0.5505           | -0.6612          | 0.4113            |
| Interest/Enjoyment   | 0.1037         | 0.7703               | 1.0000             | 0.1025           | -0.4423          | 0.5001            |
| Perceived Choice     | -0.0737        | 0.5505               | 0.1025             | 1.0000           | -0.3748          | 0.1014            |
| Pressure/Tension     | 0.1257         | -0.6612              | -0.4423            | -0.3748          | 1.0000           | 0.1301            |
| Effort/Importance    | 0.4670         | 0.4113               | 0.5001             | 0.1014           | 0.1301           | 1.0000            |

method: spearman

Table 8: Correlation matrix with p-values of Difference of Scores and Motivation for the group Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.9714               | 0.7359             | 0.8109           | 0.6824           | 0.1076            |
| Intrinsic Motivation | 0.9714         | 0.0000               | 0.0021             | 0.0512           | 0.0139           | 0.1627            |
| Interest/Enjoyment   | 0.7359         | 0.0021               | 0.0000             | 0.7390           | 0.1302           | 0.0818            |
| Perceived Choice     | 0.8109         | 0.0512               | 0.7390             | 0.0000           | 0.2070           | 0.7417            |
| Pressure/Tension     | 0.6824         | 0.0139               | 0.1302             | 0.2070           | 0.0000           | 0.6718            |
| Effort/Importance    | 0.1076         | 0.1627               | 0.0818             | 0.7417           | 0.6718           | 0.0000            |

method: spearman

## 5 Difference of Scores and Motivation for the group Master

Table 9: Correlation matrix of Difference of Scores and Motivation for the group Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | -0.7247              | -0.6957            | -0.6912          | 0.4058           | -0.0882           |
| Intrinsic Motivation | -0.7247        | 1.0000               | 0.8857             | 0.9856           | -0.7143          | 0.1449            |
| Interest/Enjoyment   | -0.6957        | 0.8857               | 1.0000             | 0.9276           | -0.7714          | -0.3189           |
| Perceived Choice     | -0.6912        | 0.9856               | 0.9276             | 1.0000           | -0.7827          | 0.0147            |
| Pressure/Tension     | 0.4058         | -0.7143              | -0.7714            | -0.7827          | 1.0000           | 0.3189            |
| Effort/Importance    | -0.0882        | 0.1449               | -0.3189            | 0.0147           | 0.3189           | 1.0000            |

method: spearman

Table 10: Correlation matrix with p-values of Difference of Scores and Motivation for the group Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.1032               | 0.1248             | 0.1283           | 0.4247           | 0.8680            |
| Intrinsic Motivation | 0.1032         | 0.0000               | 0.0333             | 0.0003           | 0.1361           | 0.7841            |
| Interest/Enjoyment   | 0.1248         | 0.0333               | 0.0000             | 0.0077           | 0.1028           | 0.5379            |
| Perceived Choice     | 0.1283         | 0.0003               | 0.0077             | 0.0000           | 0.0657           | 0.9779            |
| Pressure/Tension     | 0.4247         | 0.1361               | 0.1028             | 0.0657           | 0.0000           | 0.5379            |
| Effort/Importance    | 0.8680         | 0.7841               | 0.5379             | 0.9779           | 0.5379           | 0.0000            |

method: spearman

## 6 Difference of Scores and Motivation for the group non-gamified.Apprentice

Table 11: Correlation matrix of Difference of Scores and Motivation for the group non-gamified.Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | 0.0513               | 0.6156             | -0.5000          | 0.3078           | 0.7895            |
| Intrinsic Motivation | 0.0513         | 1.0000               | 0.5000             | 0.6669           | -0.7000          | -0.0513           |
| Interest/Enjoyment   | 0.6156         | 0.5000               | 1.0000             | -0.2052          | 0.1000           | 0.6669            |
| Perceived Choice     | -0.5000        | 0.6669               | -0.2052            | 1.0000           | -0.9747          | -0.3947           |
| Pressure/Tension     | 0.3078         | -0.7000              | 0.1000             | -0.9747          | 1.0000           | 0.2052            |
| Effort/Importance    | 0.7895         | -0.0513              | 0.6669             | -0.3947          | 0.2052           | 1.0000            |

method: spearman

Table 12: Correlation matrix with p-values of Difference of Scores and Motivation for the group non-gamified.Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.9347               | 0.2690             | 0.3910           | 0.6144           | 0.1122            |
| Intrinsic Motivation | 0.9347         | 0.0000               | 0.4500             | 0.2189           | 0.2333           | 0.9347            |
| Interest/Enjoyment   | 0.2690         | 0.4500               | 0.0000             | 0.7406           | 0.9500           | 0.2189            |
| Perceived Choice     | 0.3910         | 0.2189               | 0.7406             | 0.0000           | 0.0048           | 0.5108            |
| Pressure/Tension     | 0.6144         | 0.2333               | 0.9500             | 0.0048           | 0.0000           | 0.7406            |
| Effort/Importance    | 0.1122         | 0.9347               | 0.2189             | 0.5108           | 0.7406           | 0.0000            |

method: spearman

## 7 Difference of Scores and Motivation for the group non-gamified.Master

Table 13: Correlation matrix of Difference of Scores and Motivation for the group non-gamified.Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1              | -1                   | 1                  |                  | -1               | -1                |
| Intrinsic Motivation | -1             | 1                    | -1                 |                  | 1                | 1                 |
| Interest/Enjoyment   | 1              | -1                   | 1                  |                  | -1               | -1                |
| Perceived Choice     |                |                      |                    | 1                |                  |                   |
| Pressure/Tension     | -1             | 1                    | -1                 |                  | 1                | 1                 |
| Effort/Importance    | -1             | 1                    | -1                 |                  | 1                | 1                 |

method: spearman

Table 14: Correlation matrix with p-values of Difference of Scores and Motivation for the group non-gamified.Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0              | 1                    | 1                  |                  | 1                | 1                 |
| Intrinsic Motivation | 1              | 0                    | 1                  |                  | 1                | 1                 |
| Interest/Enjoyment   | 1              | 1                    | 0                  |                  | 1                | 1                 |
| Perceived Choice     |                |                      |                    | 0                |                  |                   |
| Pressure/Tension     | 1              | 1                    | 1                  |                  | 0                | 1                 |
| Effort/Importance    | 1              | 1                    | 1                  |                  | 1                | 0                 |

method: spearman

## 8 Difference of Scores and Motivation for the group ont-gamified.Apprentice

Table 15: Correlation matrix of Difference of Scores and Motivation for the group ont-gamified.Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0000         | -0.2381              | 0.0000             | 0.1190           | 0.3615           | 0.5455            |
| Intrinsic Motivation | -0.2381        | 1.0000               | 0.8333             | 0.5952           | -0.6627          | 0.3637            |
| Interest/Enjoyment   | 0.0000         | 0.8333               | 1.0000             | 0.1905           | -0.6025          | 0.5213            |
| Perceived Choice     | 0.1190         | 0.5952               | 0.1905             | 1.0000           | -0.1928          | 0.2425            |
| Pressure/Tension     | 0.3615         | -0.6627              | -0.6025            | -0.1928          | 1.0000           | 0.1350            |
| Effort/Importance    | 0.5455         | 0.3637               | 0.5213             | 0.2425           | 0.1350           | 1.0000            |

method: spearman

Table 16: Correlation matrix with p-values of Difference of Scores and Motivation for the group ont-gamified.Apprentice between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.5821               | 1.0000             | 0.7930           | 0.3790           | 0.1619            |
| Intrinsic Motivation | 0.5821         | 0.0000               | 0.0154             | 0.1323           | 0.0733           | 0.3758            |
| Interest/Enjoyment   | 1.0000         | 0.0154               | 0.0000             | 0.6646           | 0.1140           | 0.1852            |
| Perceived Choice     | 0.7930         | 0.1323               | 0.6646             | 0.0000           | 0.6474           | 0.5629            |
| Pressure/Tension     | 0.3790         | 0.0733               | 0.1140             | 0.6474           | 0.0000           | 0.7500            |
| Effort/Importance    | 0.1619         | 0.3758               | 0.1852             | 0.5629           | 0.7500           | 0.0000            |

method: spearman

## 9 Difference of Scores and Motivation for the group ont-gamified.Master

Table 17: Correlation matrix of Difference of Scores and Motivation for the group ont-gamified.Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 1.0            | -0.8                 | -1.0               | -0.8             | 0.6              | 0.2               |
| Intrinsic Motivation | -0.8           | 1.0                  | 0.8                | 1.0              | -0.8             | 0.4               |
| Interest/Enjoyment   | -1.0           | 0.8                  | 1.0                | 0.8              | -0.6             | -0.2              |
| Perceived Choice     | -0.8           | 1.0                  | 0.8                | 1.0              | -0.8             | 0.4               |
| Pressure/Tension     | 0.6            | -0.8                 | -0.6               | -0.8             | 1.0              | -0.2              |
| Effort/Importance    | 0.2            | 0.4                  | -0.2               | 0.4              | -0.2             | 1.0               |

method: spearman

Table 18: Correlation matrix with p-values of Difference of Scores and Motivation for the group ont-gamified.Master between participants' motivation and learning outcomes in the pilot empirical study

| round                | Diff of Scores | Intrinsic Motivation | Interest/Enjoyment | Perceived Choice | Pressure/Tension | Effort/Importance |
|----------------------|----------------|----------------------|--------------------|------------------|------------------|-------------------|
| Diff of Scores       | 0.0000         | 0.3333               | 0.0833             | 0.3333           | 0.4167           | 0.9167            |
| Intrinsic Motivation | 0.3333         | 0.0000               | 0.3333             | 0.0833           | 0.3333           | 0.7500            |
| Interest/Enjoyment   | 0.0833         | 0.3333               | 0.0000             | 0.3333           | 0.4167           | 0.9167            |
| Perceived Choice     | 0.3333         | 0.0833               | 0.3333             | 0.0000           | 0.3333           | 0.7500            |
| Pressure/Tension     | 0.4167         | 0.3333               | 0.4167             | 0.3333           | 0.0000           | 0.9167            |
| Effort/Importance    | 0.9167         | 0.7500               | 0.9167             | 0.7500           | 0.9167           | 0.0000            |

method: spearman