

Summary of nonparametric statistics analysis for Gain in Skill/Knowledge as the latent trait estimates in the third study for signed up students

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Table 1: Summary of Scheirer-Ray-Hare results for Gain in Skill/Knowledge as the latent trait estimates in the third study for signed up students

	Df	Sum Sq	H	p.value	Sig
gain.theta					
gain.theta:Type	1	1290.572	6.321	0.012	*
gain.theta:CLRole	1	1029.892	5.045	0.025	*
gain.theta:Type:CLRole	1	3.010	0.015	0.903	
gain.theta:Residuals	45	7476.026			

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 third study for signed up students

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type.greater.1	ont-gamified	23	0.04	30.46	700.5	424.5	2.51	0.006	0.359	medium
Type.greater.2	w/o-gamified	26	-0.04	20.17	524.5	424.5	2.51	0.006	0.359	medium
Type.two.sided.1	ont-gamified	23	0.04	30.46	700.5	424.5	2.51	0.011	0.359	medium
Type.two.sided.2	w/o-gamified	26	-0.04	20.17	524.5	424.5	2.51	0.011	0.359	medium
Type:CLRole.greater.1	ont-gamified.Apprentice	16	0.07	22.84	365.5	229.5	2.57	0.005	0.434	medium
Type:CLRole.greater.2	w/o-gamified.Apprentice	19	-0.03	13.92	264.5	229.5	2.57	0.005	0.434	medium
Type:CLRole.two.sided.1	ont-gamified.Apprentice	16	0.07	22.84	365.5	229.5	2.57	0.009	0.434	medium
Type:CLRole.two.sided.2	w/o-gamified.Apprentice	19	-0.03	13.92	264.5	229.5	2.57	0.009	0.434	medium
Type:CLRole.greater.11	ont-gamified.Apprentice	16	0.07	14.69	235.0	99.0	2.87	0.001	0.599	large
Type:CLRole.greater.21	w/o-gamified.Master	7	-0.07	5.86	41.0	99.0	2.87	0.001	0.599	large
Type:CLRole.two.sided.11	ont-gamified.Apprentice	16	0.07	14.69	235.0	99.0	2.87	0.003	0.599	large
Type:CLRole.two.sided.21	w/o-gamified.Master	7	-0.07	5.86	41.0	99.0	2.87	0.003	0.599	large
Type:CLRole.greater.12	w/o-gamified.Apprentice	19	-0.03	15.21	289.0	99.0	1.88	0.032	0.368	medium
Type:CLRole.greater.22	w/o-gamified.Master	7	-0.07	8.86	62.0	99.0	1.88	0.032	0.368	medium

Table 3: Full descriptive statistic of the pair wilcoxon analysis for Gain in Skill/Knowledge as the latent trait estimates in the third study for signed up students

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type.less.1	ont-gamified	23	0.04	30.46	700.5	424.5	2.51	0.995	0.359	medium
Type.less.2	w/o-gamified	26	-0.04	20.17	524.5	424.5	2.51	0.995	0.359	medium
Type.greater.1	ont-gamified	23	0.04	30.46	700.5	424.5	2.51	0.006	0.359	medium
Type.greater.2	w/o-gamified	26	-0.04	20.17	524.5	424.5	2.51	0.006	0.359	medium
Type.two.sided.1	ont-gamified	23	0.04	30.46	700.5	424.5	2.51	0.011	0.359	medium
Type.two.sided.2	w/o-gamified	26	-0.04	20.17	524.5	424.5	2.51	0.011	0.359	medium
Type:CLRole.less.1	ont-gamified.Apprentice	16	0.07	13.19	211.0	75.0	1.27	0.901	0.265	small
Type:CLRole.less.2	ont-gamified.Master	7	-0.02	9.29	65.0	75.0	1.27	0.901	0.265	small
Type:CLRole.greater.1	ont-gamified.Apprentice	16	0.07	13.19	211.0	75.0	1.27	0.111	0.265	small
Type:CLRole.greater.2	ont-gamified.Master	7	-0.02	9.29	65.0	75.0	1.27	0.111	0.265	small
Type:CLRole.two.sided.1	ont-gamified.Apprentice	16	0.07	13.19	211.0	75.0	1.27	0.222	0.265	small
Type:CLRole.two.sided.2	ont-gamified.Master	7	-0.02	9.29	65.0	75.0	1.27	0.222	0.265	small
Type:CLRole.less.11	ont-gamified.Apprentice	16	0.07	22.84	365.5	229.5	2.57	0.996	0.434	medium
Type:CLRole.less.21	w/o-gamified.Apprentice	19	-0.03	13.92	264.5	229.5	2.57	0.996	0.434	medium
Type:CLRole.greater.11	ont-gamified.Apprentice	16	0.07	22.84	365.5	229.5	2.57	0.005	0.434	medium
Type:CLRole.greater.21	w/o-gamified.Apprentice	19	-0.03	13.92	264.5	229.5	2.57	0.005	0.434	medium
Type:CLRole.two.sided.11	ont-gamified.Apprentice	16	0.07	22.84	365.5	229.5	2.57	0.009	0.434	medium
Type:CLRole.two.sided.21	w/o-gamified.Apprentice	19	-0.03	13.92	264.5	229.5	2.57	0.009	0.434	medium
Type:CLRole.less.12	ont-gamified.Apprentice	16	0.07	14.69	235.0	99.0	2.87	0.999	0.599	large
Type:CLRole.less.22	w/o-gamified.Master	7	-0.07	5.86	41.0	99.0	2.87	0.999	0.599	large
Type:CLRole.greater.12	ont-gamified.Apprentice	16	0.07	14.69	235.0	99.0	2.87	0.001	0.599	large
Type:CLRole.greater.22	w/o-gamified.Master	7	-0.07	5.86	41.0	99.0	2.87	0.001	0.599	large
Type:CLRole.two.sided.12	ont-gamified.Apprentice	16	0.07	14.69	235.0	99.0	2.87	0.003	0.599	large
Type:CLRole.two.sided.22	w/o-gamified.Master	7	-0.07	5.86	41.0	99.0	2.87	0.003	0.599	large
Type:CLRole.less.13	ont-gamified.Master	7	-0.02	13.14	92.0	64.0	-0.14	0.455	0.028	none
Type:CLRole.less.23	w/o-gamified.Apprentice	19	-0.03	13.63	259.0	64.0	-0.14	0.455	0.028	none
Type:CLRole.greater.13	ont-gamified.Master	7	-0.02	13.14	92.0	64.0	-0.14	0.567	0.028	none
Type:CLRole.greater.23	w/o-gamified.Apprentice	19	-0.03	13.63	259.0	64.0	-0.14	0.567	0.028	none
Type:CLRole.two.sided.13	ont-gamified.Master	7	-0.02	13.14	92.0	64.0	-0.14	0.910	0.028	none
Type:CLRole.two.sided.23	w/o-gamified.Apprentice	19	-0.03	13.63	259.0	64.0	-0.14	0.910	0.028	none
Type:CLRole.less.14	ont-gamified.Master	7	-0.02	8.57	60.0	32.0	0.96	0.841	0.256	small
Type:CLRole.less.24	w/o-gamified.Master	7	-0.07	6.43	45.0	32.0	0.96	0.841	0.256	small
Type:CLRole.greater.14	ont-gamified.Master	7	-0.02	8.57	60.0	32.0	0.96	0.191	0.256	small
Type:CLRole.greater.24	w/o-gamified.Master	7	-0.07	6.43	45.0	32.0	0.96	0.191	0.256	small

Table 3: *(continued)*

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type:CLRole.two.sided.14	ont-gamified.Master	7	-0.02	8.57	60.0	32.0	0.96	0.383	0.256	small
Type:CLRole.two.sided.24	w/o-gamified.Master	7	-0.07	6.43	45.0	32.0	0.96	0.383	0.256	small
Type:CLRole.less.15	w/o-gamified.Apprentice	19	-0.03	15.21	289.0	99.0	1.88	0.972	0.368	medium
Type:CLRole.less.25	w/o-gamified.Master	7	-0.07	8.86	62.0	99.0	1.88	0.972	0.368	medium
Type:CLRole.greater.15	w/o-gamified.Apprentice	19	-0.03	15.21	289.0	99.0	1.88	0.032	0.368	medium
Type:CLRole.greater.25	w/o-gamified.Master	7	-0.07	8.86	62.0	99.0	1.88	0.032	0.368	medium

Table 3: *(continued)*

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type:CLRole.two.sided.15	w/o-gamified.Apprentice	19	-0.03	15.21	289.0	99.0	1.88	0.063	0.368	medium
Type:CLRole.two.sided.25	w/o-gamified.Master	7	-0.07	8.86	62.0	99.0	1.88	0.063	0.368	medium