

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

1 Difference in Scores and Motivation

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.1199	0.1217	0.0375	-0.1500	0.1440
Intrinsic Motivation	0.1199	1.0000	0.8259	0.7716	-0.4835	0.3756
Interest/Enjoyment	0.1217	0.8259	1.0000	0.4901	-0.3053	0.2248
Perceived Choice	0.0375	0.7716	0.4901	1.0000	-0.3139	0.1344
Pressure/Tension	-0.1500	-0.4835	-0.3053	-0.3139	1.0000	0.0994
Effort/Importance	0.1440	0.3756	0.2248	0.1344	0.0994	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.3745	0.3670	0.7817	0.2655	0.2851
Intrinsic Motivation	0.3745	0.0000	0.0000	0.0000	0.0001	0.0040
Interest/Enjoyment	0.3670	0.0000	0.0000	0.0001	0.0209	0.0928
Perceived Choice	0.7817	0.0000	0.0001	0.0000	0.0174	0.3191
Pressure/Tension	0.2655	0.0001	0.0209	0.0174	0.0000	0.4620
Effort/Importance	0.2851	0.0040	0.0928	0.3191	0.4620	0.0000

method: spearman

2 Difference in Scores and Motivation for the group non-gamified

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.2388	0.3479	-0.0184	-0.0679	0.2325
Intrinsic Motivation	0.2388	1.0000	0.7874	0.7837	-0.4993	0.3385
Interest/Enjoyment	0.3479	0.7874	1.0000	0.4434	-0.2170	0.3298
Perceived Choice	-0.0184	0.7837	0.4434	1.0000	-0.4511	0.1034
Pressure/Tension	-0.0679	-0.4993	-0.2170	-0.4511	1.0000	0.2944
Effort/Importance	0.2325	0.3385	0.3298	0.1034	0.2944	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.2303	0.0753	0.9276	0.7364	0.2432
Intrinsic Motivation	0.2303	0.0000	0.0000	0.0000	0.0080	0.0841
Interest/Enjoyment	0.0753	0.0000	0.0000	0.0205	0.2770	0.0930
Perceived Choice	0.9276	0.0000	0.0205	0.0000	0.0182	0.6077
Pressure/Tension	0.7364	0.0080	0.2770	0.0182	0.0000	0.1361
Effort/Importance	0.2432	0.0841	0.0930	0.6077	0.1361	0.0000

method: spearman

3 Difference in Scores and Motivation for the group ont-gamified

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	-0.0614	-0.2199	0.0474	-0.2027	0.0802
Intrinsic Motivation	-0.0614	1.0000	0.8232	0.6049	-0.3841	0.2957
Interest/Enjoyment	-0.2199	0.8232	1.0000	0.3809	-0.2937	0.0329
Perceived Choice	0.0474	0.6049	0.3809	1.0000	0.0020	-0.0594
Pressure/Tension	-0.2027	-0.3841	-0.2937	0.0020	1.0000	0.0721
Effort/Importance	0.0802	0.2957	0.0329	-0.0594	0.0721	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.7472	0.2429	0.8037	0.2828	0.6734
Intrinsic Motivation	0.7472	0.0000	0.0000	0.0004	0.0361	0.1126
Interest/Enjoyment	0.2429	0.0000	0.0000	0.0378	0.1152	0.8631
Perceived Choice	0.8037	0.0004	0.0378	0.0000	0.9918	0.7550
Pressure/Tension	0.2828	0.0361	0.1152	0.9918	0.0000	0.7051
Effort/Importance	0.6734	0.1126	0.8631	0.7550	0.7051	0.0000

method: spearman

4 Diference in Scores and Motivation for the group Apprentice

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.0826	0.2004	−0.0398	−0.0817	−0.0615
Intrinsic Motivation	0.0826	1.0000	0.8355	0.7950	−0.5172	0.3482
Interest/Enjoyment	0.2004	0.8355	1.0000	0.5361	−0.2963	0.1983
Perceived Choice	−0.0398	0.7950	0.5361	1.0000	−0.3128	0.1124
Pressure/Tension	−0.0817	−0.5172	−0.2963	−0.3128	1.0000	−0.0055
Effort/Importance	−0.0615	0.3482	0.1983	0.1124	−0.0055	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.6749	0.3064	0.8408	0.6795	0.7558
Intrinsic Motivation	0.6749	0.0000	0.0000	0.0000	0.0048	0.0694
Interest/Enjoyment	0.3064	0.0000	0.0000	0.0033	0.1258	0.3116
Perceived Choice	0.8408	0.0000	0.0033	0.0000	0.1050	0.5691
Pressure/Tension	0.6795	0.0048	0.1258	0.1050	0.0000	0.9779
Effort/Importance	0.7558	0.0694	0.3116	0.5691	0.9779	0.0000

method: spearman

5 Diference in Scores and Motivation for the group Master

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.1976	0.0213	0.2539	−0.1802	0.1779
Intrinsic Motivation	0.1976	1.0000	0.8396	0.7045	−0.4310	0.4342
Interest/Enjoyment	0.0213	0.8396	1.0000	0.4397	−0.3118	0.2402
Perceived Choice	0.2539	0.7045	0.4397	1.0000	−0.2895	0.1584
Pressure/Tension	−0.1802	−0.4310	−0.3118	−0.2895	1.0000	0.2268
Effort/Importance	0.1779	0.4342	0.2402	0.1584	0.2268	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.3042	0.9128	0.1838	0.3495	0.3558
Intrinsic Motivation	0.3042	0.0000	0.0000	0.0000	0.0196	0.0186
Interest/Enjoyment	0.9128	0.0000	0.0000	0.0170	0.0997	0.2094
Perceived Choice	0.1838	0.0000	0.0170	0.0000	0.1276	0.4119
Pressure/Tension	0.3495	0.0196	0.0997	0.1276	0.0000	0.2367
Effort/Importance	0.3558	0.0186	0.2094	0.4119	0.2367	0.0000

method: spearman

6 Diference in Scores and Motivation for the group non-gamified.Apprentice

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.2582	0.4254	−0.0551	−0.3388	−0.2988
Intrinsic Motivation	0.2582	1.0000	0.7403	0.7190	−0.5637	0.2877
Interest/Enjoyment	0.4254	0.7403	1.0000	0.3213	−0.2347	0.2031
Perceived Choice	−0.0551	0.7190	0.3213	1.0000	−0.4810	0.0264
Pressure/Tension	−0.3388	−0.5637	−0.2347	−0.4810	1.0000	0.3440
Effort/Importance	−0.2988	0.2877	0.2031	0.0264	0.3440	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.3938	0.1473	0.8581	0.2575	0.3214
Intrinsic Motivation	0.3938	0.0000	0.0038	0.0056	0.0448	0.3405
Interest/Enjoyment	0.1473	0.0038	0.0000	0.2844	0.4402	0.5058
Perceived Choice	0.8581	0.0056	0.2844	0.0000	0.0961	0.9319
Pressure/Tension	0.2575	0.0448	0.4402	0.0961	0.0000	0.2498
Effort/Importance	0.3214	0.3405	0.5058	0.9319	0.2498	0.0000

method: spearman

7 Diference in Scores and Motivation for the group non-gamified.Master

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.3833	0.2762	0.2119	−0.0866	0.5339
Intrinsic Motivation	0.3833	1.0000	0.9043	0.7660	−0.4253	0.4928
Interest/Enjoyment	0.2762	0.9043	1.0000	0.5703	−0.3311	0.3502
Perceived Choice	0.2119	0.7660	0.5703	1.0000	−0.4093	0.1791
Pressure/Tension	−0.0866	−0.4253	−0.3311	−0.4093	1.0000	0.2098
Effort/Importance	0.5339	0.4928	0.3502	0.1791	0.2098	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.1762	0.3392	0.4670	0.7684	0.0493
Intrinsic Motivation	0.1762	0.0000	0.0000	0.0014	0.1295	0.0734
Interest/Enjoyment	0.3392	0.0000	0.0000	0.0332	0.2476	0.2197
Perceived Choice	0.4670	0.0014	0.0332	0.0000	0.1461	0.5401
Pressure/Tension	0.7684	0.1295	0.2476	0.1461	0.0000	0.4717
Effort/Importance	0.0493	0.0734	0.2197	0.5401	0.4717	0.0000

method: spearman

8 Diference in Scores and Motivation for the group ont-gamified.Apprentice

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	−0.2786	−0.2435	−0.0036	0.2283	0.1953
Intrinsic Motivation	−0.2786	1.0000	0.9024	0.7063	−0.4157	0.3418
Interest/Enjoyment	−0.2435	0.9024	1.0000	0.6838	−0.2257	0.1686
Perceived Choice	−0.0036	0.7063	0.6838	1.0000	0.1282	0.1150
Pressure/Tension	0.2283	−0.4157	−0.2257	0.1282	1.0000	−0.2203
Effort/Importance	0.1953	0.3418	0.1686	0.1150	−0.2203	1.0000

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	0.0000	0.3138	0.3818	0.9898	0.4132	0.4854
Intrinsic Motivation	0.3138	0.0000	0.0000	0.0032	0.1233	0.2124
Interest/Enjoyment	0.3818	0.0000	0.0000	0.0049	0.4187	0.5480
Perceived Choice	0.9898	0.0032	0.0049	0.0000	0.6488	0.6833
Pressure/Tension	0.4132	0.1233	0.4187	0.6488	0.0000	0.4302
Effort/Importance	0.4854	0.2124	0.5480	0.6833	0.4302	0.0000

method: spearman

9 Diference in Scores and Motivation for the group ont-gamified.Master

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Diference in Scores	1.0000	0.0000	−0.0449	0.2633	−0.1712	−0.1501
Intrinsic Motivation	0.0000	1.0000	0.7558	0.4183	−0.3971	0.2602
Interest/Enjoyment	−0.0449	0.7558	1.0000	0.0903	−0.4813	−0.0808
Perceived Choice	0.2633	0.4183	0.0903	1.0000	−0.1028	−0.1580
Pressure/Tension	−0.1712	−0.3971	−0.4813	−0.1028	1.0000	0.4237
Effort/Importance	−0.1501	0.2602	−0.0808	−0.1580	0.4237	1.0000

method: spearman

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

round	Difference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance
Difference in Scores	0.0000	1.0000	0.8737	0.3431	0.5418	0.5934
Intrinsic Motivation	1.0000	0.0000	0.0011	0.1207	0.1427	0.3490
Interest/Enjoyment	0.8737	0.0011	0.0000	0.7491	0.0693	0.7746
Perceived Choice	0.3431	0.1207	0.7491	0.0000	0.7155	0.5737
Pressure/Tension	0.5418	0.1427	0.0693	0.7155	0.0000	0.1155
Effort/Importance	0.5934	0.3490	0.7746	0.5737	0.1155	0.0000

method: spearman