

Summary of nonparametric statistics analysis for Gain in Skill/Knowledge as the latent trait estimates in the first study for students with effective participants

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Table 1: Summary of Scheirer-Ray-Hare results for Gain in Skill/Knowledge as the latent trait estimates in the first study for students with effective participants

	Df	Sum Sq	H	p.value	Sig
gain.theta					
gain.theta:Type	1	102.128	0.543	0.461	
gain.theta:CLRole	1	1420.158	7.554	0.006	**
gain.theta:Type:CLRole	1	748.997	3.984	0.046	*
gain.theta:Residuals	43	6376.717			

Signif. codes: 0 “***” 0.01 “**” 0.05

Table 2: Descriptive statistic of the pair wilcoxon analysis for Gain in Skill/Knowledge as the latent trait estimates in the first study for students with effective participants

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type:CLRole.greater.1	non-gamified.Apprentice	10	0.56	16.80	168	113	2.52	0.005	0.514	large
Type:CLRole.greater.2	ont-gamified.Master	14	0.32	9.43	132	113	2.52	0.005	0.514	large
Type:CLRole.two.sided.1	non-gamified.Apprentice	10	0.56	16.80	168	113	2.52	0.011	0.514	large
Type:CLRole.two.sided.2	ont-gamified.Master	14	0.32	9.43	132	113	2.52	0.011	0.514	large
Type:CLRole.greater.11	ont-gamified.Apprentice	14	0.65	19.93	279	174	3.49	0.000	0.660	large
Type:CLRole.greater.21	ont-gamified.Master	14	0.32	9.07	127	174	3.49	0.000	0.660	large
Type:CLRole.two.sided.11	ont-gamified.Apprentice	14	0.65	19.93	279	174	3.49	0.000	0.660	large
Type:CLRole.two.sided.21	ont-gamified.Master	14	0.32	9.07	127	174	3.49	0.000	0.660	large

Table 3: Full descriptive statistic of the pair wilcoxon analysis for Gain in Skill/Knowledge as the latent trait estimates in the first study for students with effective participants

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type.less.1	non-gamified	19	0.54	25.79	490	300	0.74	0.771	0.108	small
Type.less.2	ont-gamified	28	0.43	22.79	638	300	0.74	0.771	0.108	small
Type.greater.1	non-gamified	19	0.54	25.79	490	300	0.74	0.236	0.108	small
Type.greater.2	ont-gamified	28	0.43	22.79	638	300	0.74	0.236	0.108	small
Type.two.sided.1	non-gamified	19	0.54	25.79	490	300	0.74	0.471	0.108	small
Type.two.sided.2	ont-gamified	28	0.43	22.79	638	300	0.74	0.471	0.108	small
Type:CLRole.less.1	non-gamified.Apprentice	10	0.56	10.00	100	45	0.00	0.516	0.000	none
Type:CLRole.less.2	non-gamified.Master	9	0.50	10.00	90	45	0.00	0.516	0.000	none
Type:CLRole.greater.1	non-gamified.Apprentice	10	0.56	10.00	100	45	0.00	0.516	0.000	none
Type:CLRole.greater.2	non-gamified.Master	9	0.50	10.00	90	45	0.00	0.516	0.000	none
Type:CLRole.two.sided.1	non-gamified.Apprentice	10	0.56	10.00	100	45	0.00	1.000	0.000	none
Type:CLRole.two.sided.2	non-gamified.Master	9	0.50	10.00	90	45	0.00	1.000	0.000	none
Type:CLRole.less.11	non-gamified.Apprentice	10	0.56	10.60	106	51	-1.11	0.142	0.227	small
Type:CLRole.less.21	ont-gamified.Apprentice	14	0.65	13.86	194	51	-1.11	0.142	0.227	small
Type:CLRole.greater.11	non-gamified.Apprentice	10	0.56	10.60	106	51	-1.11	0.870	0.227	small
Type:CLRole.greater.21	ont-gamified.Apprentice	14	0.65	13.86	194	51	-1.11	0.870	0.227	small
Type:CLRole.two.sided.11	non-gamified.Apprentice	10	0.56	10.60	106	51	-1.11	0.285	0.227	small
Type:CLRole.two.sided.21	ont-gamified.Apprentice	14	0.65	13.86	194	51	-1.11	0.285	0.227	small
Type:CLRole.less.12	non-gamified.Apprentice	10	0.56	16.80	168	113	2.52	0.996	0.514	large
Type:CLRole.less.22	ont-gamified.Master	14	0.32	9.43	132	113	2.52	0.996	0.514	large
Type:CLRole.greater.12	non-gamified.Apprentice	10	0.56	16.80	168	113	2.52	0.005	0.514	large
Type:CLRole.greater.22	ont-gamified.Master	14	0.32	9.43	132	113	2.52	0.005	0.514	large
Type:CLRole.two.sided.12	non-gamified.Apprentice	10	0.56	16.80	168	113	2.52	0.011	0.514	large
Type:CLRole.two.sided.22	ont-gamified.Master	14	0.32	9.43	132	113	2.52	0.011	0.514	large
Type:CLRole.less.13	non-gamified.Master	9	0.50	10.78	97	52	-0.69	0.258	0.144	small
Type:CLRole.less.23	ont-gamified.Apprentice	14	0.65	12.79	179	52	-0.69	0.258	0.144	small
Type:CLRole.greater.13	non-gamified.Master	9	0.50	10.78	97	52	-0.69	0.762	0.144	small
Type:CLRole.greater.23	ont-gamified.Apprentice	14	0.65	12.79	179	52	-0.69	0.762	0.144	small
Type:CLRole.two.sided.13	non-gamified.Master	9	0.50	10.78	97	52	-0.69	0.516	0.144	small
Type:CLRole.two.sided.23	ont-gamified.Apprentice	14	0.65	12.79	179	52	-0.69	0.516	0.144	small
Type:CLRole.less.14	non-gamified.Master	9	0.50	14.33	129	84	1.32	0.910	0.276	small
Type:CLRole.less.24	ont-gamified.Master	14	0.32	10.50	147	84	1.32	0.910	0.276	small
Type:CLRole.greater.14	non-gamified.Master	9	0.50	14.33	129	84	1.32	0.101	0.276	small
Type:CLRole.greater.24	ont-gamified.Master	14	0.32	10.50	147	84	1.32	0.101	0.276	small
Type:CLRole.two.sided.14	non-gamified.Master	9	0.50	14.33	129	84	1.32	0.201	0.276	small
Type:CLRole.two.sided.24	ont-gamified.Master	14	0.32	10.50	147	84	1.32	0.201	0.276	small
Type:CLRole.less.15	ont-gamified.Apprentice	14	0.65	19.93	279	174	3.49	1.000	0.660	large
Type:CLRole.less.25	ont-gamified.Master	14	0.32	9.07	127	174	3.49	1.000	0.660	large
Type:CLRole.greater.15	ont-gamified.Apprentice	14	0.65	19.93	279	174	3.49	0.000	0.660	large
Type:CLRole.greater.25	ont-gamified.Master	14	0.32	9.07	127	174	3.49	0.000	0.660	large

Table 3: *(continued)*

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type:CLRole.two.sided.15	ont-gamified.Apprentice	14	0.65	19.93	279	174	3.49	0.000	0.660	large
Type:CLRole.two.sided.25	ont-gamified.Master	14	0.32	9.07	127	174	3.49	0.000	0.660	large