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The evaluation of training and development of employees: The case of a national oil and gas industry

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Abstract
The aim of this study was to investigate the moderating variables of training design and delivery, as well as their subsequent impacts on training outcomes: reaction, learning, intention to transfer learning, behaviour and results. The study was conducted at three separate times (before, immediately after training and 2–3 months after training). A simple sampling method were used to select employees (n1=406, n2= 402, n3=391) who worked for Omani national oil and gas companies and who had participated in health and safety training. A structural equation model was used to validate the research model. The results showed that pre-training intervention and activities were related to expectations about training outcomes. Moreover, the results indicated that trainer performance and behaviour were related to reaction and learning. Finally, training content and objectives were predictors of behaviour.

Keywords: Training, development, training design and delivery factors

1. Introduction
The oil and gas industry faces many challenges, such as global competition for depleting resources, the falling price of oil, occupational accidents, and shortage of skilled employees. In such high-risk working environments characterised by intensive competition for skilled employees, employee training and development to improve skills and knowledge is a key differentiator among companies. In 2014, training and development costs in the United States were roughly $1,299 per employee. Despite these costs, however, evaluations of such training are generally neglected, even though they are known to be crucial for measuring training outcomes (Giangreco *et al*., 2009) [45]. Only 35% of the largest businesses in the US measure the impact of training in their organisations (Association for Training and Development, in Ho, 2016) [52], with the majority of training evaluation measuring only trainees' reactions to a training programme (Saks and Haccoun, 2009) [88] in terms of their overall satisfaction with training (Giangreco *et al*., 2009) [45]. Trainee' reactions represent the first level of Kirkpatrick's (1959) [63] model, which is commonly the focus of most organisations. However, Bramley and Kitson (1994) [15] argue that the entire model's training evaluation levels (reactions, learning, behaviours, and results) should be studied, as each level provides a different kind of evidence with regard to measuring training outcomes.
Kirkpatrick's (1959) [63] four levels model has served as a widely accepted framework for training evaluation for more than fifty years now (Saks and Burke, 2012) [87]. As its title suggests, this model consists of four levels: reactions, learning, behaviours, and results. Level 1 (reactions) is concerned with the feelings and attitudes of participants. Level 2 learning assesses the degree of learners' acquisition of knowledge and skills. Level 3, behaviours, focuses on the extent to which training is applied by learners when they go back to their work. Level 4, results, measures the impact of training on an organisation's overall performance. There are discrepancies in terms of the amount of published research across these four levels, with further research required at the reactions level. Level 1 has been put into practical use by many organisations, yet little research attention has been given to it. Arthur *et al*. (2003) [8] note that past research has indeed used reaction criteria when evaluating training effectiveness, yet this represented only 15 (4%) data points compared to the 234 (59%) for learning, 122 (31%) for behaviour, and 26 (7%) for results within their meta-analysis of observed training effectiveness.

2. Literature Review

In this study, 'training and development' refers to 'the process of systematically developing work-related knowledge and expertise in people for the purpose of improving performance' (Swanson and Holton, 2009, p. 226) [95]. 'Performance' is defined, according to Cascio (1992) [22], as 'an employee's accomplishment of assigned tasks' (Yamoah and Maiyo, 2013, p. 3) [113]. Traditionally, organisations have tended to maximise investment in training and development in order to improve employee performance (Ameeq and Hanif, 2013) [7]. However, evaluations to determine training effectiveness are seldom undertaken (Collis, 2002) [30]. A training evaluation refers to 'the process of collecting descriptive and subjective information essential for making effective training decisions regarding selection, adoption, value, and modification in the training activities' (Goldstein and Ford, 2002, p. 138) [47].

Kirkpatrick's model involves evaluation criteria to measure the effectiveness and/or efficiency of training programmes in order to identify weaknesses and improve future training programmes (Saks and Burke, 2012) [87]. The Kirkpatrick four levels model has been criticised for its incompleteness, the assumption of causality, and assuming the increasing importance of information as the levels of the four outcomes ascend (Bates, 2004) [12]. Bates (2007) [13] and Guerci *et al*. (2010) [49] argue that the Kirkpatrick's model provides a reductive view of training effectiveness that oversimplifies the complex process of training evaluation. For instance, the model does not take into account the influence of the individual and contextual factors in training effectiveness (Bate, 2004) [12]. The effectiveness of training is known to be affected by organisations and individuals, as well as by training design and delivery factors, before, during, and after training (Tannenbaum and Yukl, 1992; Ford and Kraiger, 1995; Salas and Cannon-Bowers, 2001) [98, 40, 89]. Factors that refer to the training design and delivery have been identified as training content, goals of training, training methods, training environment and trainer (Kirkpatrick and Kirkpatrick, 2006; Nikandrou *et al*., 2009; Diamantidis and Chatzoglou, 2012) [65, 80, 35]. However, in employing the Kirkpatrick model, it has been assumed that it is not necessary to explore the evaluation of impact of these factors on the effectiveness of training (Bates, 2004) [12].

Design and delivery training factors

The literature suggests a wide variety of training design and delivery factors that influence training effectiveness (Campbell, 1988; Holton *et al*., 2000; Tannenbaum & Yukl, 1992; Salas & Cannon-Bowers, 2001) [19, 54, 98, 89]. Other studies have shown the impact that these factors have on a number of training outcomes (Carliner, 2003; Gauld and Miller, 2004; Charney & Conway, 2005; Kirkpatrick & Kirkpatrick, 2006; Nikandrou *et al*., 2009; Diamantidis & Chatzoglou, 2012) [23, 43, 24, 65, 80, 35] and the significant moderating effect they have on training effectiveness (Bates, 2007; Homklin, 2013) [13, 55]. Consequently, examining the evaluation of the effect of design and delivery of training factors on training effectiveness is important to shed light on the reasons why certain training outcome effects were produced.

The extant literature on training design and delivery factors includes pre-training intervention and activities, trainee readiness, the training environment, training methods, trainer performance and behaviour, training content and training objectives. A good combination of these factors leads to training effectiveness.

3. Proposed conceptual framework of the study.

The conceptual framework of this study, is based on Kirkpatrick's four-level model. This study will examine the evaluation of the effect of training design and delivery factors before and after a training programme is completed. It will explore the evaluation of the effect of pre-training interventions and activities, trainee readiness on the expectations for training outcomes. It also focuses on investigating the moderating effect of design and delivery factors, namely: training environment, training methods, trainer performance and behaviour, training content and training objectives on the relationship between Kirkpatrick's four training outcomes: reaction, learning, behaviour and results, and the evaluation of the effect of design and delivery factors on training effectiveness.

4. Methodology

Questionnaires were used for data collection. This approach is considered a particularly appropriate technique when seeking to explore facts related to specific social groups (Crotty, 1998) [33]. Additionally, questionnaires cost very little relative to their efficiency and can be used for large samples prior to quantitative analyses (Churchill, 1995; Saunders *et al*., 2012; Sekaran, 2000; Zikmund, 2003) [27, 90, 93, 114]. All of the engagement variables in the questionnaires were assessed on a five-point Likert scale (where 1 = 'strongly disagree' and 5 = 'strongly agree').

Data was collected from employees at different levels in Oman's national oil and gas industry who had been identified as potential health and safety trainees. Three questionnaires were distributed to participants at three separate times (before, immediately after and 2–3 months after training). A total of 800 questionnaires were distributed at each point in time.

Instrument

The theoretical framework consisted of three stages of training, each of which had its own concepts. For example, the pre-training event stage consisted of five concepts: pre-training interventions and activities, trainee readiness, expectations regarding trainer performance, expectations regarding the training environment and expectations regarding training outcomes. The 'immediately after' training stage consisted of eight concepts: reaction, learning, intention to transfer learning, training environment, training methods and trainer performance and behaviour. The last stage, 2–3 months after training, consisted of four concepts: behaviour, results, and training content and training objectives.

5. Results

All of the constructs from the three survey samples were reliable, as illustrated by Cronbach's alpha values (Table 1). For example, the Cronbach's alpha value for each construct in Survey 1 ranged from 0.684 to 0.869. The results also indicate that the Cronbach's alpha value for each construct in Survey 2 ranged from 0.715 to 0.856. Moreover, the results revealed that the Cronbach's alpha value for each construct in Survey 3 ranged from 0.760 to 0.826. Most of the values for Cronbach's alpha in all three surveys were within and above the recommended threshold value of 0.7, which demonstrates high internal reliability for measuring the different observed variables under each construct.

Table 1: Reliability of the constructs in the three surveys sample

Reliability of the constructs in Survey 1		
Construct	**Items**	**Cronbach's Alpha**
Pre-training intervention and activities (PTA)	3	0.795
Trainee readiness (TR)	2	0.684
Expectations for training outcomes (ETO)	8	0.854
Expectations for training environment (ETE)	4	0.869
Expectations for trainer's performance and behaviour (ETPB)	6	0.881
Reliability of the constructs in Survey 2		
Construct	**Items**	**Cronbach's Alpha**
Training methods (TM)	10	0.852
Training environment (TE)	12	0.856
Trainer performance and behaviour(TPB)	9	0.821
Reaction (R)	4	0.737
Learning (L)	3	0.730
Intention of transfer learning (ITL)	2	0.715
Reliability of the constructs in Survey 3		
Construct	**Items**	**Cronbach's Alpha**
Training content (TC)	5	0.792
Training objectives (TO)	3	0.760
Behaviour (B)	6	0.796
Results (Rs)	4	0.826

Structural Equation Modelling

Two processes were followed in the assessment measurement model, which was conducted using AMOS version 21. First, a confirmatory factor analysis (CFA) was conducted using a maximum likelihood (ML) estimation to validate the relationship between the indicator (observed) and latent (unobserved) factors. Then, the measurement model was converted into a structural model to represent the relationship between the dependent and independent variables.

The fitness of the analytic model was tested in order to ensure that the results were reliable and valid before SEM was used to validate the relationship between the variables and test the hypotheses. Certain criteria were used to assess the fit of the models for all three surveys, using suggestions from Churchill (1979) [28], Hair *et al*. (2006, 2014) [51, 50], Hu and Bentler (1999) [56], Kline, (2005) [56], Schreiber *et al*., (2006) [91], Shadfar and Melekmohammadi (2013) [94], Schumacker and Lomax (2004) [92]. Table 2 shows that all of the criteria were satisfied.

Table 2: Summary results for the final structural model of the three survey questionnaires

Summary results for the final structural model of Survey 1											
Measure	**χ2**	***P***	**df**	**X²/df**	**GFI**	**RMSEA**	**NFI**	**CFI**	**AGFI**	**PNFI**	**PGFI**
Criteria		< .05		<5	≥ 0.9	≤ .08	≥ 0.9	≥ 0.9	≥ 0.9	>.50	>0.40
Hypothesised Model	354.888	.000	158	2.246	.921	0.055	0.913	0.949	0.895	.0759	0.693
Summary results for the final structural model of Survey 2											
Measure	**χ2**	***P***	**df**	**X²/df**	**GFI**	**RMSEA**	**NFI**	**CFI**	**AGFI**	**PNFI**	**PGFI**
Criteria		< .05		<5	≥ 0.9	≤ .08	≥ 0.9	≥ 0.9	≥ 0.9	>.50	>0.40
Hypothesized Model	274.892	.000	196	1.403	0.943	0.032	0.879	0.961	0.926	0.745	0.730
Summary results for the final structural model of Survey 3											
Measure	**χ2**	***P***	**df**	**X²/df**	**GFI**	**RMSEA**	**NFI**	**CFI**	**AGFI**	**PNFI**	**PGFI**
Criteria		< .05		<5	≥ 0.9	≤ .08	≥ 0.9	≥ 0.9	≥ 0.9	>.50	>0.40
Hypothesized Model	316.218	.000	102	3.100	0.916	0.073	0.879	0.914	0.873	0.659	0.610

Note: χ2 = Chi-square; df = degree of freedom; GFI = Goodness of fit index; RMSEA = Root mean square error of approximation; NFI = Normad fit index; CFI = Comparative fit index; AGFI – Adjusted goodness of fit index; PNFI = parsimony normed fit index; PGFI = parsimony goodness of fit index.

Moderating effect

To assess the moderating effects of the training design and delivery factors on the relationships between the training outcomes (reaction, learning, intention to transfer learning, behaviour and results), the validated SEM model was tested using AMOS v.21. The moderator variables were addressed as 'for whom' and 'when' a predictor is more strongly related to an outcome (Frazier *et al*., 2004) [41]. However, the procedures outlined by Aiken and West (1991) [1] were followed prior to conducting the moderation analysis for this research. First, all of the variables (predictors, moderate variables and outcomes [optional]) were standardised using the descriptive statistics in the SPSS, (Dunlap and Kemery, 1987) [37] in order to avoid multi-collinearity (Cronbach, 1987; Dunlap & Kemery, 1987; Jaccard *et al*., 1990) [32, 37, 58]. Second, the interaction effect(s) was created, which was the score of the multiplication between the moderate variable and predictors using a transformation analysis (Awang, 2012; Field, 2013; Hair *et al*., 2014; Jaccard *et al*., 1990) [9, 39, 50, 58]. If the interaction variables were significant, then the moderation effect was deemed to exist. Subsequent follow-up analyses on the slopes showed a connection between the predictor and outcome when the moderator levels were low, medium and high (Field, 2013) [39].

The moderating model in Survey 2 showed that the training environment, training methods, and trainer performance and behaviour had no moderating impacts on the relationship between reaction and learning because the interaction terms

were not statistically significant (β = 0.001, β = 0.023 and β = -0.009, respectively). Similar results show that interaction terms for three paths – training environment training methods and trainer performance behaviour moderating the relationship between learning and intention to transfer learning – were not statistically significant (β= -0.010, β= -0.004 and β= - 0.019, respectively; p > 0.05).

Finally, the path coefficients, observed t-statistics and significance levels of the interactions were compared to assess the moderating models for Survey 3. The results show that the interactions between two paths – training content moderating the relationship between behaviour and results, and training objectives moderating the relationship between behaviour and results – were not statistically significantly (β= -0.041, t= -.292, β= 0.144 and t= 0.816, respectively; p > 0.05).

6. Discussion

The findings of the three survey questionnaires are discussed as below.

Discussion on findings of Survey 1

A data analysis for the final model for Survey 1 revealed that pre-training interventions and activities had a strong impact on expectations regarding trainer performance and behaviour, and on expectations regarding the training environment. Meanwhile, the results of this study indicated that trainee readiness had a strong impact on expectations regarding training outcomes. This finding is consistent with Tannenbaum *et al*. (1993) [97] who showed that trainee readiness had a substantial influence on training and job-related outcomes. Meanwhile, Putter (2013) [83] showed that trainee readiness was significantly correlated with the transfer of knowledge. Moreover, Chung *et al*. (2016) [26] found that trainee readiness had a significant impact on training outcomes. This confirms other studies by Cannon-Bowers *et al*. (1998) [20] and Mesmer-Magnus and Viswesvaran (2010) [79], who investigated the influence of pre-training interventions and activities on expectations regarding training and its outcomes.

Moreover, this study found that expectations regarding trainer performance and behaviour, and expectations regarding the training environment were not affected by trainee readiness. This suggests that trainee readiness does not contribute to expectations about trainer performance and behaviour or expectations about the sufficiency of the training environment. This finding departs from many earlier studies that have supported maximising trainee readiness prior to training. For example, Machin (2002) [73] and Tannenbaum *et al*. (1993) [97] found that trainee readiness significantly influenced training and job-related outcomes by arguing that each individual enters training with different goals, expectations, needs, desires and attitudes toward the training (Tannenbaum *et al*., 1993; Baldwin *et al*., 2009) [97, 11]. Likewise, trainees' expectations for the training will be varied.

Pre-training interventions and activities had no direct impact on expectations regarding training outcomes. This is contrary to findings in earlier studies that revealed pre-training interventions and activities influenced training outcomes (Cannon-Bowers *et al*., 1998; Mesmer-Magnus & Viswesvaran, 2010) [20, 79]. This finding can be justified by the fact that trainees are less likely to have expectations about training outcomes if they have had previous training that was similar or if the pre-training interventions and activities were insufficient.

Discussion on findings of Survey 2

The data analysis and hypotheses testing for the final model for Survey 2 showed that reaction had a strong effect on learning. This finding was consistent with previous studies by Homklin *et al*. (2013) [55], Kirkpatrick (1996) [64], Tan *et al*. (2003) [96] and Warr *et al*. (1999) [108].

This study found that learning had no direct impact on intention to transfer learning. This finding is consistent with research by Colquitt *et al*. (2000), which showed that learning was not a significant predictor of transfer of learning and Machin and Fogarty (2003, 2004) [74-75] who found an insignificant relationship between learning and the intention to implement learning. Machin and Fogarty (2003) [74] argued that perceived success in learning is no guarantee that a learner will have intentions to apply their learned skills and knowledge.

Moreover, this study revealed that reaction is influenced by trainer performance and behaviour. This result is consistent with research by Basarab and Root (1992), Indira (2008), Iqbal *et al*. (2011) [57] and Ghosh *et al*. (2011) [44] who found a positive relationship between trainer performance, and behaviour and reaction.

Furthermore, the results showed that learning was affected by the training environment and trainer performance and behaviour. This finding was consistent with previous studies that found the training environment had a significant impact on learning (Iqbal *et al*., 2011; Tan & Hall, 2003) [57, 96] and was consistent with previous studies that indicated trainer performance and behaviour had a significant impact on learning (Charney & Conway, 2005; Lawson, 2006) [24]. Furthermore, the training environment, training methods, and trainer performance and behaviour did not moderate the relationship between reaction and learning. Arthur *et al*. (2003) [8] contended that no single method was better than another. Indeed, some studies found that the training environment and trainer performance and behaviour were unrelated to learning. For example, Diamantidis and Chatzoglou (2012) [35] argued that insufficient trainer performance and behaviour do not support trainees in acquiring knowledge and skills.

The results also showed that the training methods had an insignificant impact on reaction, learning and intention to transfer learning. This finding was contrary to Basarab and Root, (1992), Indira (2008), Iqbal *et al*. (2011) [57] and Tan and Hall (2003) [96] who found that training methods had a significant impact on reaction by arguing that the use of training methods did not support trainee participation (Chen *et al*., 2007; Reid & Barrington, 2011) [25], nor did using traditional training methods rather than new ones (Atiyyah, 1993; Albahussain, 2000). The results of this study are also inconsistent with previous studies by Burke *et al*. (2006), Nikandrou *et al*. (2009) [80] and Ratcliff-Daffron and Wehby-North (2006) who examined the impacts of specific and various training methods on learning. This inconsistency is due to the fact that the selected training methods do not match the needs or aims of the organisation and the materials and equipment do not meet the participants' backgrounds, skills and abilities. Moreover, these findings differed from previous research by Nikandrou *et al*. (2009) [80] who suggested that training methods could affect the perceived usefulness of the training. Lim (2000)

[72] showed that instructional methods promoted the transfer of learning to the workplace. The most likely explanation for this inconsistency is that inappropriate training methods may affect the trainee's intention to transfer their learning to daily work tasks, as argued by Foxon (1993) [42].

Furthermore, the training environment, training methods, and trainer performance and behaviour did not moderate the relationship between learning and intention to transfer learning. The most likely explanation for this inconsistency is inappropriate training environment, inappropriate training methods used, and inappropriate performance and behaviour of trainer. Foxon (1993) [42] argued that the use of inappropriate media (training facilities) inhibited the intention to transfer learning. Indeed, some studies have found that the training environment and trainer performance and behaviour were unrelated to the usefulness of the training (e.g. Diamantidis and Chatzoglou, 2012) [35]. They explained that a consistent trainer who displays appropriate behaviour during the implementation of the programme may increase the impact of the training, thus improving trainees' knowledge and abilities and helping them to understand the usefulness of the training in performing their daily tasks.

Discussion on findings of Survey 3

Third, the results from the data analysis for the final model in Survey 3 indicated that behaviour and results are significantly related. This result is consistent with studies by Clement (1982), Homklin *et al.* (2013) [55] and Kennedy (2014) [55] who found that there was a significant relationship between behaviour and results. Furthermore, the results found that training content had a significant positive influence on behaviour. This finding was consistent with studies by Bates *et al.* (2007) [13], Velada *et al.* (2007) [105] and Grohmann *et al.* (2013) who investigated this relationship. In addition, this finding is in accordance with Brown (2005) [16], Diamantidis and Chatzoglou (2012) [35], Gist *et al.* (1990) [46], Johnson *et al.* (2012) [60], Latham and Saari (1979) [69], Morin and Latham (2000) [78], Richman-Hirsch (2001) [85], Wexley and Baldwin (1986) [109], and Wexley and Nemeroff (1975) [110] who also found a positive relationship between goal setting and transfer of learning.

The findings of this study revealed that training content and objectives did not influence results. This finding was contrary to studies that found a significant relationship between training content and behaviour (Bates *et al.*, 2007; Velada *et al.*, 2007) [13, 105], as well as other studies that found a significant relationship between the application of training content and employee job performance (training results) (Diamantidis and Chatzoglou, 2014) [36]. Previous studies have also revealed a significant relationship between behaviour and results (Homklin *et al.*, 2013) [55]. In addition, the results of this study are inconsistent with Brown (2005) [16], Diamantidis and Chatzoglou (2012) [35], Gist *et al.* (1990) [46], Johnson *et al.* (2012) [60], Latham and Saari (1979) [60], Morin and Latham (2000) [78], Richman-Hirsch (2001) [85], Wexley and Baldwin (1986) [109], and Wexley and Nemeroff (1975) [110] who found that goal setting had a positive impact on the transfer of learning. It is also inconsistent with Homklin *et al.* (2013) [55] and Kennedy (2014) [55] who found a positive relationship between behaviour and results.

However, the moderating variables, including training content and training objects, did not moderate the relationship between behaviour and results. This result is contrary to the suggestion that, the more trainees apply their new knowledge and skills to their jobs, the greater the positive results in their job performance will be. Yamnill and McLean (2005) [112] contend that in order to accomplish the required training outcome, transfer of learning must be seen as a sequence of training objectives, which must be reflected in the training design. A possible justification for the results is that trainees may understand the principles and concepts behind the delivered knowledge, skills and behaviour, and its usefulness for work tasks, but they will not be able to apply them to their workplaces unless they are given new challenges and unfamiliar problems to practise. In other words, the perceived effect of the training content will not appear in the workplace unless there is a chance to practise it in the training programme.

7. Conclusion

This study contributes to the extant body of knowledge in the area of training evaluation. The aim of the current study was to examine the moderating influence of training design and delivery factors on the relationship between training outcomes (reaction, learning, intention to transfer learning, behaviour and results), as well as the subsequent the evaluation of impacts of these factors on training effectiveness. Important constructs were also identified and their relationships were verified to provide justification for their inclusion in this empirical research. The findings and analytical results were discussed to validate the study's hypotheses and refine the proposed conceptual framework for further research.

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