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What influences transfer of training in an African agricultural research network?

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What influences transfer of training in an African Agricultural Research Network?
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Abstract

Purpose: A study was conducted to determine the extent to which transfer of training back to work among trainees from national partners of an international bean research network in Africa was perceived to have taken place; and to determine the factors that predicted transfer of training back to the job.

Methodology/approach: Online data collection using the Learning Transfer Systems Inventory (LTSI) from 139 respondents was made and analyzed using bivariate correlations and hierarchical multiple regression.

Findings: An average of 75% of the training skills were perceived as transferred. Personal capacity significantly predicted transfer, while motivation to transfer, transfer design, supervisor and peer support positively correlated with training transfer.

Theoretical implications: The Learning Transfer System Inventory factors remain relevant explanations for training transfer with in African agricultural research and development organizations. Certain work environments are likely to have new factors such as 'Peer and supervisor' support which operated as one explanatory factor for training transfer, showing the closeness of peers and supervisors in agricultural research and development settings.

Practical implications: The international agricultural research network needs to pay attention to the trainees' ability to transfer new training, particularly on workload related hindrances.

Originality/value: The study has tested out the applicability of the LTSI for international agencies that conduct training for agricultural research and development in Africa. Understanding personal capacity to transfer is critical in this context, suggesting that institutions need policies that enhance trainee capacity to transfer enacted, facilitated and enforced.

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Introduction

Ensuring that the training employees receive is transferred back to work remains a challenge for most of organizations around the globe (Grossman & Salas, 2011; Sokhai & Budworth, 2010). Training transfer is the effective and continuing job application of the knowledge and skills gained in training. However, the process of training transfer is complex with a multiplicity of variables (Bates, Holton, & Hatala, 2012) which vary from one training and application context to the other, implying that further research on what enhances or hinders transfer in various contexts is needed.

A variety of models have been used to study training transfer and training effectiveness as evidenced in articles by the following authors: Chiaburu, van Dam, and Hutchins (2010); Galanou and Priporas (2009); Lim and Morris (2006); Martin (2010); Nga et al. (2010); Nikandrou, Brinia, and Bereri (2009); Nijman et al. (2006); Sofo (2007); Sookhai and Budworth (2010). A number of organizations have been involved in the studies, but agricultural research organizations in Africa lack empirical evidence on training effectiveness. Yet enormous investments are made into training of agricultural R&D actors due to agriculture's centrality to economically and for the livelihoods of its ever-growing population.

The Learning Transfer Systems Inventory (LTSI) developed by Holton and Bates was developed to aid in holistic measurement of factors that affect training transfer irrespective of type of training, form of organization or part of the world (Bates et al., 2012; Donovan & Darcy, 2011; Holton, Chen & Naquin, 2003; Khasawneh, Bates & Holton, 2006; Yamnill & McLean, 2005). However, specific applications of the LTSI in predicting training transfer are still limited and even among those that have endeavored to use the model, a number of varying results have been obtained. The use of the LTSI to determine the factors that predict training transfer has revealed that even the dependent variables so far used have differed. A number of dependent variables are however used in the process. Hutchins, Nimon, Bates and Holton (2013), used the intent to transfer as the dependent variable, while Bates et al. (2007); Devos et al. (2007); Miiro et al. (2012); and Velada et al. (2007), tested actual transfer following training. Bates & Khasawneh (2005) on the other hand measure transfer of training in terms of perceived organization innovativeness. The varying forms of transfer measurements point to the diversity of approaches that can be used and the room for further testing even with other forms of training and unique job/work settings.

In addition to varying dependent variables tested, even the predictor variables in LTSI studies have varied from one study to another. Hutchins et al., (2013) whose study focused on 235 law enforcement personnel trained in leadership development found that 'motivation to transfer', 'transfer design', 'transfer performance expectations', were the strongest predictors of intent to transfer. Miiro et al., (2012)'s study on predictors of training transfer of governance-facilitation skills among 99 leaders of farmers' marketing organizations in Uganda, found 'personal capacity to transfer', 'transfer design', ' supervisor support', and 'feedback' as significant predictors. A

study by Devos et al., (2007) in French speaking Belgium, that targeted 106 public and private sector organization trainees, beyond its validation of a French version of the LTSI, sought to identify factors that would predict transfer of training. It found that 'learner readiness', 'transfer design', 'transfer performance expectation', 'performance outcome expectations', 'motivation to transfer', 'self efficacy', and 'opportunity to transfer' to be significantly correlated with the transfer of trained skills. Bates et al., (2007) study of private sector organizations in Germany found 'motivation to transfer', 'personal outcomes positive', 'personal capacity to transfer', 'content validity', 'peer support', and 'learner readiness' as significant predictors. Velada et al., (2007) study of 182 employees of grocery market companies in Portugal who were trained in customer service, security, environmental issues and hygiene, found that 'training design', 'performance self efficacy', 'training retention', and 'feedback' significantly predicted transfer. These studies show that different transfer factors of the LTSI will predict transfer of training depending on the context in question.

The LTSI factors are based on a theoretical underpinning that views individual's perceived performance improvement from training as a function of four sets of elements containing 16 variables. First, (1) secondary elements including performance self efficacy, learner readiness before the training and job attitudes, (2) ability/enabling elements including content validity, transfer design, capacity to transfer and opportunity to use, (3) motivation elements including motivation to learn, motivation to transfer, transfer effort – performance, performance outcomes and (4) environmental elements including feedback, peer support, supervisor support, openness to change within the organization, personal outcomes positive and personal outcomes negative, and supervisor sanctions (Khasawneh *et al.,* 2006). It is expected that all the above factors will

have a positive influence and predict the transfer of training within the research context.

The objective of the study was therefore to determine the extent to which the level of self-reported and perceived training transfer had taken place. Additionally, it sought to determine the factors that influenced the perceived transfer of training among trainees who attended four trainings offered by the Pan African Bean Research Alliance (PABRA).

Methodology

Research approach

This study was a quantitative cross-sectional survey design that enabled the determination of factors from the LTSI that influenced the perceived transfer of training among trainees of PABRA training programs.

Context of the Study

The study focuses on PABRA an agricultural research agency mandated to build capacity of its partner members in Africa. PABRA is a consortium of 3 African-owned regional bean research networks, the International Center for Tropical Agriculture [Centro Internacional de Agricultura Tropical (CIAT)] and the donors. The consortium represents 28 national bean programmes as members, it coordinates training and capacity building for bean value chain actors including scientists (Buruchara *et al.,* 2011). The training courses of interest included crop breeding, bean seed systems and marketing, gender, as well as monitoring and evaluation. Scientists from CIAT conducted the capacity building for the target participants. The trainees were from all PABRA member countries and each training lasted between one week and three weeks and took place

between 2009 and 2012.

Sample selection

A total of 391 participants from an e-mail list of all trainees including 73 of breeding; 225 of seed systems and marketing; 46 of the gender, and 47 of the monitoring and evaluation training were contacted to participate in the study. These received an online questionnaire via Survey Monkey (www.surveymonkey.net). In return, only 147 participants responded to the online questionnaire from all four trainings giving a response rate of 38%. However, 139 respondents had complete data on key variables. This response rate could reflect respondents with higher motivation and ability to work with internet based surveys (Petty & Cacioppo, 1984) or that had a more positive attitude towards the training, thus suggesting non-response bias. While internet based surveys can enlist low response rates (Kaplowitz, Lupi, Couper & Thorp, 2012), suggesting poor quality data (Rindfuss et at., 2015), in this study this can be ruled out on the basis of the regression analysis for a multivariate model that was used, and is known to eliminate potential non-response bias due to the inclusion of control variables in the regression model (Fitzgerald, Gottschalk, and Moffitt 1998).

Description of the sample

Out of the 139 respondents, 33 had received the breeding training, 23 were for the 'Gender' training, 21 for 'Monitoring and Evaluation', while 62 were for 'Seed systems and marketing' training. Out of the overall sample size of 139, 4% were from an International Agricultural Research Organization, 73% were from a National Agricultural Research Organization, 5% were from a private business company, 6% were from Universities, 3% from an International Non

governmental organization, the same proportion from a national non-governmental organization, and 6% from a farmers' organization. Sixty eight percent were males, 58% were between the age of 40 to 59, while 37% were between 18 and 39 years, the rest were 60 years and above. Fifty five percent had Masters degrees, 19% had Bachelors degrees, 16% had PhDs, 6% had diplomas while 4% had postgraduate diploma as their highest level of education.

Measures and instrumentation

An online self-administered questionnaire was developed. The questionnaire had three major sections:(i) information on the demographic aspects of the trainees, (ii) questions to establish the extent to which the trainees perceived themselves (through self reporting) to have applied the acquired skills back to their work place. This captured the dependent variable. While self reporting on training transfer can be inaccurate as respondents may score themselves highly to impress (social desirability), and due to poorly constructed measurements (Blume, Ford, Baldwin & Huang, 2010; Ford and Weissbein, 1997), in this study, participants were encouraged to be honest with their responses: "As one of PABRA's esteemed partners and beneficiary kindly provide an honest assessment of these initiatives by participating in this study." Inaccurate construction of the instrument was guarded against by focusing the self-reporting on objective measures of behaviorally anchored skill areas linked to trained content. Items were stated in a way that captured behaviorally anchored changes. For example: "To what extent have you been able to apply the following aspects that you learnt back to your work place/job?". All the behavioral change aspects were stipulated by the specific trainer of the course increasing the accuracy of self-reporting responses (Ford and Weissbein, 1997). The perceptions of extent of application were measured on a scale of 1 to 5 where "1" represented "very little", "2",

represented "little", "3" represented "not being sure", "4" represented "moderate/some extent", and "5" represented "to a great extent".

Section three collected data on the factors that affected the transfer of training. The sets of questions were drawn from the LTSI, the full instrument can be obtained from the authors (Holton & Bates) as copyright regulations do not permit public sharing. Permission to use the LTSI version 3 (Bates et al., 2012) had been granted to the corresponding author by Holton during his PhD study in 2008. Only 11 Out of the 16 factors of the LSTI available in Table 1.0 were identified for use in this study. The five factors were left out to reduce on the amount of time the respondent would need to finish the instrument. Those items that relate to the trainee, were purposively removed.

Some LTSI statements were adjusted to suit the context; for example, a statement assessing supervisor support that originally read: "My supervisor meets with me to discuss ways to apply training on the job." was modified to: "My supervisor/ manager/team leader/Head of Department meets with me to discuss ways to apply training on the job." This modification reflected the supervisors that the respondents from the different organizations could have had. The other change had to do with replacing 'is' with 'was' for example 'What is taught in training closely matches my job requirements" was changed to "What was taught….". This would guide the respondent to look back to what happened since the training had already occurred. This is also in line with the measuring of "far transfer" and the factors that influenced it. "Far transfer has been studied in cases in which the transfer context is much different in location from the learning context, such as when conflict management material learned in a classroom would be applied in

workplace. For example, near transfer can occur and be studied during the same session as the

learning, and far transfer can be studied months or years later." (Blume et al., 2009, pp. 1067).

Table 1: The 16 factors of the LTSI, which affect transfer of training

Factor	Definition
Training related scale constructs	
1 Learner Readiness	Extent to which trainees are prepared to enter and participate in training.
2 Motivation to Transfer	Trainees' desire to use the knowledge and skills mastered in the training program on the job.
3 Peer Support	Extent to which peers reinforce and support use of learning to the job.
4 Supervisor Support	Extent to which supervisors/managers support and reinforce use of training on the job.
5 Personal Outcomes positive	Degree to which applying training on the job leads to outcomes that is positive for the trainees.
6 Personal Outcomes negative	Extent to which individuals believe that not applying skills and knowledge learned in training will lead to negative personal outcomes.
7 Supervisor Sanctions	Extent to which individuals perceive negative responses from supervisors/managers when applying skills learned in training.
8 Content Validity	Extent to which trainees judge training content to accurately reflect job requirements
9 Transfer Design	Degree to which (1) training has been designed and delivered to give trainees the ability to transfer learning to the job (2) training instructions match job requirements.
10 Personal Capacity to Transfer	Extent to which individuals have the time, energy and mental space in their work lives to make changes required to transfer learning to the job.
11 Opportunity To Use	Extent to which trainees are provided with or obtain resources and tasks on the job enabling them to use training on the job.
General scale constructs	
12 Performance Self Efficacy	Trainee's general belief that they are able to change their performance when they want to.
13 Transfer Effort- Performance Expectations	Expectation that effort devoted to transferring learning will lead to changes in job performance.
14 Performance - Outcomes Expectations	Expectation that changes in job performance will lead to valued outcomes.
15 Feedback	Formal and informal indicators from an organization about an individual's job performance
16 Openness to Change	Extent to which prevailing group norms are perceived by trainees' to resist or discourage the use of skills and knowledge acquired in training.

Source: Holton, E.F. III, Bates, R.A & Ruona W.E.A., 2000, 'The development of a generalised learning transfer system inventory,' *Human Resource Development Quarterly*, 11, 4, 344-346.

The LTSI assesses a set of 16 factors that influence learning transfer in organizations (Table 1.0). It is an 89-item instrument with two sections: the first section contains training-specific constructs that reference a specific training program. This section includes 63 items representing 11 constructs. The second section of the LTSI contains 26 items, measuring five constructs that reference training in general in the respondent's organization (Khasawneh *et al.,* 2006). However, because the instrument was to be applied online, there was need to reduce some of the items to fit into the recommended number of questions, the recommended time for self administering the instrument, and consideration of the busy work schedules of the respondents who would not commit a lot of time for the online survey. As a result, 11 constructs including 2,3,4,7,8,9,10,11, from the training related scale constructs, while items 12, 15, 16 from the general scale were selected (Table 1.0). 'Training related scale constructs' are related to the specific training received, while 'General scale constructs' relate to training more generally (Bates et al., 2012). Five trainee related constructs out of 8 were dropped, with three considered as a sufficient representation of personal constructs. A total of 51 items resulted to measure the influencing factors in the LTSI.

Some of the respondents were from French speaking countries of Africa, the questionnaire was translated into French for these respondents. Distinguishing between the English and French speaking trainees was beyond the scope of the study. The questionnaire was pilot tested with scientific staff at CIAT Kawanda for suitability and content validity. Protection of human subjects was ensured by writing to them an earlier notice and providing them room to accept to participate in the study or not in case they find it inconvenient or unnecessary to them.

Data collection

Data was collected online using survey monkey (www.surveymonkey.com/pabra-study). Prior to data collection an advance letter was sent to the selected respondents requesting them to respond to an incoming online survey questionnaire from CIAT. After issuing the instrument, three to five follow up online notices were sent to the respondents. The data were collected over a 45-day period.

Data analysis

Data analysis proceeded in three major stages before hypothesis testing. The first stage involved obtaining factors that provided an interpretable structure of the LTSI as used in the study, and then running reliability tests for the extracted transfer factor constructs from both the training specific and the general scale items of the LTSI. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.690 for the training specific scales, which qualifies the data set for factor analysis (Coetsee, et al., 2006). The Bartlet's test of Sphericity was 0.561 at $P < 0.0001$. Eight factors were specified for extraction from the training-specific section of the LTSI in relation to the 8 constructs that had been retained during the selection of which constructs to place for the online survey. The $8 -$ factor solution explained 67.2% of the common variance. Items retained were those whose factor loadings was greater than 0.35. The eight factors that were extracted included 'supervisor and peer support' (α=0.907, n=8), Supervisor sanctions (α=0.781, n=7), Transfer design (α=0.714, n=6), Motivation to transfer α=0.684, n=3, Opportunity to use (α=0.696, n=4), Resource challenges at work (α=0.729, n=2), and Personal capacity to transfer (α=0.426, n=2). All the above items loaded onto their expected factors except for news ones which emerged such as 'supervisor and peer support', and 'resource challenges at work', which seem to reflect the flat nature of the research organizations where

most respondents came from, and the criticality of resources in those organizations for their job activities to succeed. Such collapse of work environment factors has occurred before, as a reflection of unique training transfer situations, and interconnected transfer variables (Lim & Morris, 2006).

The Kaiser-Meyer-Olkin measure of sampling adequacy for the general section of the LTSI was 0.767, which qualifies the data set for factors analysis (Coetsee et al., 2006), while the Bartlet's test of Sphericity was 483.8 at P < 0.0001. Three factors were specified for extraction from the training in general section of the LTSI in relation to the three constructs that had been retained during the selection of which constructs to place for the online survey. The 3 – factor solution explained 63.5% of the common variance. Items retained were those whose factor loadings was greater than 0.35. The 3 factors extracted included 'Performance self-efficacy' (α=0.853, n=4), 'Performance coaching – feedback' (α=0.749, n=4), and 'Openness to change' (α=0.568, n=5). The second stage included running basic descriptive statistics (means, standard deviations and bi-variate correlations of the independent and dependent variables. The third stage was hierarchical multivariate regression analysis. SPSS for Windows Version 21.0 was used for the analysis.

RESULTS and DISCUSSIONS

The extent to which trainees transferred training back to their jobs

As shown in Table 2.0, for each of the training areas and their skill areas, Breeding (5 skill areas), Seed Systems and Marketing (7 skill areas), Gender (6 skill areas), and Monitoring and Evaluation (9 skill areas), the mean score (as an average of scores the trainees for each of these courses gave), for each of the skill areas was 3.72, 3.91, 3.72, and 3.73 respectively. This indicates that for each of the training areas, participants perceived themselves to have applied

slightly less than a 'moderate extent' – a score of '4'. Translated into percentages by dividing the mean score with the highest possible score, this meant that for each of the training areas, the level of application of skills was 74%, 78%, 74% and 75% respectively. The highest level was registered for 'Seed systems and marketing' while the least were 'Breeding' and 'Gender'.

Table 2.0: The extent of application of skills back to the job

Training area	No. of topics	n	Minimum score and percent equivalent	Maximum score	Mean score	S.D.	Mean/Highest possible score	Level of application (Percent of the mean)
Breeding	5	20	1.60 (32%)	5.00	3.72	0.88	3.72/5	74%
Seed systems & marketing	7	32	2.86 (57%)	5.00	3.91	0.74	3.91/5	78%
Gender	6	20	2.40 (48%)	5.00	3.72	0.67	3.72/5	74%
Monitoring & Evaluation	9	18	2.22 (44%)	4.89	3.73	0.75	3.73/5	75%

Regression analysis to predict the factors that influence the application of skills across all the training courses

Hierarchical regression was conducted to determine the best linear combination of trainee characteristics, transfer design, and work environment factors, as well as factors from the general scale items that predicted transfer/application of skills from among all the trainees of the 4 capacity building initiatives whose data was eligible for this analysis. Table 3.0 shows the descriptive statistics of the scale items.

Table 3.0: Correlations between the independent and dependent factors

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Skills application	3.77	0.802	.									
2. Personal capacity to use	4.06	0.824	.310 **	.								
3. Motivation to transfer	4.33	0.769	.305 **	.303 **	.							
4. Transfer design	3.93	0.560	.255 *	.189	.287 *	.						
5. Supervisor and peer support	4.01	0.725	.408 ***	.393 **	.252 *	.375 **	.					
6. Supervisor sanctions and ability limitations	1.78	0.638	-.178	-.061	-.209	-.316 **	-.237 *	.				
7. Opportunity to use	3.68	0.777	.175	.288 *	.327 **	.213	.392 **	-.032	.			
8. Resource challenges to use	3.46	1.077	-.163	-.013	-.118	-.048	-.249 *	.168	.186	.		
9. Openness to change	2.59	0.650	-.312 **	-.158	-.300 *	-.276 *	-.206	.612 ***	.005	.197	.	
10. Performance self efficacy	4.31	0.542	.434 ***	.407 ***	.482 ***	.504 ***	.392 **	-.349 **	.330 **	.008	-.326 **	.
11. Feedback	3.79	0.633	.339 **	.162	.304 **	.558 ***	.418 ***	-.203	-.022	.002	-.243 *	.439 ***

* $P<0.05$; **$P<0.01$; *** $P<0.001$

Table 4.0: Hierarchical regression for the transfer of skills to the job

	Dependent variable					
	Transfer/application of skills					
	Model 1	Model 2	Model 3	Model 4	Tolerance	VIF
	β	β	β	β	for Model 4	
Personal capacity to transfer	.302*	.264*	.176	0.082	.732	1.365
Training design	-	.292	.140	-0.117	.567	1.764
Supervisor and peer support	-	-	.288	0.199	.508	1.968
Supervisor sanctions	-	-	-.076	0.145	.567	1.763
Opportunity to use	-	-	.014	0.041	.615	1.625
Resource challenges	-	-	-0.063	-0.081	.777	1.287
Openness to change	-	-	-	-0.261	.584	1.712
Performance self efficacy	-	-	-	0.387	.537	1.861
Feedback	-	-	-	0.196	.515	1.943
R^2	0.096	0.136	0.214	0.315		
Adj. R^2	0.079	0.102	0.114	0.175		
F	5.53*	4.02*	2.131	2.246*		

* $P<0.05$

The first model (Table 4.0) shows that 'personal capacity to transfer' – a trainee characteristic (β=0.302, $p<0.05$), significantly predicted the perceived transfer/ application of skills, F = 5.53, $p<0.05$. The second model in which transfer design factors were entered had 'personal capacity to transfer' (β=0.264, $p<0.05$) significantly predict the perceived transfer /application of skills, F = 4.02, $p<0.05$. The third model in which 'personal capacity to transfer training', 'transfer design', 'supervisor and peer support', 'supervisor sanctions', 'opportunity to use' and 'resource challenges' were entered had no significant predictor factor of perceived application of skills. In the fourth and last model which accounted for all the factors including trainee characteristics, transfer design, and work environment factors as well as factors from the general scale items including 'openness to change', 'performance self efficacy' and 'feedback' had all of them contributing to a significant model prediction, F = 2.246, $p<0.05$. However, no single factor contributed significantly to the final model. The adjusted R squared value for the final model indicates that 32% of the variance in the transfer/application of skills to the work place was explained by the model.

However, significant positive but however low correlations were registered between several factors and the perceived transfer/application of skills acquired back to the job. For example: 'personal capacity to transfer' (r=0.31, p=0.01), 'motivation to transfer' (r=0.305, p=0.01), 'transfer design'(r=0.255, p=0.05), 'supervisor and peer support' (0.408, p=0.001), 'openness to change' (r=-.312, p=0.01), 'performance self-efficacy' (r=0.434, p=0.001) and 'feedback' (r=0.339, p<0.01). A partial confirmation of the role of these factors in predictors of perceived transfer/application of skills among the trainees was nevertheless obtained.

Discussions and implications

This study was set up to determine the extent to which trainees from several African countries whose training was organized by a regional international agency applied their training to the work context. Additionally, it was to identify the factors that influenced application of training back to the job of four training areas 'bean breeding', 'seed systems and commercialization', 'gender' and 'monitoring and evaluation'. On average, each participant perceived themselves to have applied close to 75% of the skills they had been trained in, a very high level of training transfer. This can be explained by opportunities the trainees had to apply the training, and the closeness of these skills to their day-to-day activities.

'Personal capacity to transfer' was the most significant predictor of transfer in the first two models except in the third and last models. The non significant contribution of the independent variables in the final model, could have been due to some items correlating with each other. Nevertheless important relationships are understood from the study.

Personal capacity to transfer is defined as the "Extent to which individuals have the time, energy, and mental space in their work lives to make changes required to transfer learning to the job'' (Holton, Bates, Bookter & Yamkovenko, 2007, 398). The first two models reveal that "personal capacity to transfer" is critical for one to be able to transfer and apply skills acquired during training back to the job. This is certainly important since the capacity building activity was provided to participants the majority of whom were researchers. This shows that it is important that the participants of the capacity building programs have the ability to transfer skills back to their jobs. Personal capacity to transfer was an aggregate of the following items in the LTSI: 'I do not have time to try to use the training', 'my work load allows me time to try the new things I have learned', 'I have time in my schedule to change the way I do things to fit my new learning',

'someone will have to change my priorities before I will be able to apply my new learning', and 'I always wish I have time to do things the way I learnt/know they should be done'. Thus for the skills acquired in a training to be transferred there has to be minimal interference in terms of time availability, mental and physical capacity, and workload for one to be able to apply these skills in their job. The results are similar to what Bates *et al.,* (2007), and Velada *et al.,* (2007) found in relation to 'personal capacity' factor significantly contributing to the transfer of trained skills. It is likely that since the study dealt with mainly research organizations where self-direction and initiative is important, busy schedules and heavy work load (Lynam et al., 2012), as well as multiple opportunities for research and outreach, the issue of personal capacity becomes critical if one is to successfully transfer training back to work.

The factors that had a positive significant correlations with training transfer included motivation to transfer, supervisor and peer support, openness to change, performance self-efficacy, and performance feedback. These point to personal and environmental features that are critical in this context in influencing training transfer. The study reveals that motivation to learn, and performance self-efficacy need enhancement if trainees are to apply what they have learnt. Supervisor and peer support which seem to operate together in the context of this study, have been confirmed as critical for transfer as in other studies (Chiaburu, 2010; Scaduto et al. 2008). The proximity of the supervisors and peers to the trainees is revealed. This underscores why openness to change within the work organization and performance feedback also correlated with training transfer - a sign of the closeness of workers within PABRA partner organizations.

Theoretical implications

This study specifically extends research on the role of transfer system factors in influencing transfer of training. The use of a modified LTSI as a predictive tool for transfer performance is further tested. The most revealing contribution is the fact that the LTSI is a relevant tool for assessing transfer factors in a posttest manner in an international agricultural research network in Africa. Certain work environments are likely to have new factors such as 'Peer and supervisor' support which operated as one explanatory factor for training transfer, showing the closeness of peers and supervisors in agricultural research and development settings.

Practical implications

For agencies whose training management spans multiple countries in the field of agricultural research, it is important to select trainees that have the time, and appropriate work load to facilitate application of training. For positive factors that correlate with transfer such as motivation to transfer, personal self efficacy, training institutions need to pay attention particularly through pre-training dialogue with potential trainees, to increase chances of recruiting trainees with potential to transfer. Ensuring that trainees have the time, personal capacity to transfer, and are motivated to attend training through more objective discussions with the trainees and the training organizers, and supervisors before, during and after the training is critical. National, program and institutional policies that encourage regular studies on training transfer, incentivizing and developing of robust transfer design strategies are needed. Partner organizations whose workers receive training, will through these strategies improve the quality of planning and delivery of training, get greater training transfer , and organization productivity.

Limitations

The key limitations of this study relate to use of the LTSI, after a seemingly long time has passed, since the training was delivered, yet some variables such as motivation to transfer need to be measured close to the training as possible. In this case the participant had to recall how motivated they were at the time. The other limitation relates to not using the entire set of 16 constructs presented in the LTSI. Five components were not used in order to ensure the instrument was not burden some to respondents and met the standards of on line surveys. There is still need to use all the constructs to see the results. The small sample size of the potential trainees that PABRA works with was also a limitation. If the sample size were adequate, it would have been good to establish for example whether there are variations in the results due to the training types. Incorporating the LTSI as part of course evaluation increase response rate as well as address the issue of immediate testing of the transfer climate. The use of self reported transfer of training is also indicated to have weaknesses (Devos et al., 2007). Other measurements such as supervisors and peers assessments can be explored. Some of the training had taken place over a four-year period; there were chances that respondent recall of transfer system factors was faded. The use of the online survey while it is so resource effective when carrying out surveys over expansive scales created challenges that led to a low response rate. There were several cases of respondent fatigue as they started off filling the instrument and failed to complete it despite more than four reminders. Lastly data analysis has to further explore correlating variables, which might affect the regression model results.

Conclusions

This study was conducted to establish the factors from the LTSI that influence the transfer of training of skills to the work place within and among multinational trainees who have benefited from training organized by an international agricultural research network. Personal capacity to transfer has come through as an important factor for successful transfer of training back to the job. Secondly, motivation to transfer, transfer design, supervisor and peer support, openness to change within the organization, performance self efficacy or confidence as well as giving of positive feedback emerge as additional important factors associated with enhancing transfer of training offered by PABRA. The results have revealed that work environments of PABRA partners exhibit unique predictive factors, and thus research to identify such unique factors in transfer of training is always needed. The results offer an initial understanding on what PABRA needs to focus on when building capacity for agricultural research and development among its clients. Importantly, the study has confirmed the cross-cultural and cross organizational fitness of the LTSI to act as an evaluative and predictive tool that can measure factors that enhance training transfer in a post test approach. More research will however be needed on measuring training application given that it is time sensitive, and has high proneness to adaptive application if one takes into consideration the perceptions of the trainee and the conditions in which training transfer occurs (Volet, 2013).

systems and bean marketing'. We are also grateful to the trainees that responded to the survey as well as Resty Nagadya and Innocent Obilil for their efforts in consolidating the database of trainees that was used in this survey. Dr. Robin Buruchara, Dr. Matthew Abang, the staff, visiting scholars, the CIAT administrative work, the PABRA partner members, are acknowledged.

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