

Fortified Force Field Analysis in Data Mining of One-Way Repeated Measure ANOVA

Matthew Goldman Kimher Lim and Nordin A. Razak

Abstract—This paper reports the analytics for force field analysis in data mining to discover new information in motivational force field for leaning among young graduating adults. A database of harmonized summaries from Repeated Measures design within group was analyzed with a series of equations from which three challenges that were overcome to reflect the pedagogy’s development: Delphi method to interpret variables, treatment of unequal arrays for Paired t-test, and a posterior probabilities computation from revised prior value for One-Way Repeated Measures ANOVA.

Index Terms—Bayesian, Delphi, force-field, motivation, Paired t-test, repeated measures ANOVA.

I. BACKGROUND AND INTRODUCTION

Considering Kline’s [1] list of fallacies surrounding the null hypothesis significance test, it justified that before quantitative design is pursued, an exploratory approach had better precede to discover the range of quantitative that might justify making hypothesis. The data mining analytics was called upon to supplement an earlier measurement that had produced a database (DB) of harmonized means summarized in Table I & II and computation of Table IV [3]. The reasons to supplement the earlier computation were: to abide to ethic agreed with the sponsor regarding seeking a balance between constructivism and behaviorism in enhancing leaning for professional training, and to demonstrate a different perspective in motivating young adults’ learning to compel revision of evaluation method.

From the common DB of OWRM, the Delphi method reclassified the dependent variables (DV) items from Table I and II. The IV being the Pedagogy Index (PI) was to be re-ascertained in this paper to compare with that of Table III which had graphed the right column of Fig. 2 by constructivist and behaviorist variables without OWRM ANOVA. The method in this paper used an exploratory data mining procedure of selection, processing, transformation, mining, interpretation /evaluation [4] and involved a suite of analytics below to evaluate variables for learning motivation.

The analyses were to investigate attitude changes in each variable and its 12 sub-variables (refer to column 2 of Table XIII) for each gender in relation to CPD companies’ expectation. Changes to look for were divergences, convergences and consistencies in ranking and correlational analysis. While the ratings’ value changes may not seem

significant or difficult to grasp its impact, the other views to observe changes are in the ranking of those variables, their sub-variables and items. The analyses were also to determine the effect of rating changes from interns and their CPD companies on trends in each time interval of repeated measures. The analytics measured interns’ capability growth dependence on pedagogic variables that defined the PI force field performance.

TABLE I: H_μ UNCATEGORIZED SUMMARIES OF SUBJECTS’ OWN [3]

		Sept		October		November		December		
		Type	All	O ¹	X ¹	O ²	X ²	O ²	X ³	O ⁴
				M	L	M	L	M	L	
1	Career	B	N	5.2	5.7	6.2	5.7	6.5	6.3	
2	Personal Attributes	B	N	6.4	6.6	6.2	6.4	6.7	6.9	
3	Structural Functionalism	B	N	5.7	5.3	5.8	6.3	7.1	6.6	
4	Decision Tree Thinking	C	N	5.2	5.2	6.2	6.5	6.7	6.5	
5	Facilitation	C	N	5.7	5.6	5.9	6.0	6.7	6.6	
6	Knowledge Accessibility	C	N	5.9	5.2	5.7	5.8	6.5	6.9	
7	Concept Mapping	C	N	5.9	5.6	6.2	6.2	6.6	6.6	
8	Seminar	C	N	5.5	4.7	5.7	6.4	6.8	6.5	
9	Workshop	C	N	5.2	5.4	5.7	6.2	6.4	6.2	
10	WIDE assignment	C	N	6.7	5.8	7.2	5.5	7.7	7.2	
11	CPD office	C	N	5.8	5.1	5.8	6.4	6.5	6.4	
12	CPD relationship	C	N	4.7	5.4	5.5	5.9	6.9	7.0	

.B=Behavioral, C=Constructivist, N=Nil, O=Occasion, X=Treatment, M=Men, L=Ladies

II. THREE QUANTITATIVE CHALLENGES

The analytics design poised three challenges. The Delphi method reclassified harmonic means was used to overcome the first challenge. Secondly, sub-variables have unequal items which Excel® Paired t-tests cannot compute unequal arrays. Hence, to compute correlations between selective sub-variables, higher computed level of each sub-variable have to generate the required arrays for comparison by Excel® Paired t-test. Thirdly, there was no generic solver to obtain posterior probabilities from revised prior value for One-Way Repeated Measure (OWRM) ANOVA although the Bayes’ factor for the ANOVA solver was for testing of null hypothesis [2]. In the absence of a generic solver, a longer

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computation procedure in Excel® was used to overcome the second challenge.

TABLE II: Hμ UNCATEGORIZED SUMMARIES OF CPDS' RATING OF SUBJECTS RATING [3]

		Sept	October		November		December	
			O ¹	X ¹	O ²	X ²	O ²	X ³
		All	M	L	M	L	M	L
1	Demonstrated self-motivated	N	5.1	4.7	5.4	5.6	4.9	6.4
2	Displayed interest in going a good job	N	6.0	4.0	6.7	7.3	7.4	5.5
3	Demonstrated positive attitude	N	5.4	5.9	7.5	6.5	7.2	5.7
4	Demonstrated strong sense of professionalism	N	6.4	5.5	5.8	5.6	7.0	6.1
5	Overall work quality produced was adequate	N	5.3	4.6	6.5	5.6	6.2	5.9
6	Technical ability displayed was adequate	N	6.0	5.3	5.1	4.9	6.3	6.7
7	Displayed cooperation and team work	N	5.3	4.7	6.1	6.4	5.4	7.1
8	Able to work with minimum supervision	N	5.4	4.9	5.6	6.3	6.1	6.9
9	Able to handle direction and accept criticism	N	6.8	5.6	6.7	6.1	7.6	6.5
10	Intern has prospects for regular employment	N	4.9	5.1	6.6	5.4	7.0	5.7
11	WIDE write up was accurate	N	5.5	6.1	6.1	6.5	6.3	6.7
12	WIDE was interesting and applicable	N	4.2	6.1	6.2	7.0	7.3	5.7
13	Intern offered creative input for the report	N	5.3	6.9	6.2	4.9	6.4	6.1

. N=Nil, O=Occasion, X=Treatment, M=Men, L=Ladies

$$SS_{time} = \sum_{i=1}^k n_i (\bar{x}_i - \bar{x})^2 \tag{1}$$

$$SS_w = \sum_1 (\bar{x}_{i1} - \bar{x}_1)^2 + \dots + \sum_k (\bar{x}_{ik} - \bar{x}_k)^2 \tag{2}$$

$$SS_{subjects} = k \cdot \sum (\bar{x}_i - \bar{x})^2 \tag{3}$$

$$SS_{error} = SS_w - SS_{subjects} \tag{4}$$

$$MS_{time} = \frac{SS_{time}}{(k-1)} \tag{5}$$

$$MS_{error} = \frac{SS_{error}}{(n-1)(k-1)} \tag{6}$$

$$F = \frac{MS_{time}}{MS_{error}} = \frac{FM_{conditions}}{MS_{error}} \tag{7}$$

$$F(df_{time}, df_{error}) = F_{value}, = p_{value}, \tag{8}$$

For each of the 4 motivation class and alone for WIDE, calculate the Paired t-test in Table VI and present the results in Table VII. (9)

Calculate the post probability rP (last column) having obtain p-value. [5] (10)

Revise prior probabilities P(Si) to posterior probabilities [6] rP(Si) by rP(Si)∩P (t<=t) (11)

TABLE III: RECLASSIFICATION OF DV ITEMS IN DATABASE FOR PEDAGOGY INDEX (IV) COMPUTATION

Subjects' DV items (Support)	CPD DV items (Pressure)
Cognitive Motivational Quotient	
Concept Mapping Technique Hμ	Hμ of the level of the technical ability displayed by the widern was adequate
Decision Tree Thinking Method Hμ	
Knowledge Base Accessibility Hμ	
Affective Motivational Quotient	
Facilitation Hμ	Hμ of the widern displayed a strong sense of professionalism
Seminar Hμ	
Workshop Hμ	
Conative Motivational Quotient	
Workplace motivation Hμ	Hμ of the widern was self-motivated during widernship
	Hμ of the widern demonstrated a positive attitude during their employment
Structural Functionalism Hμ	Hμ of the widern displayed enthusiasm and interest in doing good job
	Hμ of the overall quality of work produced by the widern was adequate
Personal Attributes Hμ	Hμ of the widern was able to handle and accept direction and criticism
Career Hμ	Hμ of the widern has prospects of regular employment with the company after the widernship.
Social Motivational Quotient	
Workplace relationship Hμ	Hμ of the widern displayed cooperation and ability to work with others was effective
	Hμ of the widern ability to work independently with minimal supervision

III. DATABASE PREPARATION

The foremost step was to understand the DB's characteristics to discover further knowledge about motivation in leaning. The DB of harmonized means in Table I was derived from 2 sets of responses, one with 3 regular self-ratings by subjects while Table II was from continuous professional development (CPD) companies about subjects' CPD performance. The purposive homogeneity sampling involved semi-professional level accounting students within the 21 years age group; had provided a high 100% compliance to sample criteria of age, education background and learning objective. Homogeneity having reduced bias and variability among subjects and therefore had enabled higher accurate estimate of pedagogy after the treatments; no control group was applied as evidenced in a commercial success of measuring effectiveness in training without control group over a short period [7].

Three ratings in the order of O, X, O¹, X, O², X, O³ were made with each done after a treatment whereby subjects were taught how to consolidate their pre-exist learning in a 3 months period sequence of improvements that confluence with FF analysis of freezing, unfreezing and re-freezing [8]. Subjects were not assessed at occasion 'O' but provided with initial treatment X during the first 4 weeks and subsequent two 4-weeks after each assessment. The treatments were aimed at developing subjects' ability to consolidate pre-exist knowledge.

Wilson [9] had used harmonic mean Hμ to overcome both internal and external threats in assessment. According to him, among the three means: normal, geometric and harmonic, the Hμ being conservative had maintained standard by preventing students who were uncaught for plagiarizing assignments, from doing well in exams and vice-versa especially students good at rote learning. Excel® function Hμ

was applied to the adopted DB to remove internal and external threats and resulted in a harmonized DB.

TABLE IV: PEDAGOGY INDEX (IV) COMPUTATION [3]

O _n	All		Men		Ladies		CPD	Excel @ functions
	B	C	B	C	B	C		
O ¹	5.71	5.42	5.62	5.57	5.75	5.31	5.54	Harmonic Mean = H^{kt}
O ²	6.03	6.05	5.96	5.94	6.07	6.09	6.11	
O ³	6.47	6.67	6.56	6.73	6.40	6.63	6.36	
	0.2	0.8	0.2	0.8	0.2	0.8	1.0	Pareto Distribution
O ¹	0.07	0.27	0.07	0.27	0.07	0.27	0.33	Probability distribution (assigned) = p^{kt}
O ²	0.07	0.27	0.07	0.27	0.07	0.27	0.33	
O ³	0.07	0.27	0.07	0.27	0.07	0.27	0.33	
O ¹	0.38	1.45	0.37	1.48	0.38	1.42	1.8	Joint Probability H^{kt}, P^{kt}
O ²	0.40	1.61	0.40	1.59	0.40	1.62	2.0	
O ³	0.43	1.78	0.44	1.79	0.43	1.77	2.1	
Effectiveness Expected Value of Joint Probability \hat{E}								\hat{E}^{kt}
	All (B+C)		Men (B+C)		Ladies (B+C)			
O ¹	1.83		1.86		1.80			
O ²	2.01		1.98		2.03			
O ³	2.21		2.23		2.20			
Harmonic Mean Discounted probability								Improve over last assessment $Hp^{n=25, kt}$
O ¹	0.64		0.65		0.64			
O ²	0.63		0.63		0.63			
O ³	0.78		0.76		0.79			
Effectiveness Adjusted Value \hat{E}								$\hat{E}^{kt} \cdot Hp^{kt}$
O ¹	1.16		1.22		1.16			
O ²	1.27		1.25		1.27			
O ³	1.72		1.70		1.73			
Cumulative Pedagogy Effectiveness, CPE								$\hat{E}^{kt} / (H^{kt} \cdot P^{kt})$
	All	Men	Ladies	CPD				
O ¹	0.63	0.66	0.63	1.00				
O ²	1.25	1.27	1.25	2.00				
O ³	2.06	2.07	2.07	3.00				
Pedagogy Index								[CPE ^{kt} / CPE ^{3,4}] *
	All	Men	Ladies	CPD				
O ¹	21.0	21.9	20.9	33.3				
O ²	41.7	42.4	41.7	66.7				
O ³	68.7	69.0	68.9	100.0				

The DB was screened for consistency and completeness with appropriate Excel® functions. Initial information produced PI for constructivist and behaviorist columns in Fig. 2. Being general, it warranted mining the DB to account improvement between CPD and both gender from earlier baselines. Having known the DB's characteristics were about motivation in learning, the following analytics of equations (1) to (11) mentioned in Section I were pursued.

IV. ANALYTICS DESIGN

Since the DB was related to motivation in learning [10], a Delphi method re-categorized the variables according to translations of Table III; cognitive, conative, social, affective and work integrated dissertation effort (WIDE) which resulted with data arranged as per Table V. Wild card questions which evaluate degree of consistency in answering questions were excluded although their purposes were to review subjects' para consciousness and consciousness in rating the question [11].

TABLE VII: ONE WAY REPEATED MEASURES ANOVA INFORMATION

P (Men CPD)										
RMA on: State of Nature S _j	Source	SS	df	MS	F	Prior P(S _i)	Revised Prior P(S _i)	Conditional P(T<=t two tail on df)	Joint P(S _i) ∩ P(t<=t)	Post P(S _i)
Cognitive S ₁	Time	15.63	2.00	7.82	1.21	0.32	0.182	0.138	0.025	0.096
	Error	116.58	18.00	6.48			0.330	0.138	0.046	0.129
Affective S ₂	Time	9.83	2.00	4.92	0.43	0.66	0.370	0.458	0.170	0.648
	Error	204.27	18.00	11.35			0.670	0.458	0.307	0.871
Conative S ₃	Time	2.96	2.00	1.48	0.61	0.56	0.314	0.138	0.043	0.166
	Error	43.74	18.00	2.43						
Social S ₄	Time	2.96	2.00	14.05	1.56	0.24	0.134	0.176	0.024	0.090
	Error	161.78	18.00	8.99						
WIDE S ₅	Time	16.14	2.00	8.07	1.49	0.25	0.252	0.089	0.022	0.277
	Error	97.44	18.00	5.41						

P (Ladies CPD)										
RMA on: State of Nature S _j	Source	SS	df	MS	F	Prior P(S _i)	Revised Prior P(S _i)	Conditional P(T<=t two tail on df)	Joint P(S _i) ∩ P(t<=t)	Post P(S _i)
Cognitive S ₁	Time	8.88	2.00	4.44	0.66	0.5247	0.281	0.182	0.051	0.106
	Error	189.67	28.00	6.77			0.604	0.182	0.110	0.554
Affective S ₂	Time	17.18	2.00	8.59	1.11	0.3436	0.184	0.224	0.041	0.085
	Error	217.70	28.00	7.78			0.396	0.224	0.089	0.446
Conative S ₃	Time	10.20	2.00	5.10	4.85	0.0155	0.008	0.039	0.000	0.001
	Error	29.42	28.00	1.05						
Social S ₄	Time	0.26	2.00	0.13	0.02	0.9802	0.526	0.746	0.392	0.808
	Error	235.07	28.00	8.40						
WIDE S ₅	Time	27.26	2.00	13.63	2.40	0.1091	0.109	0.032	0.003	0.113
	Error	159.08	28.00	5.68						

From Table V, the re-categorized weighted $H\mu$ matrices directly relevant to classroom facilitation were selected as DVs to analyze the PI. The remaining motivational variables were retained as indirect DVs to offer explanations about variations later because they were not within the scope of classroom facilitation. The 2 sets of responses by subjects and their CPDs have allowed the DV to be partitioned into intrinsic and extrinsic motivational sources depicted in Fig. 1.

CPD companies' ratings were re-categorized as the opposing 4 extrinsic motivational variables. Together these 4 motivation variables from both sides depicted the FF representing resistance or pressure of market driven element that a subject has to overcome through performance that satisfy their CPD companies' expectation. Re-categorizing data by the 5 definitions; cognitive, affective, conative, social and WIDE had in combination represented their learning curve [12-13]. Information for analysis by OWRM ANOVA [14] produced Table VII from the transformation matrices of Table V & VI to indicate the probability of significance acceptance of motivational variables (State of Nature S_j) by Bayesian transformation of Force Field (FF) differences from OWRM ANOVA of CPD companies for both gender. The analysis determined if the pedagogy was effective from results scored before and after the treatment.

V. ANALYZES

A. Pearsonian

For the study period, the breakdown by the FF analysis, observations made thrice at 95% C.I., $p < 0.5$, have suggested the following differences about their means for cognitive and affective motivation. The conative and social dependent variables were negated as these two dependent variables were indirect and do not directly incapacitated learning in formal lectures [15]. Pearsonian coefficient of correlation r in Paired t -Test in Table VI showed mainly negative correlation in

cognitive and affective aspects within each gender in term of their differences with CPD during the repeated measures during the period. This was not to say that within each gender group, there was no relationship in the carry over effect in the learning from one period to another. It meant that the measure was for the difference of each group with their CPD in each period compared with the same in the next measurement;

therefore the negative correlation was a positive sign that learning was added. Had the correlation being positive, it might not be positive learning. Therefore that sort of analysis had to be read from the inside out as the negative correlation of low values of one variable by associating with the low value of the next measurement to produce a positive sign of incremental learning.

TABLE V: H_μ SUMMARIES DATABASE CATEGORIZED BY MOTIVATION FORCE FIELD AND REARRANGED BY FORCE FIELD DIFFERENCES FROM POST-TREATMENT 1 TO 3 FOR COGNITIVE TO WIDE (DATA OF POST TREATMENT 2 AND 3 NOT SHOWN)

		Intrinsic motivation										Extrinsic motivation																
		Subjects' DV score of 4 motivation ratios & 1 work integrated dissertation ratio										Subjects' DV score of 4 motivation ratios & 1 work integrated dissertation ratio by post-treatments (O*)																
		Subject's perceived score					CPD company's score					O ¹					O ²					O ³						
Subject	Gender	Cognitive	Affective	Conative	Social	WIDE	Cognitive	Affective	Conative	Social	WIDE	Cognitive	Affective	Conative	Social	WIDE	Cognitive	Affective	Conative	Social	WIDE	Cognitive	Affective	Conative	Social	WIDE		
O ¹ , Post-treatment 1	1	1	4.9	3.5	3.8	7.3	9.0	7.0	6.0	6.2	5.5	3.2	1	-2.07	-3.27	-2.43	-2.47	0.89	-3.93	-2.44	1.33	-0.16	1.87	1.13	3.00	5.79	3.18	1.10
	2	1	3.9	4.4	4.7	1.7	7.5	8.0	10.0	3.9	5.5	4.7	2	-4.08	1.18	2.63	-5.65	1.11	-2.36	0.84	-0.08	-0.95	-3.74	1.92	-1.11	2.81	2.51	-1.07
	3	1	3.4	4.9	4.0	2.3	4.4	1.0	9.0	4.3	3.3	2.5	3	2.42	2.61	0.67	-4.13	0.99	-0.19	-0.28	-2.31	0.86	-0.97	0.67	2.23	1.94	3.20	2.67
	4	1	4.7	3.7	3.9	2.0	7.9	5.0	1.0	4.9	5.1	4.3	4	0.34	2.34	-4.24	2.72	-5.46	-4.71	-0.92	0.16	1.03	-3.13	-0.06	-3.56	3.56	-3.72	1.51
	5	1	4.4	4.1	4.0	1.8	2.4	3.0	5.0	3.8	6.5	1.3	5	1.37	1.86	1.87	-0.86	1.69	3.20	0.15	1.62	-0.40	-4.66	3.93	1.44	1.07	0.64	3.98
	6	1	5.4	3.8	4.6	2.1	5.5	4.0	7.0	4.1	5.0	4.4	6	1.37	-2.67	2.53	-3.23	2.66	-4.03	0.56	-0.62	0.27	-2.88	-3.31	2.68	1.10	1.52	-3.04
	7	1	3.6	4.2	4.8	3.8	6.7	7.0	4.0	3.7	2.9	2.9	7	-3.37	0.05	-0.28	0.21	-6.33	-2.03	1.10	-1.36	0.43	0.97	-4.30	1.61	3.76	1.06	0.95
	8	1	4.3	3.2	4.4	2.2	7.5	8.0	10.0	2.3	9.5	4.9	8	-3.73	-1.82	-0.80	-6.83	-4.57	2.70	2.06	-1.58	-1.01	-7.27	2.46	0.80	2.59	-2.12	5.71
	9	1	4.1	4.2	5.1	6.1	7.5	7.0	8.0	2.9	3.0	4.7	9	-2.90	-4.26	-0.50	-3.77	-3.02	1.38	2.16	0.03	-1.70	3.09	-2.38	1.74	2.81	0.73	0.00
	10	1	3.4	4.2	5.0	4.9	4.5	10.0	4.0	6.1	1.7	3.5	10	-6.62	2.85	-4.25	0.25	0.13	-1.34	-1.16	-2.50	1.75	3.24	-0.43	1.35	1.02	3.03	0.13
	11	2	3.8	4.8	4.4	2.5	8.9	6.0	9.0	3.0	4.4	7.3	11	-2.20	0.00	-4.18	-4.21	-3.58	2.35	1.37	-1.30	-0.24	-1.97	-3.83	0.15	1.56	0.00	-3.66
	12	2	3.4	2.6	3.7	3.2	5.5	6.0	6.0	3.7	1.8	6.9	12	-6.02	0.39	-2.43	-3.37	2.72	-4.98	-0.07	1.18	-0.96	1.41	0.32	-4.41	-1.45	0.08	-3.30
	13	2	3.3	4.9	5.3	6.4	1.7	1.0	1.0	2.8	3.0	6.0	13	2.27	-0.05	1.22	3.90	-1.62	0.08	2.50	2.72	-0.58	3.41	-5.14	-3.59	-4.24	-1.21	1.63
	14	2	2.8	3.1	4.6	1.7	2.9	3.0	9.0	3.0	2.7	2.5	14	-0.24	-1.89	2.69	-5.95	-4.11	2.44	1.57	-0.35	2.08	-0.95	0.62	0.59	0.40	-2.76	2.52
	15	2	2.4	2.4	4.3	1.4	6.9	7.0	6.0	2.2	1.7	7.3	15	-4.58	-2.57	-2.34	-3.57	1.35	-0.76	2.06	1.38	0.31	-0.31	1.37	1.80	-0.45	-2.68	-1.38
	16	2	3.3	4.2	4.3	2.2	1.8	8.0	1.0	3.3	1.8	5.1	16	-4.70	-5.58	0.96	3.24	-2.66	2.74	0.94	-2.66	-1.65	0.40	2.27	-1.41	-3.31	0.29	0.04
	17	2	5.7	3.6	6.0	5.6	5.5	5.0	4.0	4.5	3.0	1.4	17	0.67	2.16	-2.58	-0.39	0.35	-1.32	1.58	0.89	1.25	2.63	0.24	-2.41	4.03	1.55	4.60
	18	2	4.7	2.6	4.8	8.2	2.4	1.0	8.0	3.7	1.3	7.9	18	3.73	0.07	1.24	-5.42	-1.39	2.01	1.03	1.26	0.34	6.82	-0.50	0.10	-5.52	1.13	3.98
	19	2	3.5	3.9	4.5	4.9	3.0	1.0	5.0	3.2	9.0	2.2	19	2.47	2.71	-2.92	-1.11	0.28	-1.31	1.25	-0.55	1.65	-4.09	1.92	4.16	0.80	-3.60	5.20
	20	2	3.4	4.5	4.4	4.1	4.5	7.0	6.0	2.6	6.7	4.9	20	-3.60	1.45	0.27	-1.46	1.70	-2.15	1.84	1.43	0.85	-2.53	3.41	-2.96	-0.41	-2.43	1.17
	21	2	4.0	3.1	4.2	2.2	5.1	3.0	5.0	2.3	7.2	7.3	21	0.98	0.77	-0.24	-1.90	1.70	-1.43	1.91	0.39	-0.74	-5.05	-1.02	3.22	-2.21	-4.58	-2.66
	22	2	4.6	3.4	5.1	4.6	6.7	3.0	9.0	2.5	3.3	2.1	22	1.56	-2.43	2.07	-5.59	-3.93	-0.99	2.61	-0.16	1.04	1.34	3.00	1.43	4.60	1.10	1.55
	23	2	4.2	3.2	3.9	4.1	8.2	9.0	3.0	5.1	4.4	7.7	23	-4.84	2.63	1.76	0.21	-2.36	-1.20	-1.24	-0.95	0.50	-0.31	-1.11	-2.17	0.52	-1.07	-0.11
	24	2	3.9	3.3	4.7	4.0	7.5	10.0	4.0	2.8	1.7	7.3	24	-6.10	0.67	-4.92	-0.67	-0.19	-2.45	1.86	0.86	1.71	2.37	2.23	4.11	0.20	2.67	5.04
	25	2	4.2	4.5	3.9	2.4	4.5	9.0	7.0	2.9	7.5	4.8	25	-4.80	-4.24	1.23	-2.49	-4.71	0.89	1.04	1.03	-0.47	-5.07	-3.56	-0.98	-0.30	1.51	2.00

TABLE VI: MATRIC RESULT OF PAIRED T-TEST AND DESCRIPTIVE

t-Test: Paired Two Sample for Means Computed at 0.05 on RM ANOVA on Force Field Differences	within each gender and CPD for COGNITIVE motivation quotient				within each gender and CPD for AFFECTIVE motivation quotient				within each gender and CPD for CONATIVE motivation quotient				within each gender and CPD for SOCIAL motivation quotient				within each gender and CPD for WIDE			
	Men		Ladies		Men		Ladies		Men		Ladies		Men		Ladies		Men		Ladies	
	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3	O1 vs O2	O2 vs O3
Observations	10	10	15	15	10	10	15	15	10	10	15	15	10	10	15	15	10	10	15	15
Pearson Correlation	0.06	-0.15	0.29	-0.50	-0.28	-0.04	0.09	-0.76	-0.20	-0.45	0.36	0.09	-0.54	-0.20	0.03	0.30	-0.07	-0.40	0.16	0.29
df	9	9	14	14	9	9	14	14	9	9	14	14	9	9	14	14	9	9	14	14
P(T<=t) two-tail	0.20	0.78	0.25	0.73	0.47	0.97	0.44	0.51	0.32	0.44	0.01	0.99	0.47	0.38	0.90	0.83	0.10	0.88	0.74	0.04
t Critical two-tail	2.26	2.26	2.14	2.14	2.26	2.26	2.14	2.14	2.26	2.26	2.14	2.14	2.26	2.26	2.14	2.14	2.26	2.26	2.14	2.14
<i>Descriptive Statistics</i>																				
Confidence L(95.0%)	2.73	2.83	1.92	2.33	2.02	2.02	1.20	1.20	1.79	1.79	1.20	1.20	1.79	1.79	1.20	1.20	1.79	1.79	1.20	1.20

B. Comparative Pareto Distribution of Sub-Variables

The direct intrinsic affective | cognitive dependent variables with a combined very significance 84.9 (men) and 83.3 (ladies) against CPD's assumed 100 index level on the circled lower section of Fig. 2 suggested the PI exceeded industry's expectation to cope with processing information of previous learning aided by the interlinked affective motivation variable. This information using affective | cognitive versus the more significance 68.8 (men) and 69.3 (ladies) demonstrated formal lessons were effective.

To indicate the FF directions, circle in top right of Fig. 2 indicated that though both genders' PI was effectively within industry's significance at index level of 69 and 68.9 for the behaviorist | constructivism ratio. The reclassified ratio of affective | cognitive showed very significance 84.9 & 83.3

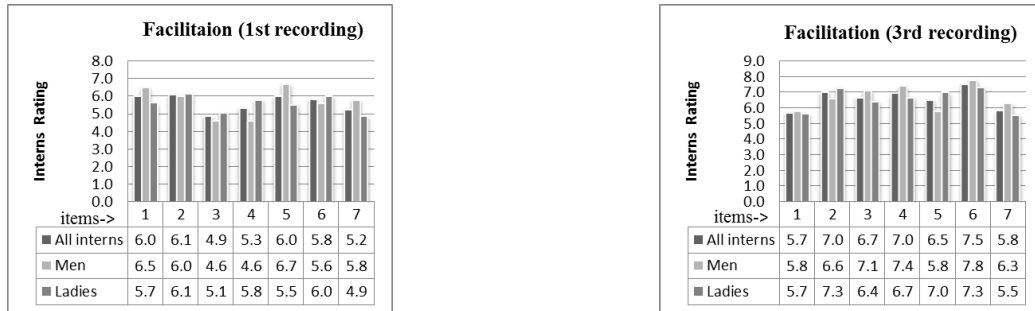
shown in the top left of Fig. 2 for men and lady at the assumed Pareto distribution of 20 | 80 which indicate that pedagogy effectiveness improvement being small increment was no significance from the 80 | 20 level of between 82.9 and 82.5, and between 68.8 and 69.3. At the default Pareto distribution ration of 80 | 20 for constructivism | behaviorism in Fig. 2 and Table VIII, both genders' pedagogy index were measured at 69 and 68.9 for men and ladies respectively when companies assumed 100 as the benchmark. That closeness suggested there was almost indifference between men and ladies just by comparing the PI without analyzing further as it might risk compensating differences of component numbers within an individual number.

The significance was also confirmed by "All correlation intern" of Table X which reported corr (R1|R2) 0.99, 0.97, 0.92, 0.9 & 0.79. As for CPD corr (R1|R2), the result was

very significance for men though the exception of no significance -1.0 by CPD for ladies was traceable to the sub-variable R1 & R2 *corr* of -0.09 & 0.5. Table X was a summary of sub-variable computed according to the format of Table IX. Table IX has to be repeated for each 12 sub-variables. Manipulation of items in the behavioral | constructivism ratio had provided understanding of the extent that interns were stressed with CPD related assignments during a particular time frame before learning begins to diminish after the default 80 | 20 distribution threshold. As

company's rating was only as good as interns' performance, therefore the comparative analysis of Fig. 2 and Table X suggested that with more constructivism elements for small incremental improvement the no significance meant the constructivism sub-variable directly related to affective and cognitive in formal lessons needed further investigation on improvement methods because intern's capability is only as good as the companies' ratings.

TABLE IX: FACILITATION SUB-VARIABLE ANALYSIS AFTER 1ST & 3RD RECORDING (TO BE REPEATED FOR EACH SUB-VARIABLES)



A=All, M=Men, L=Ladies, ML=inter-gender, 1 or 3 = occasions									
1	The facilitator varies his training methods according to the needs of the module.	2	2	4	7	6	6		
2	The facilitator communicated regularly on electronic bulletin board.	1	3	1	2	4	2		
3	Whenever I am not clear of what I read on the electronic bulletin board	7	6	6	4	3	5		
4	The facilitator is always prompt to reply all interns' queries.	5	6	3	3	2	4		
5	I communicate with the facilitator often.	2	1	5	5	6	3		
6	I read the bulletin board daily.	4	5	2	1	1	1		
7	All assessment about the training are well informed.	6	4	7	6	5	7		
Rating Correlation (R1)				Ranking Correlation (R2)					
All	M	L	ML=1	ML=3	All	M	L	ML=1	ML=3
0.08	-0.77	0.71	0.17	0.47	0.03	-0.84	0.79	0.00	0.51
$s^2 \text{ corr } (R1, R2), \text{rank}(s^2) = 0.31, 8 10$									

TABLE X: SUMMARIES OF SUB-VARIABLES' RATING & RANKING CORRELATION

No. items	Category	Items	Weight %	Rating Correlation (R1)					Ranking Correlation (R2)					s ²	Rank (s ²)
				All	M	L	ML=1	ML=3	All	M	L	ML=1	ML=3		
7	Career	0.47	0.84	0.67	-0.40	0.09	-0.60	0.75	0.51	-0.49	0.14	-0.49	0.32	9	
4	Personality	0.27	0.93	0.79	0.95	0.99	0.68	1.00	1.00	0.80	1.00	0.80	0.01	1	
4	Structural Functionalism	0.27	-0.27	-0.54	0.37	0.00	0.31	-0.40	-0.60	0.13	-0.13	0.60	0.17	6	
14	Concept mapping	0.70	0.26	0.33	0.08	-0.12	-0.74	0.16	0.32	0.10	-0.10	-0.49	0.13	5	
6	Decision Tree	0.30	-0.19	-0.11	-0.01	-0.41	0.86	-0.11	-0.33	-0.08	-0.18	0.04	0.12	4	
4	Knowledge retrieval	0.57	-0.73	0.32	-0.75	0.17	-0.84	-0.72	0.26	-0.20	0.20	-0.26	0.22	7	
7	Facilitation	1.00	0.08	-0.77	0.71	0.17	0.47	0.03	-0.84	0.79	0.00	0.51	0.31	8	
5	Seminar	0.45	-1.00	-0.80	-0.68	0.75	0.12	-1.00	-0.90	-0.60	0.90	-0.10	0.51	10	
6	Workshop	0.55	0.10	-0.05	0.15	0.28	0.47	0.03	0.23	0.26	-0.11	0.54	0.04	3	
10	Internship	1.00	-0.03	0.12	0.08	-0.02	0.11	-0.24	0.10	0.01	0.15	0.18	0.01	2	
67	1.00														
10	1.00	1.00	CPD Companies	0.71	0.58	0.08		0.72	0.59	0.09			0.09		
3	1.00	1.00	Reports	-0.39	-1.00	-0.09		-0.50	-1.00	0.50			0.33		
Interns and CPD's correlation between rating and ranking															
Correlation Intern				0.99	0.97	0.92	0.90	0.79							
Correlation CPD				1.00	1.00	-1.00									

A=All, M=Men, L=Ladies, ML=inter-gender, 1 or 3 = occasions

C. Gender Motivation Comparison Analysis

From Table X, the only significance and reasonable consistent correlation is found between men | ladies in the personality sub-variables as well as CPD companies' evaluation of their capabilities which indicated although both gender learn differently, they were acceptable to CPD companies. All others indicators showed divergence between both genders in motivation, learning intent and styles. Table XI ascertained a ranking of motivation sub-variable as insight

into what the purposive samples perceived as important compare with their workplace's perception. While interns perceived conative as importance, it was the ranked opposite by CPD companies. Lady interns perceived that contribution from social motivation as more than cognitive perception while men interns perceived the opposite. From how interns perceive themselves and how their seniors in CPD companies perceived them. Interns being GZ young adults do not agree with how senior people in CPD viewed this difference as perceived capability was seen in conative by interns versus affective by CPD.

TABLE XI: MOTIVATIONAL VARIABLES RANKING

	Subjects' self-rating H _μ over 3mths					CPD rating over 3 months				
	Cognitive	Affective	Conative	Social	WIDE	Cognitive	Affective	Conative	Social	WIDE
All	4.9	4.8	5.2	5.0	5.9	5.7	6.0	4.7	4.8	4.9
Rank	3	4	1	2	N/A	2	1	4	3	NA
Men	5.0	4.8	5.2	4.8	6.5	5.8	6.4	5.1	4.6	4.8
Rank	2	4	1	3	NA	2	1	3	4	NA
Ladies	4.9	4.8	5.2	5.2	5.5	5.6	5.8	4.5	5.0	5.0
Rank	3	4	1	2	NA	2	1	4	3	NA

NA = Not Applicable

The implication to learning had reflected on changing motivation methods to produce improved learning. Both

genders learning growth differs although learning were dependent on affective motivation from 0.670 & 0.871 for men in the bordered upper section of Table VII which measured p (Men/CPD) meant improvement was made from more significant to very significance . For ladies, the measurement was 0.396 & 0.446 meaning ladies formal learning improved from rising significance to significance. The lowered cognitive score doesn't mean learning had retrograded by cognitive mean in both gender. It simply meant that on a ratio basis, affective motivation is preferred by both gender. Affective meant facilitating promptings at the right pace to keep interns engaged in thoughts.

Assumed Force Field Indicator Expectation

Range	Description
80-100	above industry's significant expectation
62-80	within industry's significance expectation
38-62	less significance to industry expectation
<38	insignificant to industry expectation

- F (2, 18) = 1.21, $p < 0.05$, $8.0 < H_{\mu}^-$ (Men cognitive index) < 11
 \Rightarrow less significance
- F (2, 18) = 0.43, $p < 0.05$, $16.3 < H_{\mu}^-$ (Men affective index) < 73.9
 \Rightarrow very significance
- F (2, 28) = 0.66, $p < 0.05$, $13.2 < H_{\mu}^-$ (Ladies cognitive index) < 46.2
 \Rightarrow rising significance
- F (2, 28) = 1.11, $p < 0.05$, $8.7 < H_{\mu}^-$ (Ladies affective index) < 37.2
 \Rightarrow significance

TABLE VIII: PEDAGOGY INDEX BEFORE AND AFTER CONVERSION

Affective Cognitive ratio with Repeated Measure ANOVA after Reclassifying Selective behavioral and constructivism items into affective and cognitive Motivational Items. conative and social Items were Negated in Computation										Behavioral Constructivism ratio without Repeated Measure ANOVA and without Motivational Quotient Classification Process																	
Rows (i)	Column (j)	1	2	3	4	5	6	7	Matrices Computation procedures	Column (j)	1	2	3	4	5	6	7										
1	O_n	All			Men			Ladies			C	P	D	Period $k = 1,4$	O_n	All			Men			Ladies			C	P	D
2		Aff	Cog	Aff	Cog	Aff	Cog	O_n	B	C					B	C	B	C									
3	O_1	3.78	3.96	4.02	4.21	3.61	3.80	5.72	Harmonic Mean = $H_{k t}$	O_1	5.71	5.42	5.62	5.57	5.75	5.31	5.54	O_1	5.71	5.42	5.62	5.57	5.75	5.31	5.54		
4	O_2	4.90	5.00	4.61	4.99	5.10	5.01	5.34		O_2	6.03	6.05	5.96	5.94	6.07	6.11	6.11	O_2	6.03	6.05	5.96	5.94	6.07	6.11	6.11		
5	O_3	5.78	5.86	5.87	5.82	5.73	5.89	6.50		O_3	6.47	6.67	6.56	6.73	6.40	6.63	6.36	O_3	6.47	6.67	6.56	6.73	6.40	6.63	6.36		
6		0.2	0.8	0.2	0.8	0.2	0.8	1.0	Pareto Distribution		0.2	0.8	0.2	0.8	0.2	0.8	1.0		0.2	0.8	0.2	0.8	0.2	0.8	1.0		
7	O_1	0.07	0.27	0.07	0.27	0.07	0.27	0.33		Probability distribution (assigned) p^{kt}	O_1	0.07	0.27	0.07	0.27	0.07	0.27	0.33	O_1	0.07	0.27	0.07	0.27	0.07	0.27	0.33	
8	O_2	0.07	0.27	0.07	0.27	0.07	0.27	0.33			O_2	0.07	0.27	0.07	0.27	0.07	0.27	0.33	O_2	0.07	0.27	0.07	0.27	0.07	0.27	0.33	
9	O_3	0.07	0.27	0.07	0.27	0.07	0.27	0.33	O_3		0.07	0.27	0.07	0.27	0.07	0.27	0.33	O_3	0.07	0.27	0.07	0.27	0.07	0.27	0.33		
10	O_1	0.25	1.06	0.27	1.12	0.24	1.01	1.9	Joint Probability H^{kt}, p^{kt}	O_1	0.38	1.45	0.37	1.48	0.38	1.42	1.8	O_1	0.38	1.45	0.37	1.48	0.38	1.42	1.8		
11	O_2	0.53	1.33	0.31	1.33	0.34	1.33	1.8		O_2	0.40	1.61	0.40	1.59	0.40	1.63	2.0	O_2	0.40	1.61	0.40	1.59	0.40	1.63	2.0		
12	O_3	0.39	1.56	0.39	1.55	0.38	1.57	2.2		O_3	0.43	1.78	0.44	1.79	0.43	1.77	2.1	O_3	0.43	1.78	0.44	1.79	0.43	1.77	2.1		
13		Effectiveness Expected Value of Joint Probability \hat{E}							\hat{E}^{kt}	Effectiveness Expected Value of Joint Probability \hat{E}																	
14		All (A+C)		Men (A+C)		Ladies (A+C)				All (A+C)		Men (A+C)		Ladies (A+C)													
15	O_1	1.31	1.39	1.39	1.25					O_1	1.83	1.86	1.80				O_1	1.83	1.86	1.80							
16	O_2	1.66	1.64	1.68					O_2	2.01	1.98	2.03				O_2	2.01	1.98	2.03								
17	O_3	1.95	1.94	1.95					O_3	2.21	2.23	2.20				O_3	2.21	2.23	2.20								
18		Default to 1 as performed in RM ANOVA							Improve over last assessment $H_{pn} = 25, k^t$	Harmonic Mean Discounted																	
19	O_1	1.00	1.00	1.00						O_1	0.64	0.65	0.64				O_1	0.64	0.65	0.64							
20	O_2	1.00	1.00	1.00						O_2	0.63	0.63	0.63				O_2	0.63	0.63	0.63							
21	O_3	1.00	1.00	1.00					O_3	0.78	0.76	0.79				O_3	0.78	0.76	0.79								
22		Not Required for RM ANOVA. $\hat{E} = \hat{E}$							$\hat{E}^{kt} \cdot H_{p^{kt}}$	Effectiveness Adjusted Value \hat{E}																	
23	O_1									O_1	1.16	1.22	1.16				O_1	1.16	1.22	1.16							
24	O_2									O_2	1.27	1.25	1.27				O_2	1.27	1.25	1.27							
25	O_3								O_3	1.72	1.70	1.73				O_3	1.72	1.70	1.73								
26		Cumulative Pedagogy Effectiveness, CPI							\hat{E}^{kt}	Cumulative Pedagogy Effectiveness, CPI																	
27		All	Men	Ladies	CPD					All	Men	Ladies	CPD				All	Men	Ladies	CPD							
28	O_1	0.69	0.73	0.66	1.00					O_1	0.63	0.66	0.63	1.00				O_1	0.63	0.66	0.63	1.00					
29	O_2	1.62	1.65	1.60	2.00				O_2	1.25	1.27	1.25	2.00				O_2	1.25	1.27	1.25	2.00						
30	O_3	2.52	2.55	2.50	3.00				O_3	2.06	2.07	2.07	3.00				O_3	2.06	2.07	2.07	3.00						
31		Pedagogy Index (PI)							$[CPI^{kt} / CPI_{3,4}] * 100$	Pedagogy Index (PI)																	
32		All	Men	Ladies	CPD					All	Men	Ladies	CPD				All	Men	Ladies	CPD							
33	O_1	22.9	24.3	21.9	33.3					O_1	20.0	21.9	20.9	33.3				O_1	20.0	21.9	20.9	33.3					
34	O_2	54.0	55.0	53.3	66.7				O_2	41.2	42.4	41.8	66.7				O_2	41.2	42.4	41.8	66.7						
35	O_3	83.9	84.9	83.3	100				O_3	68.7	69.0	68.9	100				O_3	68.7	69.0	68.9	100						

TABLE XII: PERMUTATION OF PEDAGOGY INDEX

Extracts from bordered sections of OWRM ANOVA Table VII

Motivation type	O ¹ Men	O ³ Men	O ¹ Ladies	O ³ Ladies
cognitive	0.330	0.129	0.604	0.554
affective	0.670	0.871	0.396	0.446
conative	N/A	N/A	N/A	N/A
social	N/A	N/A	N/A	N/A
	1.000	1.000	1.000	1.000
WIDE	0.252	0.274	0.109	0.113

Extracts from circled part of Table VII
 Example in O³ Ladies: 83.3 x 0.544 = 46.2 and 83.3 x 0.446 = 37.2

Motivation type	O ¹ Men	O ³ Men	Increase	O ¹ Ladies	O ³ Ladies	Increase
cognitive	8.0	11.0	3.0	13.2	46.2	33
affective	16.3	73.9	57.6	8.7	37.2	28.5
conative	N/A	N/A	N/A	N/A	N/A	N/A
social	N/A	N/A	N/A	N/A	N/A	N/A
Pedagogy Index	24.3	84.9		21.9	83.3	

N/A = Not Applicable

Based on the assumed FF indicator expectation above which were appointed with Pareto and Golden ratios, the FF analysis reading indicated significance extrinsic expectation by CPD companies and that they were offered regular employment. It was an indication of interns' acceptability by the industry. For formal lesson evaluation of PI considered only the cognitive and affective sub-variables values indicated in the bolded box of Table XII as men affective increased significantly by 57.6 points and ladies improvement rising significance by 28.5.

In cognitive men improvement was less significance at 3.0 points where as ladies was rising significance at 33 points. Clearly men learn differently than ladies. Given the variability of the purposive sample, the formal lecture incapacitated motivation sub-variables at 95% confidence level of lower and upper limits for the various H_{μ}^- estimated above. While the WIDE values aspect in Table VII indicated a progressive value of 0.25 to 0.274 for men and 0.11 to 0.113 for ladies, these low scores were too early to indicate insignificance because the observations were made for three months the program has another 10 months to compete before it can be established that CPD had been helpful in consolidating practice with theories.

The direct intrinsic cognitive motivation part of the dependent variable with a combined higher value of factor of 69.0 (men) and 68.9 (ladies) against 100 for CPD in Table VIII suggested that they were within industry's significance expectation to cope with processing information of previous learning aided by the interlinked affective motivation variable. Then a better way to produce result might effectively turn extrinsic motivation inside by using intrinsic means to effect learning process. Narrowing asynchronous opportunities to induce more practice by re-scaling the program might be one way.

Having mentioned the importance of cognitive and affective motivators, this was not to undermine the importance of social and conative motivation which are almost not consider to influence knowledge delivery within formal lectures. Beyond formal lectures is where CPD adds

value to learning not just by inducing practice but also the development of social relationship skills. Although another component of the FF analysis considered conative and social motivation, these two were indirect and insignificant to formal lectures. However, the elements of social forces can motivate or un motivate learning as indicated very highly in the ladies with a $p < 0.808$ circled in Table VII showed ladies have strong social forces to capacitate their professional education and CPD by forming relationships through adding value from group culture beyond the class as compare to $p < 0.090$ circled in men which indicate independence in learning.

Adding value through non-independent learning has low sustainability because without peer, resources were reduced and handicap one's autonomy development of cognitive capacity [16]. The analysis had observe if companies were in agreement with the interns' progressive learning and capacity to retain essential knowledge in consolidating pre-exist knowledge with new learning to create skills for the structural functionalism society although this conative motivation sub-variable's scores at 0.166 (men) and 0.001 (ladies) of Table VII were not significant. Extrinsic motivation has low indication in learning support as seen that intrinsic motivations have overcome even the expectations raised by CPD companies as indicated by the rating differences between CPD and interns in Table XI.

There were differences between genders' learning pattern as seen in their direct intrinsic motivational quotients. The indicator varies between genders; men learn more by affective whereas ladies indicated more cognitive effects. This variant would suggest some form of rebalancing time in instructing concept maps with more case practice along with skewing promptings to ladies from men. CPD was obligatory for professionals to motivate lifelong learning to keep knowledge and practice current by adding on to one's knowledgebase.

D. Ranking Analysis

Table IX provided a format wherein each sub variable of the re-classified variable was re-arranged from which the top 20% items of each sub-variables were tabulated in Table XIII to provide insights of divergence, convergence and consistencies during the studied period. Additionally, the re-ranking of motivation variable also showed what the purposive samples perceive as important compare with the workplace's perception in Table XI. From Table XI, it was clearly seen that subjects being Generation Z (GZ) young adults do not agree with how senior staff in CPD viewed them. This difference in perceived ability was seen in conative by subjects versus affective by CPD. The implication onto learning reflected onto changing motivation tactics to produce improved learning.

Table XIII showed that for convergences, out of 79 items: 66 intern ratings and 13 CPD ratings, across 12 sub-variables in 4 variables, 11 have converged (▲). Of these 11, 3 convergences were more significant (▲▲) such as concept mapping instructional method as interns became more familiar with how it was delivered. Work based learning at CPD was a significant aspect of social motivation as agreed as interns became more aware that more people with FED skills are needed.

Regarding divergences, there were two divergences (▼)

among the 17 top items ranked as top 20% among the 12 sub-variables. Upon examination, the facilitation sub-variable Table XIII was insignificant because reliance on electronic media has increased. The reason for not participating in seminars was a divergent, perhaps over the study period; increased module contents might have shifted participation to electronic media indicated in Table XIV.

Five items have held their consistent (■) top ranked positions. Interestingly, among these five: concept mapping techniques positivity to career and workshop as a thinking construct, were much preferred.

VI. CONCLUDING REMARKS

An online survey of GZ [17] indicated that young adults perceived being creative, confident and sincerity/honesty among the important qualities to achieve their goals in addition to friendship, happiness, health and love. The indicators boxed in Table X were important to bear severe implication about managing conflicts in learning theories in the sense of how older generation were taught to teach and how new generation wanted to learn when technologies advent have replaced old ways of learning with social learning networking.

On the basis that subject's ability were as good as industries see it, the manipulation of direct intrinsic motivational variables provided understanding of the extent that subjects can be stressed with CPD related assignments during a particular time frame before learning begins to diminish after the threshold that engagement can keep sustaining through workflow cases.

Only 4 motivational quotients were identified instead of adding more such as biological and culture because the purposive samples have negated variability. Learning has both extrinsic and intrinsic elements and within each, there were direct and indirect as in Fig. 1. Each type of motivators would not be isolated by itself and the 4 motivators influence each other. Intrinsic and extrinsic motivation were synonymous with pushes (pressure) and what pulls (attracts) were synonymous and the directional arrows of Fig. 1 demonstrates through incentive, need, self-determination, to direct behavioural change that affects independent learning [16]. Learners were motivated when their expectations of what they will learn were met and that was the reason for measuring the extent which the training had met interns' expectation [18].

The Cognitive and Affective intrinsic motivational variables were more important because they being interwoven, they represented the contact time with the facilitator Learning has plenty to do with information processing, storing; retrieval and instructional methods in the program were directly related to this end in teaching how to learn to process information. The cognitive aspect in this study identified with instructional methods to develop critical thinking path to retrieve the right knowledge in time to process information for learning to make professional advise/decisions that were expected in professional exams and CPD while the affective aspect trigger the engagement of mind, matters and form.

From fundamental of system theory, the schema consisted of a loop of input, process, output, feedback and control [19].

The ability to management information in the way that subjects can efficiently store (input) and retrieve (output) information would enlighten self-esteem when subjects could

have the right information earlier and with equations learn from his/her semi-professional stage, process these information into results.

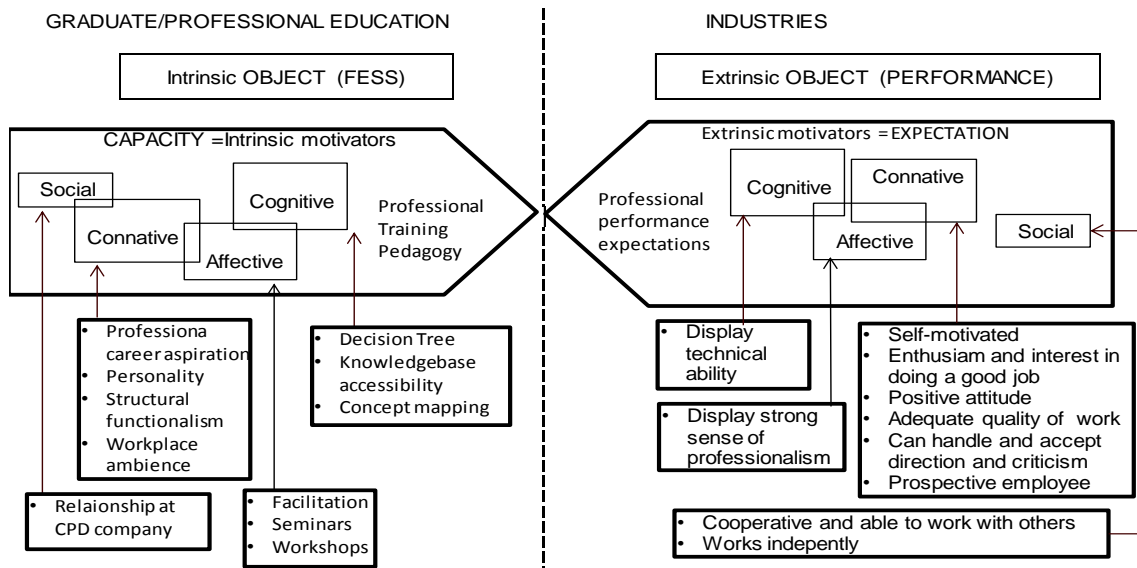


Fig. 1 Motivational for learning force field between subjects and industries [10].

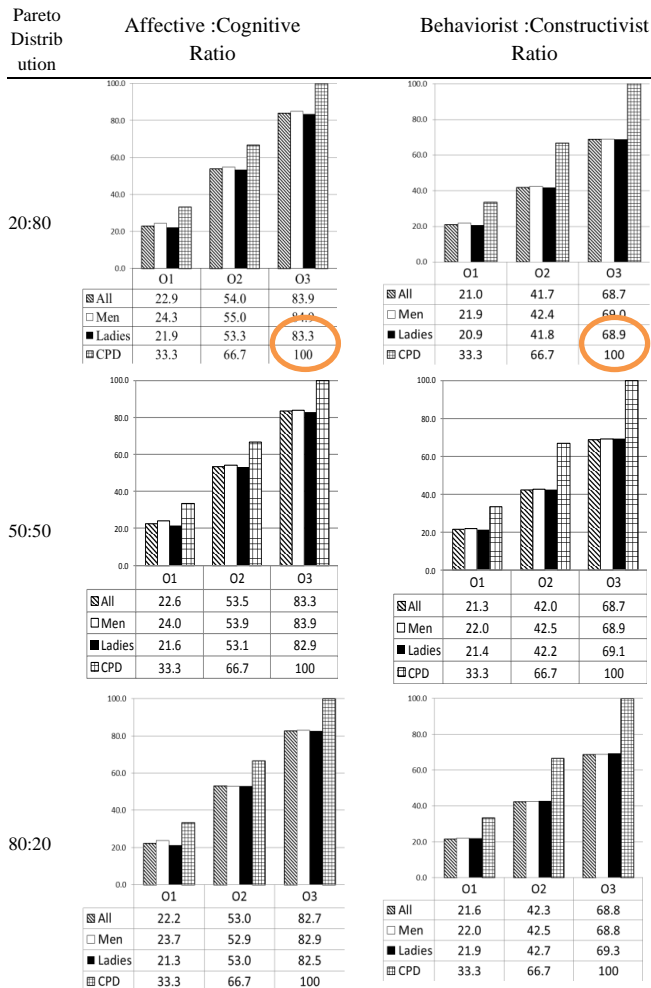


Fig. 2. Side-by-side comparisons of pedagogy growth by changes in Pareto distribution of Force Field.

As it turned out, the justification to explore with data mining discover new information paid off when the Delphi method reclassified data for the prescribed analytics. The exploratory data mining approach had first sought an

understanding of what those data represented for examination from a new dimension. By reclassifying behaviorist and constructivist items into intrinsic and extrinsic and for each of the 2 further reclassify to 4 motivation types, the analytics have identified the pedagogic growth justification and suggested improvement in view of changing learning trends in GZ.

Moreover, external information from an independent online survey of GZ [17] traits confirmed that learning characteristics were leaning towards conative and social dependencies. While this agreed with the expectancy value theory [18], then the better way to produce result might effective be through turning extrinsic motivation inside out with intrinsic as the overcoming the process of producing learning by narrowing asynchronous opportunities for induce more practice with re-scaling the training program to cumulate learning by adding on experiences of distributions from varieties.

From the onset of an exploratory quantitative study, the system had suggested appropriate significance levels for hypothesis at 95% C.I. rather than being led into designing self-fulfilling prophecies. The result showed that subjects were able to rebalance their priorities by the best way they knew according to their due dates to deliver results to avoid discourse. In this aspect Piaget [16] claimed that one's cognitive maturity would reflect subjects' understanding the first real professional world by coming to term with expectation of CPD's extrinsic motivation yet have depended on their ability to avoid extrinsic pressure and in so doing were self-esteemed from their developed capacity.

This paper had explored the effectiveness of the pedagogy from the effect on the change of subject's rated ability and companies rating were dependent upon motivational variables mentioned so as to understand these variables' performance and their causal effects. The epitome of the training would be subjects' cognitive ability to practice CPD through consolidating learning by adding new knowledge to prior learning with direct intrinsic motivation for cognitive

development by affective means [20], the prime being instructional pedagogy on programs that bring out the best in fundamental knowledge as the basis for understanding advance seminars facilitated by critical thinking techniques; decision tree, concept maps, promptings and cases to develop knowledge management in recollection, reflection and applying prior learning.

Preluding quantitative research, an exploratory study had

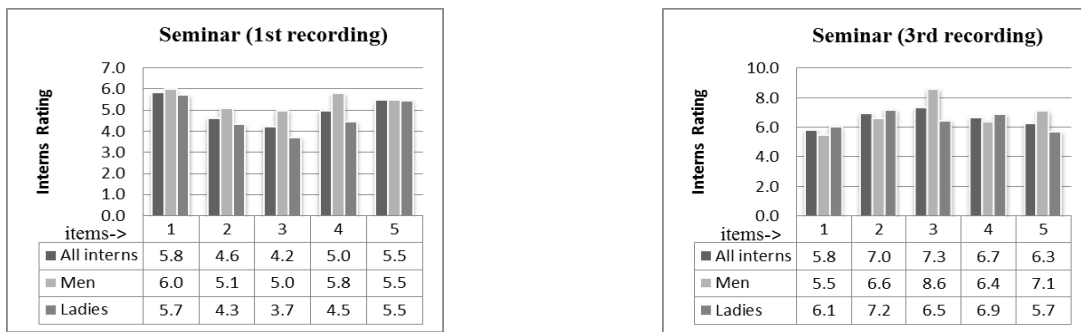
provided a benchmark from current result to be compared with hypothesis of new effort by improved instructional methods. Where there were unanswered issues, exploratory data mining approach benefitted research with suggestions of enhancement on research instrument for subsequent surveys. The exploratory data mining approach with its procedures of analytics had uncovered from empirical data to inform changes in motivation for learning.

TABLE XIII: STATEMENT OF SUB-VARIABLES' TOP 20% RANK AFTER 1ST AND 3RD RECORDING

Variable	Sub-variable	Item #	Description	Rank		Status
				O ¹	O ³	
Cognitive	Concept map	13	The concept mapping techniques will help my career	1	1	■
		8	I have enough opportunity to apply concept mapping techniques at my internship.	4	2	▲
		9	The procedure in mapping concept was clearly taught.	12	3	▲▲
	Decision tree	4	The decision tree thinking method helps my career.	3	1	▲
		2	I always access the direction given to get the knowledge.	3	1	▲
Affective	Facilitation	6	I read the bulletin board daily.	4	1	▲
		2	The facilitator communicated regularly on electronic bulletin board.	1	2	▼
	Seminar	3	I have opportunities to participate in all seminars but I did not	5	1	▼▼
	Workshop	2	The workshop s caused me to think	1	1	■
Conative	Career	4	I want a career that combines Finance and Economics	1	1	■
	Personality	3	My family depends on me to support them in future	1	1	■
	Functionalism	3	My country will need more people with financial economics skills.	4	1	▲▲
Social	Internship	2	My assignments at internship contribute a lot to my career development.	3	1	▲
		8	The internship company is pleasure to work in	10	2	▲▲
	CPD company	9	The intern was able to handle and accept direction and criticism	1	1	■
		8	The intern worked independently with minimal supervision	5	2	▲
	WIDE	1	The interns twice a month write up accurately match the company's activities to the report objectives	2	1	▲

Status legend: O¹=1st occasion, O³=3rd occasion ■=consistent, ▲= convergence, ▲▲= more convergence, ▼=divergence

TABLE XIV: SEMINAR SUB-VARIABLE ANALYSIS AFTER 1ST & 3RD RECORDING



A=All, M=Men, L=Ladies, ML=inter-gender, 1 or 3 = occasions		A	M	L	A	M	L		
1	Seminar on new learning were clear	1	1	1	5	5	4		
2	I have opportunities to participate in seminar and I always do	4	4	4	2	3	1		
3	I have opportunities to participate in all seminars but I did not	5	5	5	1	1	3		
4	Many examples were given to cause understanding of concepts	3	2	3	3	4	2		
5	The pace of the seminar is just right	2	3	2	4	2	5		
Rating Correlation (R1)				Ranking Correlation (R2)					
All	M	L	ML=1	ML=3	All	M	L	ML=1	ML=3
-1.00	-0.80	-0.68	0.75	0.12	-1.00	-0.90	-0.60	0.90	-0.10
$s^2 \text{ corr}(R1,R2), \text{rank}(s^2) = 0.51, 10/10$									

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