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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	0.0239	-0.2616	0.1349	0.1320	0.2227	
Intrinsic Motivation	0.0239	1.0000	0.4578	0.7768	-0.6088	0.3974	
Interest/Enjoyment	-0.2616	0.4578	1.0000	0.2866	0.0301	-0.0620	İ
Perceived Choice	0.1349	0.7768	0.2866	1.0000	-0.3731	0.1231	İ
Pressure/Tension	0.1320	-0.6088	0.0301	-0.3731	1.0000	-0.0909	İ
Effort/Importance	0.2227	0.3974	-0.0620	0.1231	-0.0909	1.0000	i
Level of Motivation	-0.0582	0.5550	0.7220	0.3955	-0.0118	0.1999	İ
Attention	-0.1486	0.1947	0.6813	0.1310	0.1889	-0.0567	İ
Relevance	0.1253	0.6495	0.2285	0.5495	-0.3067	0.2520	İ
Satisfaction	0.0200	0.5288	0.6499	0.3535	0.0571	0.3209	i

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of M
Diference in Scores	0.0000	0.8746	0.0791	0.3714	0.3819	0.1369	
Intrinsic Motivation	0.8746	0.0000	0.0014	0.0000	0.0000	0.0062	
Interest/Enjoyment	0.0791	0.0014	0.0000	0.0535	0.8424	0.6821	
Perceived Choice	0.3714	0.0000	0.0535	0.0000	0.0107	0.4151	
Pressure/Tension	0.3819	0.0000	0.8424	0.0107	0.0000	0.5480	
Effort/Importance	0.1369	0.0062	0.6821	0.4151	0.5480	0.0000	
Level of Motivation	0.7008	0.0001	0.0000	0.0065	0.9382	0.1828	
Attention	0.3243	0.1948	0.0000	0.3854	0.2087	0.7081	
Relevance	0.4068	0.0000	0.1267	0.0001	0.0381	0.0912	
Satisfaction	0.8952	0.0002	0.0000	0.0159	0.7063	0.0297	

method: spearman

2 Diference in Scores and Motivation for the group ont-gamified

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.0364	-0.2547	-0.0969	0.1441	0.3309	
Intrinsic Motivation	-0.0364	1.0000	0.3846	0.8487	-0.3744	0.2829	
Interest/Enjoyment	-0.2547	0.3846	1.0000	0.1759	0.2804	-0.1623	
Perceived Choice	-0.0969	0.8487	0.1759	1.0000	-0.2880	0.1141	
Pressure/Tension	0.1441	-0.3744	0.2804	-0.2880	1.0000	-0.0554	
Effort/Importance	0.3309	0.2829	-0.1623	0.1141	-0.0554	1.0000	İ
Level of Motivation	0.0767	0.4559	0.7967	0.3128	0.3436	0.1282	İ
Attention	-0.0039	0.2354	0.8167	0.1090	0.4144	0.0049	İ
Relevance	-0.0260	0.6866	0.2995	0.6576	-0.1513	-0.1784	İ
Satisfaction	0.2453	0.2422	0.6370	0.1542	0.5337	0.3354	

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.8756	0.2652	0.6760	0.5333	0.1428	
Intrinsic Motivation	0.8756	0.0000	0.0852	0.0000	0.0945	0.2141	
Interest/Enjoyment	0.2652	0.0852	0.0000	0.4457	0.2183	0.4821	
Perceived Choice	0.6760	0.0000	0.4457	0.0000	0.2056	0.6224	
Pressure/Tension	0.5333	0.0945	0.2183	0.2056	0.0000	0.8116	
Effort/Importance	0.1428	0.2141	0.4821	0.6224	0.8116	0.0000	
Level of Motivation	0.7411	0.0378	0.0000	0.1674	0.1273	0.5798	
Attention	0.9866	0.3042	0.0000	0.6380	0.0618	0.9831	
Relevance	0.9108	0.0006	0.1873	0.0012	0.5127	0.4391	
Satisfaction	0.2839	0.2902	0.0019	0.5045	0.0127	0.1372	

method: spearman

3 Diference in Scores and Motivation for the group w/o-gamified

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.2804	-0.3640	-0.0664	0.2867	-0.1192	
Intrinsic Motivation	-0.2804	1.0000	0.5106	0.7203	-0.7629	0.3882	
Interest/Enjoyment	-0.3640	0.5106	1.0000	0.3195	-0.1330	0.0764	
Perceived Choice	-0.0664	0.7203	0.3195	1.0000	-0.4968	-0.0422	
Pressure/Tension	0.2867	-0.7629	-0.1330	-0.4968	1.0000	-0.1052	
Effort/Importance	-0.1192	0.3882	0.0764	-0.0422	-0.1052	1.0000	
Level of Motivation	-0.2889	0.6662	0.6663	0.4452	-0.3460	0.3023	
Attention	-0.1913	0.2556	0.6145	0.2263	-0.0041	0.0555	
Relevance	-0.0948	0.6463	0.1119	0.3879	-0.5230	0.4051	
Satisfaction	-0.2693	0.7133	0.6645	0.4350	-0.3442	0.3111	

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.1745	0.0737	0.7523	0.1648	0.5704	
Intrinsic Motivation	0.1745	0.0000	0.0091	0.0000	0.0000	0.0551	
Interest/Enjoyment	0.0737	0.0091	0.0000	0.1195	0.5261	0.7165	
Perceived Choice	0.7523	0.0000	0.1195	0.0000	0.0115	0.8413	
Pressure/Tension	0.1648	0.0000	0.5261	0.0115	0.0000	0.6167	
Effort/Importance	0.5704	0.0551	0.7165	0.8413	0.6167	0.0000	
Level of Motivation	0.1613	0.0003	0.0003	0.0258	0.0902	0.1419	
Attention	0.3596	0.2175	0.0011	0.2768	0.9846	0.7922	
Relevance	0.6522	0.0005	0.5943	0.0554	0.0073	0.0446	
Satisfaction	0.1930	0.0001	0.0003	0.0298	0.0920	0.1300	

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 third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.0812	-0.2955	0.0204	0.1161	0.1220	
Intrinsic Motivation	-0.0812	1.0000	0.5120	0.7801	-0.5699	0.4400	
Interest/Enjoyment	-0.2955	0.5120	1.0000	0.2599	-0.0269	-0.0321	
Perceived Choice	0.0204	0.7801	0.2599	1.0000	-0.3643	0.1684	
Pressure/Tension	0.1161	-0.5699	-0.0269	-0.3643	1.0000	-0.1369	
Effort/Importance	0.1220	0.4400	-0.0321	0.1684	-0.1369	1.0000	
Level of Motivation	-0.1045	0.5621	0.7486	0.3512	0.0324	0.1774	
Attention	-0.1599	0.2396	0.7183	0.0962	0.1419	-0.0959	
Relevance	0.1036	0.6107	0.2183	0.5269	-0.2406	0.1990	
Satisfaction	0.0138	0.6037	0.7056	0.3612	0.0443	0.3791	

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 third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.6586	0.1006	0.9118	0.5270	0.5061	
Intrinsic Motivation	0.6586	0.0000	0.0027	0.0000	0.0007	0.0117	
Interest/Enjoyment	0.1006	0.0027	0.0000	0.1508	0.8837	0.8614	
Perceived Choice	0.9118	0.0000	0.1508	0.0000	0.0404	0.3568	
Pressure/Tension	0.5270	0.0007	0.8837	0.0404	0.0000	0.4549	
Effort/Importance	0.5061	0.0117	0.8614	0.3568	0.4549	0.0000	
Level of Motivation	0.5692	0.0008	0.0000	0.0488	0.8605	0.3313	
Attention	0.3819	0.1866	0.0000	0.6005	0.4385	0.6016	
Relevance	0.5728	0.0002	0.2300	0.0019	0.1846	0.2748	
Satisfaction	0.9404	0.0003	0.0000	0.0422	0.8096	0.0324	

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 third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	0.4620	0.1748	0.6101	-0.3820	0.1971	-
Intrinsic Motivation	0.4620	1.0000	0.3068	0.6902	-0.6298	0.4668	į
Interest/Enjoyment	0.1748	0.3068	1.0000	0.4257	0.2522	-0.0546	į
Perceived Choice	0.6101	0.6902	0.4257	1.0000	-0.4081	-0.0055	
Pressure/Tension	-0.3820	-0.6298	0.2522	-0.4081	1.0000	-0.1233	
Effort/Importance	0.1971	0.4668	-0.0546	-0.0055	-0.1233	1.0000	
method: spearman							

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of M
Level of Motivation	0.1746	0.4447	0.6819	0.6168	0.0449	0.2016	
Attention	-0.1369	-0.0641	0.4989	0.1803	0.5147	0.0623	
Relevance	0.4548	0.6995	0.1278	0.5940	-0.2194	0.4794	
Satisfaction	-0.0332	0.4374	0.5702	0.4257	-0.1071	0.0557	

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 third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.0962	0.5501	0.0205	0.1777	0.4994	
Intrinsic Motivation	0.0962	0.0000	0.2861	0.0063	0.0158	0.0925	
Interest/Enjoyment	0.5501	0.2861	0.0000	0.1291	0.3845	0.8529	
Perceived Choice	0.0205	0.0063	0.1291	0.0000	0.1475	0.9850	
Pressure/Tension	0.1777	0.0158	0.3845	0.1475	0.0000	0.6744	
Effort/Importance	0.4994	0.0925	0.8529	0.9850	0.6744	0.0000	
Level of Motivation	0.5505	0.1111	0.0072	0.0188	0.8790	0.4896	
Attention	0.6408	0.8277	0.0694	0.5373	0.0597	0.8325	
Relevance	0.1023	0.0054	0.6633	0.0251	0.4510	0.0828	
Satisfaction	0.9103	0.1178	0.0333	0.1291	0.7156	0.8499	

method: spearman

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

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.1650	-0.0268	-0.1985	0.2804	0.1275	
Intrinsic Motivation	-0.1650	1.0000	0.4470	0.8124	0.2177	0.2856	
Interest/Enjoyment	-0.0268	0.4470	1.0000	0.2184	0.6604	0.0398	
Perceived Choice	-0.1985	0.8124	0.2184	1.0000	0.1406	-0.0505	
Pressure/Tension	0.2804	0.2177	0.6604	0.1406	1.0000	0.0865	
Effort/Importance	0.1275	0.2856	0.0398	-0.0505	0.0865	1.0000	
Level of Motivation	0.0970	0.4503	0.8993	0.3418	0.7564	0.0168	
Attention	0.1430	0.2643	0.9409	0.1071	0.7083	0.0325	
Relevance	0.1040	0.5681	0.3011	0.5794	0.5022	-0.2061	
Satisfaction	0.2315	0.3731	0.8433	0.2511	0.7497	0.1852	

method: spearman

Table 12: 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 third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.5729	0.9276	0.4964	0.3316	0.6639	
Intrinsic Motivation	0.5729	0.0000	0.1091	0.0004	0.4547	0.3223	
Interest/Enjoyment	0.9276	0.1091	0.0000	0.4532	0.0102	0.8926	
Perceived Choice	0.4964	0.0004	0.4532	0.0000	0.6315	0.8638	
Pressure/Tension	0.3316	0.4547	0.0102	0.6315	0.0000	0.7687	
Effort/Importance	0.6639	0.3223	0.8926	0.8638	0.7687	0.0000	
Level of Motivation	0.7414	0.1061	0.0000	0.2316	0.0017	0.9544	
Attention	0.6257	0.3612	0.0000	0.7156	0.0046	0.9122	
Relevance	0.7235	0.0340	0.2955	0.0299	0.0672	0.4796	
Satisfaction	0.4258	0.1889	0.0002	0.3865	0.0020	0.5262	

method: spearman

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

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of M
Diference in Scores	1.0000	0.7388	-0.1081	0.8571	-0.7783	0.6126	
Intrinsic Motivation	0.7388	1.0000	0.0636	0.9370	-0.9723	0.8727	
Interest/Enjoyment	-0.1081	0.0636	1.0000	-0.1622	0.0748	0.0636	
Perceived Choice	0.8571	0.9370	-0.1622	1.0000	-0.9636	0.8469	
Pressure/Tension	-0.7783	-0.9723	0.0748	-0.9636	1.0000	-0.8415	
Effort/Importance	0.6126	0.8727	0.0636	0.8469	-0.8415	1.0000	
Level of Motivation	0.3929	0.5586	0.4324	0.4643	-0.4447	0.8108	
Attention	-0.0180	-0.0818	0.1273	-0.0721	0.2057	0.3000	
Relevance	0.7207	0.7545	-0.3455	0.8829	-0.8602	0.5727	
Satisfaction	0.4144	0.4364	0.4909	0.3063	-0.2805	0.5636	

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of I
Diference in Scores	0.0000	0.0579	0.8175	0.0238	0.0393	0.1436	
Intrinsic Motivation	0.0579	0.0000	0.8922	0.0019	0.0002	0.0104	
Interest/Enjoyment	0.8175	0.8922	0.0000	0.7283	0.8734	0.8922	
Perceived Choice	0.0238	0.0019	0.7283	0.0000	0.0005	0.0162	
Pressure/Tension	0.0393	0.0002	0.8734	0.0005	0.0000	0.0176	
Effort/Importance	0.1436	0.0104	0.8922	0.0162	0.0176	0.0000	
Level of Motivation	0.3956	0.1925	0.3325	0.3024	0.3174	0.0269	
Attention	0.9694	0.8616	0.7857	0.8780	0.6582	0.5133	
Relevance	0.0676	0.0500	0.4479	0.0085	0.0130	0.1790	
Satisfaction	0.3553	0.3277	0.2633	0.5040	0.5423	0.1876	
method: spearman							

8 Diference in Scores and Motivation for the group w/o-gamified.Apprentice

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.3325	-0.5344	-0.1154	0.1089	-0.2584	
Intrinsic Motivation	-0.3325	1.0000	0.5548	0.7821	-0.9139	0.4772	
Interest/Enjoyment	-0.5344	0.5548	1.0000	0.2129	-0.4590	0.0702	
Perceived Choice	-0.1154	0.7821	0.2129	1.0000	-0.7869	0.1542	
Pressure/Tension	0.1089	-0.9139	-0.4590	-0.7869	1.0000	-0.2862	
Effort/Importance	-0.2584	0.4772	0.0702	0.1542	-0.2862	1.0000	
Level of Motivation	-0.4213	0.7167	0.6179	0.3837	-0.6438	0.3732	
Attention	-0.3520	0.3158	0.5595	0.1067	-0.3046	0.0783	
Relevance	-0.1232	0.7095	0.1192	0.4849	-0.7353	0.3826	
Satisfaction	-0.3487	0.7593	0.6223	0.3398	-0.6019	0.4246	

method: spearman

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.1777	0.0223	0.6484	0.6672	0.3005	
Intrinsic Motivation	0.1777	0.0000	0.0169	0.0001	0.0000	0.0452	
Interest/Enjoyment	0.0223	0.0169	0.0000	0.3963	0.0554	0.7820	
Perceived Choice	0.6484	0.0001	0.3963	0.0000	0.0001	0.5412	
Pressure/Tension	0.6672	0.0000	0.0554	0.0001	0.0000	0.2495	
Effort/Importance	0.3005	0.0452	0.7820	0.5412	0.2495	0.0000	
Level of Motivation	0.0816	0.0008	0.0063	0.1159	0.0039	0.1271	
Attention	0.1520	0.2017	0.0158	0.6735	0.2190	0.7574	
Relevance	0.6263	0.0010	0.6375	0.0414	0.0005	0.1171	
Satisfaction	0.1562	0.0003	0.0058	0.1678	0.0082	0.0791	

method: spearman

9 Diference in Scores and Motivation for the group w/o-gamified.Master

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

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	-0.2857	0.0180	0.1261	-0.0371	-0.2857	
Intrinsic Motivation	-0.2857	1.0000	0.3604	0.2523	-0.3706	0.2143	
Interest/Enjoyment	0.0180	0.3604	1.0000	0.6364	0.4114	-0.0721	
Perceived Choice	0.1261	0.2523	0.6364	1.0000	-0.2244	-0.7207	
Pressure/Tension	-0.0371	-0.3706	0.4114	-0.2244	1.0000	0.4818	Į.
Effort/Importance	-0.2857	0.2143	-0.0721	-0.7207	0.4818	1.0000	
Level of Motivation	-0.3243	0.2883	0.8727	0.5818	0.5049	-0.0180	ļ
Attention	-0.1786	0.0357	0.7928	0.4144	0.7412	0.1071	
Relevance	-0.3819	0.5637	0.1284	-0.1927	0.1698	0.4910	Į.
Satisfaction	-0.3214	0.5714	0.7388	0.7748	0.0371	-0.1786	

method: spearman

Table 18: Correlation matrix with p-values of Diference in Scores and Motivation for the group w/o-gamified.Master between participants' motivation and learning outcomes in the third empirical study

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.5560	0.9694	0.7876	0.9371	0.5560	
Intrinsic Motivation	0.5560	0.0000	0.4271	0.5852	0.4131	0.6615	ŀ
Interest/Enjoyment	0.9694	0.4271	0.0000	0.1244	0.3592	0.8780	ŀ
Perceived Choice	0.7876	0.5852	0.1244	0.0000	0.6286	0.0676	ŀ
Pressure/Tension	0.9371	0.4131	0.3592	0.6286	0.0000	0.2736	ŀ
Effort/Importance	0.5560	0.6615	0.8780	0.0676	0.2736	0.0000	ŀ
Level of Motivation	0.4779	0.5307	0.0104	0.1706	0.2478	0.9694	ŀ
Attention	0.7131	0.9635	0.0334	0.3553	0.0566	0.8397	ŀ
Relevance	0.3979	0.1875	0.7837	0.6790	0.7158	0.2632	ŀ
Satisfaction	0.4976	0.2000	0.0579	0.0408	0.9371	0.7131	

method: spearman