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# TRAINING EFFECTIVENESS EVALUATION AMONG TWO DRDO CADRES IN PROOF & EXPERIMENTAL ESTABLISHMENT

# A K SANNIGRAHI SCIENTIST 'F' & ADDL. DIRECTOR PROOF & EXPERIMENTAL ESTABLISHMENT DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION CHANDIPUR

#### **ABSTRACT**

Two Management Training on "Team Building & Interpersonal Relationship Development" were conducted, one for Technical Officers of Defence Research Technical Cadre (DRTC) and the other one for Admin Assistants and Admin Officers of Administrative cadres of PXE by same PXE Trainers at the same venue inside island environment. Evaluation of training effectiveness for two Defence Research & Development Organization (DRDO) cadres was carried out in three levels following Kirkpatrick's evaluation model i.e. in 'Reaction level' (Level 1), the 'learning level' (Level 2) and also in 'Behaviour level' (Level 3). It was found that the course was highly satisfactory to all participants of both cadres while the learning percentage was recorded 44 to 70 % for DRTC participants but 16 to 49 % for participants of Administrative cadres. Even superiors commented after six months considering behaviour levels of participants about the trainings as very effective. Performance of Trainers as evaluated by participants was also found above four in five point scale in case of all faculties. Trainees from DRTC cadre harvested higher benefit from this training course than the trainees of Admin cadre due to their Engineering and scientific educational background, younger age and better open mindedness. This well designed and well conducted training motivated the trainees to improve their knowledge. Measurement of net gain by the organization from training courses is, however, a difficult task in R&D organization.

#### **KEYWORDS**

DRDO cadre, Human capital, Training effectiveness, Training evaluation.

#### INTRODUCTION

very individual enters into service with a prescribed educational qualification. During work Human Resource Development Cell finds out the gap between the existing knowledge & skill and required knowledge & skill for smooth progress of work in case of all employees, thus training needs are identified and proper trainings are arranged accordingly for each employee with a purpose to improve their human assets, the differentiator between a good institute and a great institute. Training is also important at all employees' levels since skills erode, become obsolete over a period of time and need to be replenished (Langer and Mehra, 2010). In the era of competition, training to employees in the organization is, therefore, always considered as critical for developing their skills, upgrading their knowledge and for bringing desired changes in their abilities, attitudes and behaviours. According to Lowry et al (2002), training is a factor that enhances employees' commitment and maximizes employees' potential. It is expected that a well designed and well conducted training program will lead to positive reactions from trainees, learning of the important material, behaviour change on the job, and performance improvements (Ostroff, 1991). Training is a costly affair since all government, public, private and corporate sectors including Defence Research & Development Organization (DRDO) spend a considerable amount of time and money on training for facilitating employee's learning of job related competencies. In fact, training is an investment in the human resources of an establishment, with both immediate and long range return. However, HRD cell needs to manage training programs more effectively so that it can get the highest returns from its investment. It is, therefore, utmost important to provide evidence that training efforts are being fully realized. Different researchers (Hinrichs, 1976; Kirkpatrick, 1978; Ostroff, 1991; etc.) described the evaluation of the effectiveness of training programs as very critical since training results might not be immediately reflected in trainee's performances and contributions but without documentation of the effectiveness of training, organizations have no good way to know whether training dollars are being spent wisely (Grove and Ostroff, 1991). Leach and Liu (2003) mentioned that organization would be interested to know the reactions of trainees, knowledge acquisition by trainees and behaviour change impact outcomes for critical evaluation of training investments. Hence it is very vital to measure training effectiveness for taking further decisions on continuation of training, improvements in training and allocation of training funds. In fact, nothing will improve until it is measured, the training programs have to be assessed in terms of the program itself, of the behaviour outside the training environment and whether it has desired effect or not. Evaluation determines the effect of training at individual, departmental and organizational levels. According to Pidd (2004), effective training can be gauged by the capacity of trainees to apply knowledge, skills and abilities gained in training to their work environment (i.e. transfer of learning) and maintain them over time in their job context. Huque and Vyas (2008) also suggested for assessing training effectiveness by considering the performance of the trainees and their ability to transfer training information to their jobs. Evaluation can also help to improve the quality of training activities as well as Trainer's ability.

In Defence Research & Development Organization (DRDO) employees of three different cadres are recruited having four different qualification levels. Defence Research & Development Service (DRDS) cadre officers are recruited by Recruitment & Assessment Centre (RAC), Delhi as Scientists having Bachelor of Technology (B. Tech.), Master of Technology (M. Tech.), Master of Science (M. Sc.) or Doctorate of Philosophy (Ph. D) degree. Defence Research Technical Cadre (DRTC) staff are recruited by CEPTAM, Delhi both as Senior Technical Assistants with Graduation in Science or Engineering Diploma qualifications and as Technicians having pass certificate on various trades from Industrial Training Institute (ITI). Administrative & Allied cadre employees are also recruited by CEPTAM as Admin or Store Assistants, vehicle operator, Fire men, Fire Engine Drivers and Attendant Multi Skill Workers having ten and twelve standard Board examinations pass certificate. In DRTC cadre Senior Technical Assistants become Technical Officers after getting promotion while Technicians are promoted to Technical Assistants and then Technical officers with time and acquiring experiences through Promotional Assessment. Schmidt (2009) showed that different demographic dimensions like age, gender, educational background, job status, job tenure, income, marital status, work experiences, etc played important role on training satisfaction / effectiveness. Keeping all these in view two personality development training were organized, one each for DRTC and Admin Cadre at an unique isolated island environment during 2013 with a primary objective to develop soft skill among trainees for creating efficient teams in the establishment and their training effectiveness were evaluated using Kirkpatrick's 4 level of Training Evaluation model. The 4 levels are : Reaction of Trainees (Level 1), Learning of Trainees (Level 2), Changes in Behaviour of Trainees (Level 3) and Results / impact to Institutes (Level 4).

#### **EVALUATION PROCEDURE FOLLOWED**

The Personality Development training on 'Team Building and Interpersonal Relationship Development' was organized for Admin & Allied cadre during 14 – 16 June 2013 and for DRTC cadre on 26 – 28 December 2013 at the same venue by the same Faculty members. Thirteen Admin Assistants, 3 Admin Officers, 1 Accounts Officer and 1 Store Officers dealing mainly with government administrative rules and procedures participated in first training while 14 Technical Officers-A having technical background participated in second training. However, 13 participants of each batch took part in training evaluation process. Important topics like 'Attitude Matter', 'Team Building Concepts', 'Interpersonal communication', 'Fundamental Interpersonal Relations Orientation – Behaviour (FIRO-B)', 'Motivation', 'Seven habits of highly effective people', etc were discussed in both training. In addition 'conflict management' was covered in first training while 'Return on training investment (ROTI)' was discussed in second training. Since the Trainer performance has a great impact not only in attracting trainees towards goals of program, but also to the entire effectiveness of training (Rama Devi and Shaik, 2012), efforts were made to keep the same trainers in

both training. However three trainers dealt different topics in first training while two trainers took classes in second training. After each class, participants gave feedback on overall effectiveness of the topics on 5 point scale (1= very poor, 2= poor, 3= Average, 4=Good and 5= Excellent) in both training. In second training, trainees gave feedback on Topic Content, Presenting style of the faculty and Interaction with participant in addition to overall effectiveness from which satisfying percentage were calculated by taking average. The Reaction (Level-1) of participants were recorded by taking feedback from each participants immediately after completion of training on the arrangement of facilities (i.e. logistic supports, course kits, etc) for trainees, management of classroom facilities (i.e. computer, multimedia projector, white board with coloured pens, collar microphone system, laser pointer, etc.), relevance of topics in training course, capability of trainers, etc. for judging the satisfaction level of trainees as well as quality of training (Level 1). Learning of trainees were evaluated by giving a set of questions to answer before starting of training and another similar set of questions after completion of training to each participant. Pre-test and post test score was calculated by marking answers of each Answer script. The difference of value for each trainee is called as learning gain or improvement in knowledge (Level 2) due to training. To estimate the change in behaviour (Level 3) for each trainee, feedbacks were taken after six month from their immediate superiors / Bosses who have noticed the change, if any, during working together.

#### **FINDINGS AND DISCUSSION**

#### **DEMOGRAPHIC CHARACTERISTICS OF TRAINEES**

Three days training course on 'Team Building & Interpersonal Relationship' was conducted for two different cadres having two different distinct educational backgrounds and working patterns. Employees of Admin cadre work in office and deal files for taking decisions in relation to various administrative and financial matters on the basis of Government rules and regulations. Employees of DRTC cadre are, on the other hand, busy in field for test and evaluation of various guns, tanks, rockets, mortars and their ammunitions for providing safe and secured armaments to Indian defence users on the basis of various observations and data collected using various instruments. Table 1 presents the demographic profile of these trainees. In first training, out of 18 Admin cadre employees 13 participated in training evaluation, in which 4 were officers and 9 were Senior Admin Assistants. Similarly in second training 14 Technical officer 'A' took training and 13 officers participated in Training evaluation. Age wise 8 employees of Admin cadre were more than 45 years old, majorities were of 50 years or above and only 5 employees were below 45 years. In case of DRTC cadre 100 % officers were below 45 years, majorities in between 33 to 38 years. In respect of Educational qualification 8 Admin cadre employees were arts or commerce graduates while 5 passed High school certificates (HSC) Examination. But among DRTC cadre trainees 10 employees were having Engineering diploma and 3 Graduation in Science. According to working experience or service length only 6 trainees in Admin cadre had less than 20 years experience while rest have 26 to 29 years of experience but in DRTC cadre except one trainee others had less than 20 years of experience, precisely 7 to 13 years of experience. The data in Table 1, therefore, reveals that DRTC trainees were younger in age as well as service with better IQ in comparison to the Admin cadre trainees.

#### REACTIONS OF TRAINEES (KIRKPATRICK'S LEVEL 1)

Immediately after completion of training, feedback was collected from each participants on i) relevance of course in broad area of trainee's work, ii) level of technical content, iii) enhancement of knowledge, iv) covering of course contents as per expectation, iv) Training duration, v) arrangement of logistic support like accommodation, class room and other facilities, etc. Since the course was planned for developing soft skill among trainees by increasing awareness on positive attitude, team building concepts and advantages of team work, interpersonal relationship and communication, seven habits of effective people, etc. trainees were highly satisfied. According to them, course was helpful not only in personal life but also in official activities. As the course was conducted as 'Off the Job' training at an isolated unique eco-friendly island environment having beautiful guest house and conference room facility, trainees were motivated to participate in both theoretical classes and practical demonstrations starting from morning to evening without feeling any short of boringness. As expressed by trainees of both training courses, this environment had energized their belongingness with course and also increased their interest for learning.

Code: Developed in Att it to						
Cadre	Demographic A	ttribute	Frequency	Percentage (%)		
	Rank	Officer	4	31		
		Staff	9	69		
	Age group	< 45 years	5	38		
Admin cadre		> 45 years	8	62		
	Qualifications	Graduate and above	8	62		
		Secondary / HSC	5	38		
	Service length	< 20 years	6	46		
		> 20 years	7	54		
	Rank	Officer	13	100		
		> Staff	Nil	0		
	Age group  Qualifications	< 45 years	13	100		
DRTC		> > 45 years	Nil	0		
		Diploma / Graduate	13	100		
	- 14	Secondary/ HSC	Nil	0		
	Service length	< 20 years	12	92		
		> 20 years	1	8		

**TABLE 1: DEMOGRAPHIC PROFILE OF TRAINEES** 

#### LEARNING OF TRAINEES (KIRKPATRICK'S LEVEL 2)

The course contents dealt in both training courses were not taught earlier to all trainees participated in these courses. In first training a questionnaire having objective type questions of total marks 31 from the topics to be covered for Admin cadre was given to all trainees of this cadre for answering immediately just to test the knowledge level on those topics before starting the course. Similar type of questionnaire of 31 marks was again given to answer after the training for judging the learning level due to training. The learning gain was estimated from post test and pre test results. Similar attempt was made for second batch i.e. trainees of DRTC cadre also. Both pre-test and post test score along with learning gain percentage data of each trainee participated in feedback are presented in Table 2.

**TABLE 2: LEARNING GAIN (%) OF TRAINEES** 

Admin cadre (14-16 June, 2013)			DRTC (26-28 December, 2013)				
Trainees	Score (%)		Learning Gain (%)	Trainees	Score (%)		Learning Gain (%)
	Pre-test	Post- test			Pre- test	Post- test	
A1	16	35	19	T1	12	66	54
A2	35	52	17	T2	06	61	55
A3	42	71	29	T3	24	80	56
A4	16	51	35	T4	10	80	70
A5	35	65	30	T5	26	86	60
A6	16	45	29	T6	09	68	59
A7	10	55	45	T7	22	75	53
A8	26	49	23	T8	14	68	54
A9	16	65	49	T9	17	86	69
A10	45	61	16	T10	29	73	44
A11	16	48	32	T11	16	66	50
A12	39	68	29	T12	10	54	44
A13	10	35	25	T13	03	50	47
Avg.	24.76	53.84	29.08	Avg.	15.23	70.23	55.0

The pre-test score of Admin cadre trainees varied from 10 to 45 % with an average score 24.76 % while that of DRTC trainees varied from 03 to 29 % with an average 15.23 % indicating better initial knowledge of Admin cadre trainees than younger DRTC trainees which was obvious as with experience and age Admin cadre trainees learnt the soft skill to manage many problems in life. But opposite results has been recorded in post-test scores which ranged from 35 to 71 % (Average 53.84 %) in case of Admin cadre trainees and 50 to 86 % (Average 70.23 %) in case of DRTC trainees, indicating better improvement in learning gained through training by later trainees. The range of learning gain was, however, found much better for DRTC trainees ranging from 44 to 70 % with an average 55 % in comparison to Admin cadre trainees (Range 16 to 49 % and average 29.08 %). Few low pre-test score trainees got high post-test score which might be due to their more concentration on class activities and learning, the motivating factor might be their awareness about less knowledge on the subject. More knowledgeable trainee sometimes becomes little lethargic to attend the class more attentively. The findings in Table 2 showed that all trainees irrespective of their cadre have achieved a positive knowledge gain from this personality development training. The positive knowledge gain by trainees was also earlier reported by Alvarez et al (2004), Sitzmann et al (2008), Giangreco et al (2009) and Giangreco et al (2010).

The learning gain data was analyzed further to determine the causal factors for getting variation in learning among two DRDO cadres and presented in Table 3, 4 and 5. The data in table 3 reveals that age has some impact in learning since both concentration on class and memory keeping power reduce with older age. The finding of table 4 clearly shows that educational qualification plays an important role in grasping the knowledge / information. Less education level showed less learning gain. Employees with Engineering and Science background harvested the better benefits from this training course even though it is soft skill development or personality development training. There was not much impact noticed in case of service length or experience as they were basically not from management background and not dealt the management responsibility during service. The findings on learning gain, therefore, indicate that the better learning by DRTC trainees was due to important demographic factors like their Educational qualification and younger age with energetic approach. This is in line with the findings of Schmidt (2009) in relation to role of various demographic factors on training effectiveness. In fact, the administrative people gradually lose their open mindedness and flexibility during working with rigid rules and regulation. This might be also an inherent factor for restricting Admin cadre trainees to learn more on the topics which they might not be used in their day to day office works. Fischer (2011) also stated that open-mindedness is also a significant moderator of training effectiveness.

TABLE 3: IMPACT OF AGE FACTOR IN LEARNING GAIN (%)

Cadre	Age group	Trainee numbers	Learning gain (%)	
			Range	Average
Admin	Below 45 years	5	16 - 49	30.20
	Above 45 years	8	17 - 45	28.37
DRTC	Below 45 years	13	44 - 70	55.0

#### TABLE 4: IMPACT OF EDUCATIONAL QUALIFICATION IN LEARNING GAIN (%)

TABLE 4: INFACT OF EDUCATIONAL QUALIFICATION IN LEARNING GAIN (%)						
Cadre	Qualification	Trainee numbers	rs Learning gain (%			
			Range	Average		
Admin	Graduate and above	8	17 - 49	33.25		
	Secondary / HSC	5	16 - 29	22.4		
DRTC	Diploma / Graduate	13	44 - 70	55.0		

#### TABLE 5: IMPACT OF SERVICE LENGTH ON LEARNING GAIN (%)

Cadre	Service length	Trainee numbers	Learning gain (%)	
			Range	Average
Admin	Below 20 years	6	16 - 49	29.00
	Above 20 years	7	17 - 45	29.14
DRTC	Below 20 years	12	44 - 70	55.08
	Above 20 years	1	54	54.00

#### CHANGES IN BEHAVIOUR OF TRAINEES (KIRKPATRICK'S LEVEL 3)

Personality or soft skill development training gradually helps the trainees to change his / her behaviour with more open mindedness, positive and cooperative attitude, building up trust and confidence on their colleague which ultimately expressed as good team members. This is always noticeable to his team leader or boss. The feedback taken from the superiors of all those trainees after six months of the training proved that the training was very effective as there was a remarkable change in their behaviour during dealing with colleagues, files or handling instruments. They are now more proactive and cooperative in action being responsible team members.

	TABLE 6: EVALUATION OF TRAINERS PERFORMANCE (5 POINT SCALE)					
Trainers	Topics	Admin Cadre	DRTC cadre			
		Overall effectiveness	Overall effectiveness	Topic content	Delivery style	Liveliness / Interaction
Α	Attitude Matter	4.17	4.53	4.54	4.62	4.46
	Team Building	4.78	4.31	4.08	4.31	4.46
	Interpersonal communication	4.72	4.69	4.31	4.62	4.62
	Motivation		4.38	4.25	4.50	4.13
Average		4.56	4.48	4.30	4.51	4.42
В	FIRO-B	4.72	4.69	4.38	4.85	4.62
	Seven Habits	4.50	4.85	4.62	4.85	4.85
	ROTI		4.00	4.08	4.46	4.54
Average		4.61	4.51	4.36	4.72	4.67
С	Motivation	4.17	-	-	-	-
	Conflict Management	4.33	-	-	-	-
Average		4.25	-	-	-	-

#### **EVALUATION OF TRAINERS BY TRAINEES**

As shown in Table 6 the three internal expert faculties took classes in first training course for Admin cadre while in second training course for DRTC trainees only two internal experts took classes. The grading of more than 4 given by trainees in 5 point scale for overall effectiveness indicates that trainees of both cadres were highly satisfied with the trainers' performance in dealing with different topics. Admin cadre trainees were comparatively more satisfied than DRTC cadre. Performance of all the three speakers was almost at par. The high rate grading (above 4 in 5 point scale) in topic content, delivery style and interaction for both trainers by the trainees also suggest that trainees were highly satisfied and enjoyed the training. This confirmed the earlier findings of Ostroff (1991).

#### SATISFACTION LEVEL OF TRAINEES ON TOPICS

The average grading data of 4 observations e.g. topic contents, Delivery style, Interaction and overall effectiveness was converted to percentage value and presented graphically in Figure 1 as satisfaction level of trainees on topics. The high values (above 85 %) of the chart indicate that DRTC trainees were highly satisfied with the design and delivery of all topics discussed during training.

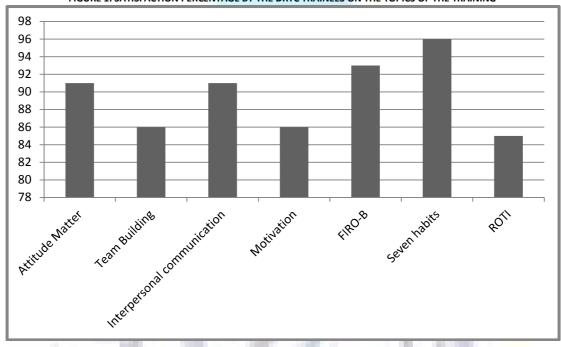


FIGURE 1: SATISFACTION PERCENTAGE BY THE DRTC TRAINEES ON THE TOPICS OF THE TRAINING

#### **LIMITATION**

Proof & Experimental establishment is a service oriented establishment where dynamic test and evaluation of various weapons and ammunitions are carried out daily at its sea-coast test range during last 120 years. In this situation evaluation of training impact on each trainee with respect to results / profits (Kirkpatrick's Level 4) was very difficult and not carried out. Since the work pattern of both DRDO cadre are quite different, it was also not possible to quantitatively assess the transfer of soft skill learning to workplace. More psychological study is required to gauge the real achievement from the behavioural changes of trainees.

#### **CONCLUSION**

The approach to take the trainees to an isolated but undisturbed unique eco-friendly environment away from office taken by the author as Course Director was found highly fruitful to create better motivation, more attention and high satisfaction among trainees as well as trainers. The finding of this study showed that all trainees were happy with the content of the course, the speakers' style of facilitating, the overall effectiveness and the learning gained. The well planed training schedule, the tension free logistic support and class room facilities arranged by the Course Director motivated the trainees for improving their knowledge on personality development which has lifelong impact towards achieving success.

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