

Global Summary of Statistics Analysis

March 15, 2018

1 Summary

One-way between-subjects ANOVA tests were conducted to compare the effects on the participants' motivation (Intrinsic Motivation, Interest/Enjoyment, Perceived Competence, Value/Userfulness) in relation to their sex (male, female), age (adulthood $\geq 25y/o$, emerging-adulthood $\geq 18y/o$ to $25y/o$, adolescence $\geq 11y/o$ to $18y/o$, childhood $< 11y/o$), and academic degree (basic-school, undergraduate, postgraduate). In this analysis, the effects on the motivation of students was also compared in relation their liking for the domain-content (*LikeDomainContent*), their declaration to know the domain-content (*KnownDomainContent*), and the participant liking for different games (liking by action games - *LikeActionGames*, liking by adventures games - *LikeAdventureGames*, ... , liking by novel games - *LikeNovelGames*). Table 1 summarizes the significant differences obtained as results of ANOVA tests in which there are significant difference on the participants' intrinsic motivation in relation to their liking for the the domain-content ($F(1, 47) = 4.434$, $p = 0.041$), their liking by simulation games ($F(1, 31) = 4.386$, $p = 0.045$), and their liking for strategy games ($F(1, 24) = 34.55$, $p = 0.001$). Post-hoc comparisons using the Tukey HSD test summarized in the 2 indicates that the mean of intrinsic motivation score for participants who like the domain-content ($lsmean = 5.257$, $SE = 0.214$) is greater than the mean of intrinsic score for participants who don't like the domain-content ($lsmean = 4.639$, $SE = 0.201$). In relation to the participants' liking by simulation games, the post-hoc comparisons indicates that the mean of participants

We also found significant difference on the participants' interest/enjoyment in the ANOVA tests in relation to the declaration to know the domain-content ($F(1, 47) = 4.303$, $p = 0.044$), ... (*repeat similar to the intrinsic motivation*)

Table 1: Summary of one-way ANOVA results

	Sum Sq	Df	F value	Pr(>F)	Sig
Interest/Enjoyment:(Intercept)	1025.921	1	502.879	0.000	
Interest/Enjoyment:KnownDomainContent	8.778	1	4.303	0.044	*
KnownDomainContent.Residuals	95.884	47			
Interest/Enjoyment:(Intercept)	1045.082	1	705.542	0.000	
Interest/Enjoyment:LikeDomainContent	7.729	1	5.218	0.027	*
Interest/Enjoyment:Residuals	63.694	43			
Interest/Enjoyment:(Intercept)	1044.560	1	605.364	0.000	
Interest/Enjoyment:LikePlatformerGames	7.388	1	4.281	0.044	*
Interest/Enjoyment:Residuals	77.648	45			
Perceived Competence:AcademicDegree.(Intercept)	394.742	1	278.601	0.000	
Perceived Competence:AcademicDegree.AcademicDegree	19.625	2	6.925	0.003	**
Perceived Competence:AcademicDegree.Residuals	59.509	42			
Value/Usefulness:LikeDomainContent.(Intercept)	1197.034	1	1136.398	0.000	
Value/Usefulness:LikeDomainContent.LikeDomainContent	14.564	1	13.826	0.001	**
Value/Usefulness:LikeDomainContent.Residuals	41.081	39			
Value/Usefulness:LikePuzzleGames.(Intercept)	913.952	1	1906.904	0.000	
Value/Usefulness:LikePuzzleGames.LikePuzzleGames	3.200	1	6.677	0.015	*
Value/Usefulness:LikePuzzleGames.Residuals	13.420	28			
Value/Usefulness:LikeRacingGames.(Intercept)	948.656	1	712.030	0.000	
Value/Usefulness:LikeRacingGames.LikeRacingGames	10.454	1	7.846	0.008	**
Value/Usefulness:LikeRacingGames.Residuals	54.625	41			
Value/Usefulness:LikeShooterGames.(Intercept)	1191.601	1	622.725	0.000	
Value/Usefulness:LikeShooterGames.LikeShooterGames	9.292	1	4.856	0.032	*
Value/Usefulness:LikeShooterGames.Residuals	89.936	47			
Value/Usefulness:LikeStrategyGames.(Intercept)	814.151	1	480.908	0.000	
Value/Usefulness:LikeStrategyGames.LikeStrategyGames	11.111	1	6.563	0.014	*
Value/Usefulness:LikeStrategyGames.Residuals	77.876	46			
Intrinsic Motivation:LikeDomainContent.(Intercept)	1195.137	1	1138.515	0.000	
Intrinsic Motivation:LikeDomainContent.LikeDomainContent	4.654	1	4.434	0.041	*
Intrinsic Motivation:LikeDomainContent.Residuals	49.337	47			
Intrinsic Motivation:LikeSimulationGames.(Intercept)	750.255	1	1427.783	0.000	
Intrinsic Motivation:LikeSimulationGames.LikeSimulationGames	2.305	1	4.386	0.045	*
Intrinsic Motivation:LikeSimulationGames.Residuals	16.290	31			
Intrinsic Motivation:LikeStrategyGames.(Intercept)	639.487	1	3079.334	0.000	
Intrinsic Motivation:LikeStrategyGames.LikeStrategyGames	7.175	1	34.552	0.000	**
Intrinsic Motivation:LikeStrategyGames.Residuals	4.984	24			

Signif. codes: 0 “**” 0.01 “*” 0.05

Table 2: Descriptive statistics and Tukey post-hoc test results

Interest/Enjoyment	N	mean	lsmean	SE	df	lwr.CI	upr.CI	t.ratio	p.value	p.adj	g	sig	mag
KnownDomainContent.no	25	4.153	4.153	0.286	47	3.579	4.728						
KnownDomainContent.yes	24	5.000	5.000	0.292	47	4.413	5.587						
KnownDomainContent.no - yes	49	-0.847	-0.847	0.408		-1.668	-0.026	-2.074	0.044	0.044	-0.583	*	medium
LikeDomainContent.no	23	4.406	4.406	0.254	43	3.894	4.918						
LikeDomainContent.yes	22	5.235	5.235	0.259	43	4.712	5.758						
LikeDomainContent.no - yes	45	-0.829	-0.829	0.363		-1.561	-0.097	-2.284	0.027	0.027	-0.669	*	medium
LikePlatformerGames.no	25	4.327	4.327	0.263	45	3.798	4.856						
LikePlatformerGames.yes	22	5.121	5.121	0.280	45	4.557	5.685						
LikePlatformerGames.no - yes	47	-0.795	-0.795	0.384		-1.568	-0.021	-2.069	0.044	0.044	-0.595	*	medium
Perceived Competence													
AcademicDegree.basic-school	10	3.467	3.467	0.376	42	2.707	4.226						
AcademicDegree.postgraduate	4	3.833	3.833	0.595	42	2.632	5.034						
AcademicDegree.basic-school - postgraduate	14	-0.367	-0.367	0.704		-2.078	1.344	-0.521	0.862	0.862	-0.268		
AcademicDegree.basic-school1	10	3.467	3.467	0.376	42	2.707	4.226						
AcademicDegree.undergraduate	31	4.984	4.984	0.214	42	4.552	5.415						
AcademicDegree.basic-school - undergraduate	41	-1.517	-1.517	0.433		-2.569	-0.466	-3.505	0.003	0.003	-1.220	**	large
AcademicDegree.postgraduate1	4	3.833	3.833	0.595	42	2.632	5.034						
AcademicDegree.undergraduate1	31	4.984	4.984	0.214	42	4.552	5.415						
AcademicDegree.postgraduate - undergraduate	35	-1.151	-1.151	0.632		-2.687	0.386	-1.819	0.176	0.176	-1.005		

Table 2: (continued)

	N	mean	lsmean	SE	df	lwr.CI	upr.CI	t.ratio	p.value	p.adj	g	sig	mag
Value/Usefulness													
LikeDomainContent.no	23	4.843	4.843	0.214	39	4.411	5.276						
LikeDomainContent.yes	18	6.044	6.044	0.242	39	5.555	6.534						
LikeDomainContent.no - yes	41	-1.201	-1.201	0.323		-1.854	-0.548	-3.718	0.001	0.001	-1.148	**	large
LikePuzzleGames.no	12	5.300	5.300	0.200	28	4.891	5.709						
LikePuzzleGames.yes	18	5.967	5.967	0.163	28	5.632	6.301						
LikePuzzleGames.no - yes	30	-0.667	-0.667	0.258		-1.195	-0.138	-2.584	0.015	0.015	-0.937	*	large
LikeRacingGames.no	29	5.538	5.538	0.214	41	5.105	5.971						
LikeRacingGames.yes	14	4.486	4.486	0.308	41	3.863	5.109						
LikeRacingGames.no - yes	43	1.052	1.052	0.376		0.294	1.811	2.801	0.008	0.008	0.895	**	large
LikeShooterGames.no	26	5.377	5.377	0.271	47	4.831	5.923						
LikeShooterGames.yes	23	4.504	4.504	0.288	47	3.924	5.085						
LikeShooterGames.no - yes	49	0.873	0.873	0.396		0.076	1.669	2.204	0.032	0.032	0.621	*	medium
LikeStrategyGames.no	12	4.200	4.200	0.376	46	3.444	4.956						
LikeStrategyGames.yes	36	5.311	5.311	0.217	46	4.875	5.748						
LikeStrategyGames.no - yes	48	-1.111	-1.111	0.434		-1.984	-0.238	-2.562	0.014	0.014	-0.840	*	large
Intrinsic Motivation													
LikeDomainContent.no	26	4.639	4.639	0.201	47	4.235	5.043						
LikeDomainContent.yes	23	5.257	5.257	0.214	47	4.827	5.687						
LikeDomainContent.no - yes	49	-0.618	-0.618	0.293		-1.208	-0.028	-2.106	0.041	0.041	-0.593	*	medium
LikeSimulationGames.no	22	4.777	4.777	0.155	31	4.462	5.092						
LikeSimulationGames.yes	11	5.338	5.338	0.219	31	4.892	5.783						
LikeSimulationGames.no - yes	33	-0.561	-0.561	0.268		-1.107	-0.015	-2.094	0.045	0.045	-0.755	*	medium
LikeStrategyGames.no	8	4.804	4.804	0.161	24	4.471	5.136						
LikeStrategyGames.yes	18	5.942	5.942	0.107	24	5.720	6.163						
LikeStrategyGames.no - yes	26	-1.138	-1.138	0.194		-1.538	-0.739	-5.878	0.000	0.000	-2.419	**	large

Due to the non-normality of data obtained in this evaluation for the dependent variables of spending time (*SpendTime*) and the improvement of skill/knowledge related to the content domain (*GainScore*), Kruskal-Wallis rank tests were performed to compare the effects in these dependent variables in relation to the participants' sex, age, academic degree, liking for the domain-content, declaration to know the domain-content, and liking for different games. Table 3 summarized the significant differences found using the Kruskal-Wallis rank tests in which The Pair Wilcoxon-Mann signed-rank tests shown in Table 4 indicates that the the media-ranks of spending time for the participants who ... is greter than ...

Table 3: Summary of Kruskal-Wallis rank test results

	chi.square	df	p.value	Sig
SpendingTime:LikeFightingGames	3.896	1	0.048	*
SpendingTime:LikeFictionGames	4.649	1	0.031	*
SpendingTime:LikeNovelGames	4.891	1	0.027	*

Table 4: Descriptive statistic of the pair wilcoxon analysis

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
SpendingTime										
LikeFightingGames	no	33	15	21.82	720.0	159.0	-1.97	0.024	0.285	small
LikeFightingGames	yes	15	27	30.40	456.0	159.0	-1.97	0.024	0.285	small
LikeFictionGames	no	29	15	20.98	608.5	173.5	-2.16	0.015	0.311	medium
LikeFictionGames	yes	19	25	29.87	567.5	173.5	-2.16	0.015	0.311	medium
LikeNovelGames	no	39	15	22.36	872.0	92.0	-2.21	0.013	0.319	medium
LikeNovelGames	yes	9	25	33.78	304.0	92.0	-2.21	0.013	0.319	medium

2 Summary of Previous NonParametric Analysis

Table 5: Summary of Kruskal-Wallis rank test results

	chi.square	df	p.value	Sig
SpendingTime:LikeFightingGames	3.896	1	0.048	*
SpendingTime:LikeFictionGames	4.649	1	0.031	*
SpendingTime:LikeNovelGames	4.891	1	0.027	*
Interest/Enjoyment:LikeDomainContent	6.133	1	0.013	*
Perceived Choice:LikePuzzleGames	5.834	1	0.016	*
Perceived Competence:AcademicDegree	6.312	2	0.043	*
Perceived Competence:KnownDomainContent	4.257	1	0.039	*
Perceived Competence:LikePlatformerGames	4.960	1	0.026	*
Perceived Competence:LikeNovelGames	4.333	1	0.037	*
Value/Usefulness:LikeDomainContent	4.489	1	0.034	*
Value/Usefulness:LikeShooterGames	4.489	1	0.034	*
Value/Usefulness:LikeStrategyGames	4.302	1	0.038	*
Intrinsic Motivation:LikeDomainContent	4.182	1	0.041	*

GainScore = Improv. Learning Score
Signif. codes: 0 “***” 0.01 “*” 0.05

Table 6: Descriptive statistic of the pair wilcoxon analysis

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
SpendingTime										
LikeFightingGames	no	33	15	21.82	720.0	159.0	-1.97	0.024	0.285	small
LikeFightingGames	yes	15	27	30.40	456.0	159.0	-1.97	0.024	0.285	small
LikeFictionGames	no	29	15	20.98	608.5	173.5	-2.16	0.015	0.311	medium
LikeFictionGames	yes	19	25	29.87	567.5	173.5	-2.16	0.015	0.311	medium
LikeNovelGames	no	39	15	22.36	872.0	92.0	-2.21	0.013	0.319	medium
LikeNovelGames	yes	9	25	33.78	304.0	92.0	-2.21	0.013	0.319	medium
Interest/Enjoyment										
LikeDomainContent	no	26	4.25	20.25	526.5	175.5	-2.48	0.006	0.354	medium
LikeDomainContent	yes	23	5.50	30.37	698.5	175.5	-2.48	0.006	0.354	medium
Perceived Choice										
LikePuzzleGames	no	19	6.75	16.97	322.5	132.5	-2.42	0.008	0.373	medium
LikePuzzleGames	yes	23	7.00	25.24	580.5	132.5	-2.42	0.008	0.373	medium
Perceived Competence										
AcademicDegree	basic-school	10	3.42	13.60	136.0	81.0	-2.50	0.006	0.376	medium
AcademicDegree	undergraduate	34	4.92	25.12	854.0	81.0	-2.50	0.006	0.376	medium
KnownDomainContent	no	25	4.17	20.88	522.0	197.0	-2.06	0.019	0.295	small
KnownDomainContent	yes	24	5.00	29.29	703.0	197.0	-2.06	0.019	0.295	small
LikePlatformerGames	no	26	4.00	20.73	539.0	188.0	-2.23	0.013	0.318	medium
LikePlatformerGames	yes	23	5.50	29.83	686.0	188.0	-2.23	0.013	0.318	medium
LikeNovelGames	no	40	4.33	22.99	919.5	99.5	-2.08	0.018	0.297	small
LikeNovelGames	yes	9	5.50	33.94	305.5	99.5	-2.08	0.018	0.297	small

Table 6: (continued)

	Group	N	Median	Mean.Ranks	Sum.Ranks	U	Z	p.value	r	magnitude
Value/Usefulness										
LikeDomainContent	no	26	4.9	20.94	544.5	193.5	-2.12	0.017	0.303	medium
LikeDomainContent	yes	23	6.0	29.59	680.5	193.5	-2.12	0.017	0.303	medium
LikeShooterGames	26	5.8	29.06	755.5	404.5	2.12	0.017	0.303	medium	
LikeShooterGames	yes	23	4.4	20.41	469.5	404.5	2.12	0.017	0.303	medium
LikeStrategyGames	no	12	4.0	17.58	211.0	133.0	-2.07	0.019	0.296	small
LikeStrategyGames	yes	37	5.6	27.41	1014.0	133.0	-2.07	0.019	0.296	small
Intrinsic Motivation										
LikeDomainContent	no	26	4.67	21.08	548	197	-2.04	0.020	0.292	small
LikeDomainContent	yes	23	5.76	29.43	677	197	-2.04	0.020	0.292	small