Statistical Analysis in the pilot study for signed up students

Table 1: Two-way ANOVA and Scheirer-Ray-Hare in the pilot study for signed up students

	Sum Sq	Df	F value	Pr(>F)	Sig	Df	Sum Sq	H	p.value	Sig
Interest/Enjoyment.(Intercept)	282.283	1	109.413	0.000						
Interest/Enjoyment.Type	10.203	1	3.955	0.057		1	277.266	3.590	0.058	
Interest/Enjoyment.CLRole	2.181	1	0.845	0.366		1	42.321	0.548	0.459	
Interest/Enjoyment.Type:CLRole	0.655	1	0.254	0.618		1	29.121	0.377	0.539	
Interest/Enjoyment.Residuals	67.079	26				26	1890.792			
Perceived Choice.(Intercept)	305.618	1	208.998	0.000						
Perceived Choice.Type	11.672	1	7.982	0.009	**	1	308.571	3.998	0.046	*
Perceived Choice.CLRole	0.201	1	0.137	0.714		1	0.027	0.000	0.985	
Perceived Choice.Type:CLRole	3.684	1	2.519	0.125		1	161.485	2.093	0.148	
Perceived Choice.Residuals	38.020	26				26	1767.917			
Pressure/Tension.(Intercept)	176.641	1	135.076	0.000						
Pressure/Tension.Type	3.404	1	2.603	0.119		1	259.286	3.367	0.067	
Pressure/Tension.CLRole	0.083	1	0.063	0.804		1	12.623	0.164	0.686	
Pressure/Tension.Type:CLRole	0.059	1	0.045	0.833		1	7.758	0.101	0.751	
Pressure/Tension.Residuals	34.001	26				26	1953.333			
Effort/Importance.(Intercept)	458.346	1	276.045	0.000						
Effort/Importance.Type	0.624	1	0.376	0.545		1	13.393	0.175	0.676	
Effort/Importance.CLRole	0.065	1	0.039	0.845		1	0.069	0.001	0.976	
Effort/Importance.Type:CLRole	0.275	1	0.166	0.687		1	7.517	0.098	0.754	
Effort/Importance.Residuals	43.170	26				26	2201.021			
Intrinsic Motivation.(Intercept)	357.956	1	472.048	0.000						
Intrinsic Motivation.Type	3.843	1	5.067	0.033	*	1	450.536	5.813	0.016	*
Intrinsic Motivation.CLRole	0.065	1	0.086	0.772		1	3.040	0.039	0.843	
Intrinsic Motivation.Type:CLRole	0.289	1	0.381	0.542		1	23.758	0.307	0.580	
Intrinsic Motivation.Residuals	19.716	26				26	1770.167			

Signif. codes: 0 "**" 0.01 "*" 0.05

Table 2: Summary of Tukey post-hoc in the pilot study for signed up students

	N	mean	lsmean	SE	df	lwr.CI	upr.CI	t.ratio	p.value	p.ajd	g	sig	mag
Interest/Enjoyment:non-gamified - ont-gamified	30	−1.370	−1.529	0.769		−2.578	−0.161	−1.989	0.057	0.028	−0.838	*	large
Perceived Choice:non-gamified - ont-gamified	30	−1.055	−1.636	0.579		−1.964	−0.145	−2.825	0.009	0.025	−0.841	*	large
Intrinsic Motivation:non-gamified - ont-gamified	30	−0.795	−0.938	0.417		−1.450	−0.140	−2.251	0.033	0.019	−0.911	*	large

Table 3: Summary of Pair wilcoxon in the pilot study for signed up students

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Interest/Enjoyment.Type.less.1	non-gamified	14	2.75	12.25	171.5	66.5	−1.89	0.029	0.346	medium
Interest/Enjoyment.Type.less.2	ont-gamified	16	4.58	18.34	293.5	66.5	−1.89	0.029	0.346	medium
Perceived Choice.Type.less.1	non-gamified	14	3.90	12.07	169.0	64.0	−2.00	0.023	0.365	medium
Perceived Choice.Type.less.2	ont-gamified	16	4.90	18.50	296.0	64.0	−2.00	0.023	0.365	medium
Perceived Choice.Type.two.sided.1	non-gamified	14	3.90	12.07	169.0	64.0	−2.00	0.046	0.365	medium
Perceived Choice.Type.two.sided.2	ont-gamified	16	4.90	18.50	296.0	64.0	−2.00	0.046	0.365	medium
Perceived Choice.Type:CLRole.less.1	non-gamified.Master	2	2.80	2.50	5.0	2.0	−1.83	0.044	0.489	medium
Perceived Choice.Type:CLRole.less.2	ont-gamified.Apprentice	12	4.80	8.33	100.0	2.0	−1.83	0.044	0.489	medium
Pressure/Tension.Type.greater.1	non-gamified	14	3.62	18.64	261.0	156.0	1.84	0.034	0.335	medium
Pressure/Tension.Type.greater.2	ont-gamified	16	2.75	12.75	204.0	156.0	1.84	0.034	0.335	medium
Intrinsic Motivation.Type.less.1	non-gamified	14	4.09	11.36	159.0	54.0	−2.41	0.008	0.440	medium
Intrinsic Motivation.Type.less.2	ont-gamified	16	4.91	19.12	306.0	54.0	−2.41	0.008	0.440	medium
Intrinsic Motivation.Type.two.sided.1	non-gamified	14	4.09	11.36	159.0	54.0	−2.41	0.015	0.440	medium
Intrinsic Motivation.Type.two.sided.2	ont-gamified	16	4.91	19.12	306.0	54.0	−2.41	0.015	0.440	medium
Intrinsic Motivation.Type:CLRole.less.1	non-gamified.Apprentice	12	4.21	9.75	117.0	39.0	−1.91	0.030	0.389	medium
Intrinsic Motivation.Type:CLRole.less.2	ont-gamified.Apprentice	12	4.91	15.25	183.0	39.0	−1.91	0.030	0.389	medium

1 Descriptive Statistics and Assumptions for Parametric Tests

Table 4: Descriptive statistics in the pilot study for signed up students

	n	Mean	Std.Dev	Median	Min	Max	25th	75th	Skew	Kurtosis
Interest/Enjoyment	30	3.873	1.711	4.250	1.000	7.000	2.375	4.917	−0.121	−1.154
Perceived Choice	30	4.334	1.313	4.309	2.000	6.400	3.300	5.400	−0.108	−1.204
Pressure/Tension	30	3.107	1.158	3.000	1.000	5.224	2.312	3.750	0.070	−0.819
Effort/Importance	30	5.067	1.229	5.000	2.333	7.000	4.083	6.112	−0.144	−0.916
Intrinsic Motivation	30	4.532	0.927	4.588	2.697	6.267	3.842	5.017	−0.014	−0.779

Table 5: Multivariate normality test in the pilot study for signed up students

	Test	Statistic	p value	Result
1	Mardia Skewness	40.1226512895834	0.253478526147182	YES
2	Mardia Kurtosis	0.7692156177597	0.441765320493421	YES
3	MVN			YES

Table 6: Univariate normality test in the pilot study for signed up students

	Test	Variable	Statistic	p value	Normality
1	Shapiro-Wilk	Interest/Enjoyment	0.9578	0.2716	YES
2	Shapiro-Wilk	Perceived Choice	0.9554	0.2346	YES
3	Shapiro-Wilk	Pressure/Tension	0.9731	0.6278	YES
4	Shapiro-Wilk	Effort/Importance	0.9643	0.3970	YES
5	Shapiro-Wilk	Intrinsic Motivation	0.9797	0.8184	YES

Table 7: Notes to be taken into account about sample size in the pilot study for signed up students

	code	description
Interest/Enjoyment.Type.1	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'non-gamified:Apprentice'.
Interest/Enjoyment.Type.2	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'ont-gamified:Apprentice'.
Interest/Enjoyment.Type.3	FAIL: min.size	current size is 2 but the minimal recomended size is 5 for the group: 'non-gamified:Master'.
Interest/Enjoyment.Type.4	FAIL: min.size	current size is 4 but the minimal recomended size is 5 for the group: 'ont-gamified:Master'.
Perceived Choice.Type.1	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'non-gamified:Apprentice'.
Perceived Choice.Type.2	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'ont-gamified:Apprentice'.
Perceived Choice.Type.3	FAIL: min.size	current size is 2 but the minimal recomended size is 5 for the group: 'non-gamified:Master'.
Perceived Choice.Type.4	FAIL: min.size	current size is 4 but the minimal recomended size is 5 for the group: 'ont-gamified:Master'.
Pressure/Tension.Type.1	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'non-gamified:Apprentice'.
Pressure/Tension.Type.2	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'ont-gamified:Apprentice'.
Pressure/Tension.Type.3	FAIL: min.size	current size is 2 but the minimal recomended size is 5 for the group: 'non-gamified:Master'.
Pressure/Tension.Type.4	FAIL: min.size	current size is 4 but the minimal recomended size is 5 for the group: 'ont-gamified:Master'.
Effort/Importance.Type.1	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'non-gamified:Apprentice'.
Effort/Importance.Type.2	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'ont-gamified:Apprentice'.
Effort/Importance.Type.3	FAIL: min.size	current size is 2 but the minimal recomended size is 5 for the group: 'non-gamified:Master'.
Effort/Importance.Type.4	FAIL: min.size	current size is 4 but the minimal recomended size is 5 for the group: 'ont-gamified:Master'.
Intrinsic Motivation.Type.1	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'non-gamified:Apprentice'.
Intrinsic Motivation.Type.2	WARN: sample.size	current size is 12 and recommended size is 15 for the group: 'ont-gamified:Apprentice'.
Intrinsic Motivation.Type.3	FAIL: min.size	current size is 2 but the minimal recomended size is 5 for the group: 'non-gamified:Master'.
Intrinsic Motivation.Type.4	FAIL: min.size	current size is 4 but the minimal recomended size is 5 for the group: 'ont-gamified:Master'.

Recent studies carried out through simulations have indicated that ANOVA is reliable even when the data are non-normally distributed and the sample size is greater thatn 15 observations for each group. This size value is based on the Reference: Rana, R. K., Singhal, R., & Dua, P. (2016). Deciphering the dilemma of parametric and nonparametric tests. Journal of the Practice of Cardiovascular Sciences, 2(2), 95.

The sample size to carried out any parametric and non-parametric analysis is 5, and it was established using common sense. The warning and fails indicated in this section should be taking into account when a paper or report will be elaborated.