

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

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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 students with effective participation

	Df	Sum Sq	H	p.value	Sig
gain.theta					
gain.theta:Type	1	1040.474	7.251	0.007	**
gain.theta:CLRole	1	668.969	4.662	0.031	*
gain.theta:Type:CLRole	1	0.004	0.000	0.996	
gain.theta:Residuals	37	4030.053			

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 students with effective participation

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type.greater.1	ont-gamified	23	0.04	25.46	585.5	309.5	2.69	0.003	0.421	medium
Type.greater.2	w/o-gamified	18	-0.05	15.31	275.5	309.5	2.69	0.003	0.421	medium
Type.two.sided.1	ont-gamified	23	0.04	25.46	585.5	309.5	2.69	0.006	0.421	medium
Type.two.sided.2	w/o-gamified	18	-0.05	15.31	275.5	309.5	2.69	0.006	0.421	medium
Type:CLRole.greater.1	ont-gamified.Apprentice	16	0.07	17.97	287.5	151.5	2.58	0.004	0.487	medium
Type:CLRole.greater.2	w/o-gamified.Apprentice	12	-0.03	9.88	118.5	151.5	2.58	0.004	0.487	medium
Type:CLRole.two.sided.1	ont-gamified.Apprentice	16	0.07	17.97	287.5	151.5	2.58	0.009	0.487	medium
Type:CLRole.two.sided.2	w/o-gamified.Apprentice	12	-0.03	9.88	118.5	151.5	2.58	0.009	0.487	medium
Type:CLRole.greater.11	ont-gamified.Apprentice	16	0.07	13.94	223.0	87.0	2.88	0.001	0.613	large
Type:CLRole.greater.21	w/o-gamified.Master	6	-0.08	5.00	30.0	87.0	2.88	0.001	0.613	large
Type:CLRole.two.sided.11	ont-gamified.Apprentice	16	0.07	13.94	223.0	87.0	2.88	0.002	0.613	large
Type:CLRole.two.sided.21	w/o-gamified.Master	6	-0.08	5.00	30.0	87.0	2.88	0.002	0.613	large
Type:CLRole.greater.12	w/o-gamified.Apprentice	12	-0.03	11.33	136.0	58.0	2.06	0.021	0.486	medium
Type:CLRole.greater.22	w/o-gamified.Master	6	-0.08	5.83	35.0	58.0	2.06	0.021	0.486	medium
Type:CLRole.two.sided.12	w/o-gamified.Apprentice	12	-0.03	11.33	136.0	58.0	2.06	0.041	0.486	medium
Type:CLRole.two.sided.22	w/o-gamified.Master	6	-0.08	5.83	35.0	58.0	2.06	0.041	0.486	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 students with effective participation

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type.less.1	ont-gamified	23	0.04	25.46	585.5	309.5	2.69	0.997	0.421	medium
Type.less.2	w/o-gamified	18	-0.05	15.31	275.5	309.5	2.69	0.997	0.421	medium
Type.greater.1	ont-gamified	23	0.04	25.46	585.5	309.5	2.69	0.003	0.421	medium
Type.greater.2	w/o-gamified	18	-0.05	15.31	275.5	309.5	2.69	0.003	0.421	medium
Type.two.sided.1	ont-gamified	23	0.04	25.46	585.5	309.5	2.69	0.006	0.421	medium
Type.two.sided.2	w/o-gamified	18	-0.05	15.31	275.5	309.5	2.69	0.006	0.421	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	17.97	287.5	151.5	2.58	0.996	0.487	medium
Type:CLRole.less.21	w/o-gamified.Apprentice	12	-0.03	9.88	118.5	151.5	2.58	0.996	0.487	medium
Type:CLRole.greater.11	ont-gamified.Apprentice	16	0.07	17.97	287.5	151.5	2.58	0.004	0.487	medium
Type:CLRole.greater.21	w/o-gamified.Apprentice	12	-0.03	9.88	118.5	151.5	2.58	0.004	0.487	medium
Type:CLRole.two.sided.11	ont-gamified.Apprentice	16	0.07	17.97	287.5	151.5	2.58	0.009	0.487	medium
Type:CLRole.two.sided.21	w/o-gamified.Apprentice	12	-0.03	9.88	118.5	151.5	2.58	0.009	0.487	medium
Type:CLRole.less.12	ont-gamified.Apprentice	16	0.07	13.94	223.0	87.0	2.88	0.999	0.613	large
Type:CLRole.less.22	w/o-gamified.Master	6	-0.08	5.00	30.0	87.0	2.88	0.999	0.613	large
Type:CLRole.greater.12	ont-gamified.Apprentice	16	0.07	13.94	223.0	87.0	2.88	0.001	0.613	large
Type:CLRole.greater.22	w/o-gamified.Master	6	-0.08	5.00	30.0	87.0	2.88	0.001	0.613	large
Type:CLRole.two.sided.12	ont-gamified.Apprentice	16	0.07	13.94	223.0	87.0	2.88	0.002	0.613	large
Type:CLRole.two.sided.22	w/o-gamified.Master	6	-0.08	5.00	30.0	87.0	2.88	0.002	0.613	large
Type:CLRole.less.13	ont-gamified.Master	7	-0.02	10.00	70.0	42.0	0.00	0.516	0.000	none
Type:CLRole.less.23	w/o-gamified.Apprentice	12	-0.03	10.00	120.0	42.0	0.00	0.516	0.000	none
Type:CLRole.greater.13	ont-gamified.Master	7	-0.02	10.00	70.0	42.0	0.00	0.516	0.000	none
Type:CLRole.greater.23	w/o-gamified.Apprentice	12	-0.03	10.00	120.0	42.0	0.00	0.516	0.000	none
Type:CLRole.two.sided.13	ont-gamified.Master	7	-0.02	10.00	70.0	42.0	0.00	1.000	0.000	none
Type:CLRole.two.sided.23	w/o-gamified.Apprentice	12	-0.03	10.00	120.0	42.0	0.00	1.000	0.000	none
Type:CLRole.less.14	ont-gamified.Master	7	-0.02	8.14	57.0	29.0	1.14	0.883	0.317	medium

Table 3: *(continued)*

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Type:CLRole.less.24	w/o-gamified.Master	6	-0.08	5.67	34.0	29.0	1.14	0.883	0.317	medium
Type:CLRole.greater.14	ont-gamified.Master	7	-0.02	8.14	57.0	29.0	1.14	0.147	0.317	medium
Type:CLRole.greater.24	w/o-gamified.Master	6	-0.08	5.67	34.0	29.0	1.14	0.147	0.317	medium
Type:CLRole.two.sided.14	ont-gamified.Master	7	-0.02	8.14	57.0	29.0	1.14	0.295	0.317	medium
Type:CLRole.two.sided.24	w/o-gamified.Master	6	-0.08	5.67	34.0	29.0	1.14	0.295	0.317	medium
Type:CLRole.less.15	w/o-gamified.Apprentice	12	-0.03	11.33	136.0	58.0	2.06	0.984	0.486	medium
Type:CLRole.less.25	w/o-gamified.Master	6	-0.08	5.83	35.0	58.0	2.06	0.984	0.486	medium
Type:CLRole.greater.15	w/o-gamified.Apprentice	12	-0.03	11.33	136.0	58.0	2.06	0.021	0.486	medium
Type:CLRole.greater.25	w/o-gamified.Master	6	-0.08	5.83	35.0	58.0	2.06	0.021	0.486	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	12	-0.03	11.33	136.0	58.0	2.06	0.041	0.486	medium
Type:CLRole.two.sided.25	w/o-gamified.Master	6	-0.08	5.83	35.0	58.0	2.06	0.041	0.486	medium