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	0.1287	-0.2239	0.2090	0.0997	0.3491	
Intrinsic Motivation	0.1287	1.0000	0.3385	0.7307	-0.5065	0.3954	
Interest/Enjoyment	-0.2239	0.3385	1.0000	0.1576	0.2382	-0.1496	
Perceived Choice	0.2090	0.7307	0.1576	1.0000	-0.1879	0.1338	
Pressure/Tension	0.0997	-0.5065	0.2382	-0.1879	1.0000	-0.0542	
Effort/Importance	0.3491	0.3954	-0.1496	0.1338	-0.0542	1.0000	
Level of Motivation	0.0268	0.4581	0.6517	0.3003	0.1903	0.2415	
Attention	-0.1459	0.1796	0.6974	0.0749	0.3309	0.0103	
Relevance	0.1695	0.5817	0.1490	0.4728	-0.1777	0.2621	
Satisfaction	0.1083	0.3891	0.5455	0.2344	0.2929	0.3684	

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 N
Diference in Scores	0.0000	0.4350	0.1707	0.2017	0.5458	0.0294	
Intrinsic Motivation	0.4350	0.0000	0.0350	0.0000	0.0010	0.0127	,
Interest/Enjoyment	0.1707	0.0350	0.0000	0.3380	0.1442	0.3633	,
Perceived Choice	0.2017	0.0000	0.3380	0.0000	0.2521	0.4169	,
Pressure/Tension	0.5458	0.0010	0.1442	0.2521	0.0000	0.7433	,
Effort/Importance	0.0294	0.0127	0.3633	0.4169	0.7433	0.0000	,
Level of Motivation	0.8716	0.0034	0.0000	0.0633	0.2458	0.1386	,
Attention	0.3753	0.2740	0.0000	0.6503	0.0396	0.9503	ŗ
Relevance	0.3023	0.0001	0.3652	0.0024	0.2791	0.1070	ŀ
Satisfaction	0.5117	0.0143	0.0003	0.1510	0.0704	0.0210	ŀ
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	
Level of Motivation	0.0767	0.4559	0.7967	0.3128	0.3436	0.1282	
Attention	-0.0039	0.2354	0.8167	0.1090	0.4144	0.0049	
Relevance	-0.0260	0.6866	0.2995	0.6576	-0.1513	-0.1784	
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

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	0.3457	-0.1077	0.4172	-0.0882	0.1239	
Intrinsic Motivation	0.3457	1.0000	0.2268	0.6418	-0.5685	0.5133	
Interest/Enjoyment	-0.1077	0.2268	1.0000	0.1023	0.2853	0.0397	
Perceived Choice	0.4172	0.6418	0.1023	1.0000	-0.0687	0.0334	
Pressure/Tension	-0.0882	-0.5685	0.2853	-0.0687	1.0000	-0.1266	
Effort/Importance	0.1239	0.5133	0.0397	0.0334	-0.1266	1.0000	
Level of Motivation	0.1209	0.4279	0.4258	0.3173	0.0847	0.4812	
Attention	-0.0373	0.1139	0.5426	0.1273	0.3524	0.2921	
Relevance	0.1926	0.5445	-0.0883	0.2125	-0.2606	0.6239	
Satisfaction	0.1120	0.4917	0.4196	0.2768	0.0224	0.4809	

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	0.1601	0.6705	0.0850	0.7279	0.6243	
Intrinsic Motivation	0.1601	0.0000	0.3654	0.0041	0.0138	0.0294	
Interest/Enjoyment	0.6705	0.3654	0.0000	0.6862	0.2512	0.8757	
Perceived Choice	0.0850	0.0041	0.6862	0.0000	0.7866	0.8953	
Pressure/Tension	0.7279	0.0138	0.2512	0.7866	0.0000	0.6166	
Effort/Importance	0.6243	0.0294	0.8757	0.8953	0.6166	0.0000	
Level of Motivation	0.6327	0.0765	0.0781	0.1995	0.7383	0.0432	
Attention	0.8832	0.6526	0.0200	0.6148	0.1515	0.2396	
Relevance	0.4438	0.0195	0.7275	0.3972	0.2963	0.0057	
Satisfaction	0.6581	0.0382	0.0830	0.2662	0.9296	0.0434	

method: spearman

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	-0.0814	-0.2929	-0.0158	0.1485	0.2460	
Intrinsic Motivation	-0.0814	1.0000	0.3604	0.7006	-0.4148	0.3673	
Interest/Enjoyment	-0.2929	0.3604	1.0000	0.0306	0.2813	-0.1529	
Perceived Choice	-0.0158	0.7006	0.0306	1.0000	-0.1232	0.0814	
Pressure/Tension	0.1485	-0.4148	0.2813	-0.1232	1.0000	-0.0529	
Effort/Importance	0.2460	0.3673	-0.1529	0.0814	-0.0529	1.0000	
Level of Motivation	-0.0508	0.4704	0.6854	0.2075	0.2974	0.2267	
Attention	-0.1709	0.2313	0.7478	-0.0091	0.3340	0.0066	
Relevance	0.0604	0.5194	0.1431	0.4043	-0.0659	0.1751	
Satisfaction	0.0967	0.4658	0.5853	0.2098	0.3667	0.4108	

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	0.6926	0.1464	0.9391	0.4691	0.2258	
Intrinsic Motivation	0.6926	0.0000	0.0705	0.0001	0.0351	0.0649	
Interest/Enjoyment	0.1464	0.0705	0.0000	0.8820	0.1640	0.4557	
Perceived Choice	0.9391	0.0001	0.8820	0.0000	0.5489	0.6925	
Pressure/Tension	0.4691	0.0351	0.1640	0.5489	0.0000	0.7976	
Effort/Importance	0.2258	0.0649	0.4557	0.6925	0.7976	0.0000	
Level of Motivation	0.8055	0.0153	0.0001	0.3090	0.1400	0.2654	
Attention	0.4038	0.2556	0.0000	0.9648	0.0954	0.9746	
Relevance	0.7695	0.0065	0.4857	0.0405	0.7490	0.3921	
Satisfaction	0.6386	0.0165	0.0017	0.3037	0.0654	0.0371	

Satisfaction method: spearman

Diference in Scores and Motivation for the group Master 5

Table 9: Correlation matrix of Diference in Scores and Motivation for the group Master between participants' motivation and learning outcomes in the third empir-

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	1.0000	0.5585	0.1853	0.7300	-0.4826	0.1274	
Intrinsic Motivation	0.5585	1.0000	0.2562	0.6869	-0.6048	0.6325	ŀ
Interest/Enjoyment	0.1853	0.2562	1.0000	0.3828	0.3244	0.0251	į
Perceived Choice	0.7300	0.6869	0.3828	1.0000	-0.3332	0.2125	
Pressure/Tension	-0.4826	-0.6048	0.3244	-0.3332	1.0000	-0.2681	
Effort/Importance	0.1274	0.6325	0.0251	0.2125	-0.2681	1.0000	
method: spearman							

round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Level of Motivation	0.1680	0.3945	0.6505	0.6091	0.1116	0.2972	
Attention	-0.1683	-0.0166	0.5319	0.2614	0.4933	0.0153	
Relevance	0.4966	0.7003	0.0694	0.6127	-0.2060	0.6203	
Satisfaction	0.0166	0.3953	0.5384	0.4222	-0.0510	0.1480	

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

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round	Diference in Scores	Intrinsic Motivation	Interest/Enjoyment	Perceived Choice	Pressure/Tension	Effort/Importance	Level of N
Diference in Scores	0.0000	0.0473	0.5444	0.0046	0.0949	0.6782	
Intrinsic Motivation	0.0473	0.0000	0.3981	0.0095	0.0285	0.0204	
Interest/Enjoyment	0.5444	0.3981	0.0000	0.1967	0.2795	0.9351	
Perceived Choice	0.0046	0.0095	0.1967	0.0000	0.2659	0.4858	İ
Pressure/Tension	0.0949	0.0285	0.2795	0.2659	0.0000	0.3759	
Effort/Importance	0.6782	0.0204	0.9351	0.4858	0.3759	0.0000	İ
Level of Motivation	0.5832	0.1822	0.0161	0.0271	0.7167	0.3240	İ
Attention	0.5826	0.9571	0.0613	0.3883	0.0867	0.9604	İ
Relevance	0.0843	0.0077	0.8216	0.0260	0.4995	0.0237	İ
Satisfaction	0.9570	0.1813	0.0577	0.1507	0.8686	0.6293	i

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	0.2448	-0.3082	0.2592	-0.3410	0.1620	
Intrinsic Motivation	0.2448	1.0000	0.0630	0.6970	-0.9069	0.6972	
Interest/Enjoyment	-0.3082	0.0630	1.0000	-0.4211	-0.0739	0.0494	
Perceived Choice	0.2592	0.6970	-0.4211	1.0000	-0.6268	0.2593	
Pressure/Tension	-0.3410	-0.9069	-0.0739	-0.6268	1.0000	-0.4513	
Effort/Importance	0.1620	0.6972	0.0494	0.2593	-0.4513	1.0000	
Level of Motivation	-0.0070	0.4737	0.1476	0.1265	-0.3739	0.6926	
Attention	-0.2222	0.1340	0.2968	-0.1396	-0.0408	0.5453	
Relevance	0.1476	0.6503	-0.1989	0.2782	-0.6184	0.6743	
Satisfaction	0.0739	0.5634	0.1340	0.0265	-0.3929	0.7996	

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	0.4435	0.3297	0.4159	0.2781	0.6150	
Intrinsic Motivation	0.4435	0.0000	0.8457	0.0118	0.0000	0.0117	
Interest/Enjoyment	0.3297	0.8457	0.0000	0.1729	0.8193	0.8789	İ
Perceived Choice	0.4159	0.0118	0.1729	0.0000	0.0292	0.4158	
Pressure/Tension	0.2781	0.0000	0.8193	0.0292	0.0000	0.1408	
Effort/Importance	0.6150	0.0117	0.8789	0.4158	0.1408	0.0000	
Level of Motivation	0.9827	0.1198	0.6470	0.6952	0.2312	0.0125	
Attention	0.4876	0.6779	0.3488	0.6653	0.8999	0.0667	İ
Relevance	0.6470	0.0221	0.5353	0.3813	0.0321	0.0162	İ
Satisfaction	0.8193	0.0564	0.6779	0.9350	0.2064	0.0018	

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 M
Diference in Scores	1.0000	0.0286	0.0000	0.4638	-0.6983	-0.7143	
Intrinsic Motivation	0.0286	1.0000	0.3769	0.1739	-0.2732	0.3714	
Interest/Enjoyment	0.0000	0.3769	1.0000	0.7059	0.5236	0.0290	
Perceived Choice	0.4638	0.1739	0.7059	1.0000	0.0924	-0.5508	
Pressure/Tension	-0.6983	-0.2732	0.5236	0.0924	1.0000	0.3339	
Effort/Importance	-0.7143	0.3714	0.0290	-0.5508	0.3339	1.0000	
Level of Motivation	-0.3714	0.1429	0.8117	0.6377	0.7590	0.0857	
Attention	-0.3714	0.1429	0.8117	0.6377	0.7590	0.0857	
Relevance	-0.5508	0.6957	0.1324	-0.0735	0.0924	0.4638	
Satisfaction	-0.0286	0.3143	0.7537	0.8407	0.3947	-0.0857	

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 I
Diference in Scores	0.0000	1.0000	1.0000	0.3542	0.1228	0.1361	
Intrinsic Motivation	1.0000	0.0000	0.4615	0.7417	0.6004	0.4972	
Interest/Enjoyment	1.0000	0.4615	0.0000	0.1170	0.2863	0.9565	
Perceived Choice	0.3542	0.7417	0.1170	0.0000	0.8618	0.2574	
Pressure/Tension	0.1228	0.6004	0.2863	0.8618	0.0000	0.5177	
Effort/Importance	0.1361	0.4972	0.9565	0.2574	0.5177	0.0000	
Level of Motivation	0.4972	0.8028	0.0499	0.1731	0.0801	0.9194	
Attention	0.4972	0.8028	0.0499	0.1731	0.0801	0.9194	
Relevance	0.2574	0.1248	0.8026	0.8899	0.8618	0.3542	
Satisfaction	1.0000	0.5639	0.0835	0.0361	0.4387	0.9194	

method: spearman