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Assessment of Instructional Design and Delivery of Leadership Training in a Large Brazilian Banking Institution

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Abstract

This study assessed the extent to which the design and delivery of leadership training offered by a Brazilian banking institution exhibited characteristics associated with training effectiveness, as defined by instructional theories and literature reviews. This qualitative research assessed the characteristics of the design and delivery of 61 trainings, according to a checklist composed of 31 items related to 11 training characteristics: type of learning, content, instructor presence, method, feedback and source of feedback, needs analysis, time spacing, modality, location, attendance policy, and leadership level. The definitions of the checklist's categories and items were mainly based on the meta-analysis by Lacerenza et al. (2017) and the review by Kraiger and Ford (2021). The results indicated that of the trainings evaluated, 80.3% are virtual, while 19.7% are face-to-face. Unidirectional information transmission (65.3%) is the most commonly used method in virtual training. More diversified methods prevail in face-to-face training, with three methods—transmission of information, demonstration, and practice (58.3%), and two combined methods (41.7%). The face-to-face training used multiple methods, provided feedback during classroom activities, presented varied content, delivered spaced training sessions, and selected internal instructors to teach the content based on real work situations. The self-instructional virtual training has several gaps, including a lack of alignment between training content and activities with leaders' daily work (identical elements) and many short training sessions with no time spacing between them. These results suggest that self-administered training may be less effective than face-to-face training due to a lack of relevant characteristics. This study details a checklist and a method for evaluating instructional materials

and resources, which can be applied before or after assessing the effects of leadership training in a business context. This evaluation provides precise information on training improvements that can enhance learning, transfer, or results.

Keywords

Training Assessment, Leadership Training, Instructional Design, Effectiveness Predictors, Instructional Theories

1. Introduction

In recent decades, high financial investments in Training, Development and Education (TD & E) actions in organisations have resulted in the strict and systematic adoption of technical and methodological criteria to assess training programmes. Theories of learning (Gagné, 1968, 1980) and instructional design (Kraiger & Ford, 2021; Reigeluth, 1999) subsidise the choice and development of content and strategies appropriate to different organisational contexts in order to favour the delivery of effective and successful instructional actions (Abbad et al., 2006; Kraiger & Ford, 2021). The vast literature on TD&E advocates that a well-structured instructional design with objectives, methods, strategies, tools and teaching resources is a condition for the delivery of effective training (Bell et al., 2017; Ford et al., 2018; Reigeluth, 1999).

The instructional design theory advocates that training actions should adopt at least two components: methods that facilitate learning and development, and instructional indications/conditions of how and when these methods should or should not be used according to the outcomes desired by the organisation (Kraiger & Ford, 2021; Reigeluth, 1999). Instructional methods refer to the approaches used in the structuring of TD&E actions established based on a Training Needs Analysis (TNA), with a focus on achieving individual, group or organisational outcomes (Kraiger & Ford, 2021). Instructional conditions refer to the media, training channels and materials used to convey the content to learners (Kraiger & Ford, 2021).

The scientific literature indicates that there is a misalignment between the theoretical prescription, which instructional science shows as effective (Lacerenza et al., 2017; Kraiger & Ford, 2021), and the practices of designing, delivering, and implementing training in organisational environments. What complicates this scenario is the lack of valid and reliable tools that allow managers and researchers to objectively evaluate the quality of the instructional design of training (Bitton & Barnes, 2024). Given this methodological gap, the following research problems emerge: How to identify opportunities for improvement in the design and delivery of leadership training in a practical way and based on the analysis of instructional materials and resources? How to accurately indicate which instructional characteristics need to be improved to increase the effectiveness of leadership training? To

what extent does the design and implementation of leadership training, conducted in a large Brazilian financial institution, adhere to the evidence-based criteria and principles that, according to the literature, condition instructional effectiveness? To answer these questions, this study was carried out in a large Brazilian banking institution with the following objectives: propose and apply a tool (checklist) to evaluate the extent to which the design and delivery of leadership training programmes have the characteristics associated with training effectiveness, following criteria established in instructional theories, reviews and meta-analyses, and compare face-to-face training with self-administered virtual training regarding these characteristics (Arthur et al., 2003; Avolio et al., 2009; Blume et al., 2010; Hogan & Warrenfeltz, 2003; Kraiger et al., 1993; Kraiger & Ford, 2021; Lacerenza et al., 2017; Latham, 1988; Reigeluth, 1999; Salas & Cannon-Bowers, 2001; Wexley & Latham, 2002).

Given this context, the study is situated within the broader effort to examine how leadership training initiatives align with evidence-based instructional principles. Specifically, it explores 61 leadership trainings conducted in a large Brazilian financial institution to understand how their design and delivery reflect characteristics identified in instructional science as predictors of training effectiveness.

Organisations adopt learning theories, instructional theories and instructional design (Anderson et al., 2001; Bloom et al., 1984; Goldstein & Ford, 2002; Kraiger et al., 1993; Kraiger & Ford, 2021) mainly in the development of training aimed at leadership development, as the effectiveness of instructional design is conditioned to the designing of learning materials, procedures and strategies that drive appropriate cognitive processes in order to obtain successful learning outcomes (Kraiger & Ford, 2021). All these organisational efforts should align the expectations of the individual and those of the organisation through the systematic process of TNA, instructional design planning and assessment (Alabdali, 2020; Borges-Andrade et al., 2012; Goldstein & Ford, 2002).

The TNA aims to diagnose and/or predict TD&E needs. These needs, transformed into instructional objectives, facilitate the design of learning actions (Alabdali, 2020; Arthur et al., 2003; Borges-Andrade et al., 2012). Instructional planning and training delivery are an important link between learning needs and expected outcomes, being composed of six steps: 1) Outlining of the instructional objectives, 2) modality, 3) sequencing, 4) learning procedures and strategies, 5) assessment criteria, and 6) instructional design testing (Abbad et al., 2006; Kraiger & Ford, 2021). The assessment, which is mainly responsible for providing information, pervades the whole instructional system and should be done before, during and after training in order to gather information and enable the review and feedback of the TD&E System (Abbad et al., 2006; Borges-Andrade et al., 2012).

Research related to leadership development has emphasised the importance of reporting the instructional design and delivery characteristics (training method, feedback, type of learning, content, spacing between sessions, delivery modality) and instructional principles (closeness to reality, overlearning), as they are posi-

tively associated with learning, retention and transfer of leadership development training programmes (Day, 2000; Day et al., 2021; Kraiger & Ford, 2021; Lacerenza et al., 2017; Tafvelin et al., 2019).

Recent literature on leadership training converges on identifying the central challenge of understanding how instructional design, delivery strategies, and implementation mechanisms condition the effectiveness and sustainability of learning outcomes (Bitton & Barnes, 2024; Davies, Moos, & Van Vuuren, 2023; Phillipson et al., 2025). Phillipson et al. (2025) highlight structural weaknesses: most interventions are evaluated using unvalidated instruments, with little methodological standardisation and a lack of longitudinal follow-up. The effect of instructional design, therefore, is often inferred but rarely causally demonstrated. This is a methodological limitation, leading to criticism of the reliance on prescriptive instructional models and suggesting that the quality of the design extends beyond the pedagogical structure to include formative intentionality, ethical coherence, and social relevance (Bitton & Barnes, 2024).

Based on the scientific literature and aiming at the development of leaders—from novice to executive leaders—and the succession process, organisations have used the pipeline training model to develop trainings. Pipeline training is delivered as a series of sequential stages, according to the level of complexity of content, leadership roles and succession structure (Charan et al., 2017; Church et al., 2021).

Most articles on leadership training describe very briefly the characteristics, strategies and educational resources in the methods sections (Church et al., 2021; Fernandez et al., 2020; Kragt & Guenter, 2018). Even in quasi-experimental studies, interventions are briefly described, leaving aside the theoretical rationale for the election of the training method (Tafvelin et al., 2019; Tafvelin & Stenling, 2021). This gap may hinder the generalisation and comparison of different instructional designs and the selection of instructional characteristics that generate more effective results for the individual and the organisation (Avolio et al., 2009; Barling et al., 2010; Lacerenza et al., 2017; Reyes et al., 2019).

2. Theoretical Framework

The instructional quality assessment is a relevant step, as it allows the identification of flaws and gaps in the instructional design to feedback the system, as well as to verify the training's potential of generating outcomes (Abbad et al., 2006; Bell et al., 2017; Davies et al., 2023; Kraiger & Ford, 2021; Okesina, 2020; Phillipson et al., 2025). In the field of instructional theory, the meta-analysis by Lacerenza et al. (2017) shows the effect of 11 characteristics of the leadership training design, delivery and implementation that moderate the effects of instructional actions at the level of the individual (reactions, learning and transfer of training), team (subordinates' outcomes) and organisation (organisational outcomes).

Leadership programmes developed from a training needs analysis are positively associated with learning, transfer and organisational outcomes (Alabdali, 2020; Collins & Holton, 2004; Goldstein & Ford, 2002; Lacerenza et al., 2017). There is

evidence that the more aligned and integrated the TNA is with the instructional system, the more positive effects it will produce in the post-training phase.

Voluntary participation in training is positively associated with higher transfer of learning outcomes (Blume et al., 2010; Curado et al., 2015; Lacerenza et al., 2017; Salamon et al., 2021), while compulsory training is associated with organisational outcomes (Lacerenza et al., 2017).

The chances of a leadership training being more effective at the level of transfer of training and organisational outcomes increase when activities are delivered in several sessions, separated by time slots (spaced), rather than in a single session, concentrated in time (massed) (Kraiger & Ford, 2021; Lacerenza et al., 2017).

Regarding the hierarchical level of participants in a leadership training, the findings of Avolio et al. (2009) suggest that leadership trainings produce higher effects on low-level leaders compared to middle- and high-level leaders. Learning and organisational outcomes were not influenced by the variable of leadership hierarchy level. However, leaders in higher hierarchical levels showed four times lower transfer of training than that achieved by leaders in lower hierarchical levels (Lacerenza et al., 2017). The low rate of learning transfer in high-level leaders may be related to the behaviours of this audience that have already been consolidated and are difficult to be changed in the workplace in the short term.

Regarding the type of training instructor (internal or external), meta-analysis results indicate that this variable is not a moderator of training effects at any of the assessment levels (Lacerenza et al., 2017). However, training conducted by internal instructors generates higher effects on learning, transfer and organisational outcomes because they can arouse greater interest in participants when compared to those delivered by external instructors, who are not part of the organisation's staff (Culpin et al., 2014; Kalinoski et al., 2013). Having an external instructor to produce a self-administered activity is more workable.

When it comes to the variables 'modality of the delivery' and 'implementation', studies point out that face-to-face trainings provide greater chances of transfer of learning compared to trainings that adopt the virtual modality (Magerko et al., 2005). While Sitzmann et al. (2006) found that web-based training was generally equal or superior to face-to-face training, Lacerenza et al. (2017) and Phillipson et al. (2025) concluded that face-to-face trainings have greater transfer effects than those delivered in the virtual modality. Since results are not convergent, more studies are needed to consistently assess the modality variable, as it involves contextual, social, historical and cultural factors. Many leadership training programmes were transferred to the virtual modality in 2020, for example, due to the social distancing protocols imposed by the Covid-19 pandemic and show positive results in leader motivation and performance (Wolor et al., 2020).

Regarding the training site, this instructional aspect is little investigated in the scientific literature, and there are greater organisational outcomes associated with leadership training delivered within the work organisation's facilities (on-site) than those delivered outside the organisation (off-site) (Lacerenza et al., 2017).

Regarding the source of feedback, it is recommended to invest in feedback from multiple sources, such as those from co-workers, managers and training instructors (DeNisi & Kluger, 2000; Jacobsen et al., 2022; Wexley & Latham, 2002), as it increases productivity and reactions favourable to training. However, these results are not consistent and conclusive, thus needing further studies in literature (Lacerenza et al., 2017).

Training methods are made up of: 1) Transmission of information, 2) Demonstration of how to train a specific skill, and 3) Practice opportunities (Lacerenza et al., 2017). Methods that use active learning approaches with opportunities for practice tend to be more effective in leadership programmes than other training methods because of the proximity between the instructional environment and job reality (Jacobsen et al., 2022). In this training design, the learner plays an active role in the pursuit of learning and efficiency by leading the actions aimed at identifying and reducing errors (Bell et al., 2017; Jacobsen et al., 2022; Weaver et al., 2010). A leadership intervention based on simulation showed a 56% improvement in the behaviour of the leaders trained (Fernandez et al., 2020). The joint use of diverse methods, such as information, demonstration and practice, may be more effective than trainings that adopt one single method. Elements such as experiential learning and multiple teaching methods are strongly associated with better results at levels 1 and 2 of the Kirkpatrick model, reaction and learning (Phillipson et al., 2025).

The characteristics of design, delivery and implementation are moderating variables and are positively associated with leadership training effectiveness (Lacerenza et al., 2017; Reyes et al., 2019; Shuffler et al., 2010). However, training effects vary according to strategies, the type of skill taught (cognitive, interpersonal or psychomotor), and the measure of the variable of criterion used, such as learning, job behaviour or organisational outcomes (Arthur et al., 2003; Lacerenza et al., 2017).

A recent study on managerial and entrepreneurial competencies, analysing the relationship between instructional design, participant selection, and the effectiveness of training programmes, found a direct and significant positive impact on the development of entrepreneurial competencies ($r = 0.471$, $p < 0.001$) and business management skills ($r = 0.400$, $p < 0.001$). Furthermore, it suggests that training programmes should carefully consider the individual characteristics of participants, such as self-efficacy (Davies et al., 2023).

The study by Phillipson et al. (2025), based on 86 systematic and non-systematic reviews, indicated that design and delivery characteristics explain much of the variability in programme effectiveness. Elements such as experiential learning, multiple teaching methods, 360˚ feedback, coaching and mentoring, and longitudinal designs are strongly associated with better results at levels 1 and 2 of Kirkpatrick's model (reaction and learning) and, to a lesser extent, at levels 3 and 4 (organisational behaviour and impact). In-person or hybrid programmes performed better than fully online ones, showing that social interaction and situated practice are determining factors in learning transfer (Phillipson et al., 2025).

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Based on these 11 characteristics of design, delivery and implementation drawn from instructional theories (Arthur et al., 2003; Avolio et al., 2009; Blume et al., 2010; Hogan & Warrenfeltz, 2003; Kraiger et al., 1993; Kraiger & Ford, 2021; Lacerenza et al., 2017; Latham, 1988; Reigeluth, 1999; Salas & Cannon-Bowers, 2001; Wexley & Latham, 2002) this study aims at assessing to which extent the design and delivery of 61 leadership trainings in a financial institution contain characteristics positively associated with training effectiveness, according to criteria extracted from instructional theories and the results of the integrative review by Kraiger & Ford (2021) and Lacerenza et al. (2017).

3. Materials and Methods

This study adopts a qualitative approach (Levitt et al., 2018; Morrow, 2005) to assess leadership training based on theoretical frameworks from instructional psychology and empirical evidence indicating which characteristics of training design and delivery produce better results (Arthur et al., 2003; Avolio et al., 2009; Day, 2000; Hogan & Warrenfeltz, 2003; Kraiger et al., 1993; Kraiger & Ford, 2021; Lacerenza et al., 2017; Reigeluth, 1999; Salas & Cannon-Bowers, 2001). The research, based on secondary sources of information (archival data), adopted categories of analysis established *a priori* predicated on scientific literature for experts in instructional design to assess the trainings.

3.1. Study Context and Trainings Assessed

The study was developed in a Corporate University (CU) of a large banking institution in Brazil, with more than 100,000 employees. The leadership training programmes were chosen for convenience and accessibility and for having the potential to produce effects at the level of behaviour of leaders in their position.

The trainings consist of three pipelines organised in ascending order of complexity (basic, intermediate and advanced), with transition stages according to the level of leadership and/or hierarchical position held in the company. Pipeline 1, Leader of Oneself, consists of 20 virtual and 4 face-to-face trainings; Pipeline 2, Team Leader, consists of 18 virtual and 4 face-to-face trainings; and Pipeline 3, Leaders of Leaders, consists of 11 virtual and 4 face-to-face trainings. Altogether, 49 virtual and 12 face-to-face trainings were assessed in this study.

3.2. Sample of Assessed Documents

To assess virtual training, the researchers reviewed all content and materials from self-instructional training in the Corporate University's Virtual Learning Environment (VLE). The instructional materials of the 12 face-to-face trainings were

reviewed. These materials are called the educator's notebook (instructional objectives, expected performances, target audience, lesson planning, activity schedule, supporting texts, teaching and learning strategies, exercises, assessment criteria and bibliographic references) and the participant's notebook (content, instructional objectives, expected performances, activity schedule, supporting texts, exercises and bibliographic references). The document sample comprised all information available on the trainings, enabling a reliable and representative assessment of the training contents (Scriven, 2007).

3.3. Data Collection Procedures and Instrument

The training materials were evaluated by nine experts in Training and Development (T&D) from the University of Brasília. The panel comprised two doctoral students in Business (22.2%), two doctoral students in Psychology (22.2%), and five undergraduate students in Psychology (55.5%). Of the nine evaluators, seven (77.7%) were women and two (22.3%) were men. All evaluators had completed a 60-hour course on Training, Development and Education, and were instructed and supervised by the second author, a senior researcher, throughout the conduct of the study.

On average, 9 experts read the training materials individually. In the first stage, each expert completed all activities foreseen in the self-instructional training on the CU virtual platform and read the didactic materials for the assigned face-to-face training. In the second step, all experts have individually completed a checklist instrument composed of 31 items classified into three categories and 11 subcategories of analysis: 1) Design, 2) Delivery and implementation and 3) Other training characteristics. In the third step, the experts decide by consensus which characteristics each training. These judgements are based on the categories, subcategories, and definitions used to construct the checklist, shown in **Table 1** and **Appendix 1** (**Spreadsheet 1**).

The checklist items, initially constructed and defined in English, were submitted to the cross-cultural adaptation process. (Cassepp-Borges et al., 2010). Two experts proficient in both languages translated the checklist from English into Portuguese and retranslated it to verify the content validity and precision of item statements. After this adaptation, the research group submitted the checklist to semantic validation to assess how well the definitions that make up the categories of analysis are understood and to standardise the application of the assessment criteria by the experts. The checklist items and the definitions of categories/subcategories are presented in **Table 1** and **Appendix 1**, respectively. The checklist included 11 categorical variables, totalling 31 judgements, each representing a specific training characteristic. The variables were structured in a mutually exclusive manner, that is, allowing only one "yes" or "no" answer per analysed dimension, with the exception of the Content variable, which allowed multiple markings (intrapersonal, interpersonal, leadership, and business), since specific educational solutions simultaneously encompassed different thematic focuses.

Table 1. Training characteristics included in the checklist.

Categories	Subcategories of analysis	Variables	Authors
Design	Training Needs Analysis	Performed or not performed	(Arthur et al., 2003; Latham, 1988)
	Type of Participation	Voluntary or Compulsory	(Blume et al., 2010; Curado et al., 2015)
	Time Spacing	Concentrated or Spaced	(Janiszewski et al., 2003; Kraiger & Ford, 2021; Van Merriënboer & Sweller, 2005)
	Leadership Level	Low, Medium and High	(Avolio et al., 2009)
	Type of Instructor	Internal, External and Self-administered	(Blume et al., 2010; Kalinoski et al., 2013)
Other characteristics	Contents	Intrapersonal, Interpersonal, Leadership, and Businesses	(Hogan & Warrenfeltz, 2003
	Type of Learning	Cognitive, Affective, and Skill-based	(Kraiger et al., 1993)
Delivery and Implementation	Modality	Face-to-face and Virtual	(Garrison, 2011)
	Delivery Site	Internal and External	(Lacerenza et al., 2017)
	Feedback	No feedback, single source of feedback, or 360˚ feedback	(DeNisi & Kluger, 2000; Kraiger & Ford, 2021)
	Training Method	Information, Demonstration and Practice	(Burke & Day, 1986; Kraiger & Ford, 2021; Salas & Cannon-Bowers, 2001; Weaver et al., 2010)

Note. Adapted from Lacerenza et al. (2017).

3.4. Data Analysis

Initially, each expert assessed a sample of training and learning materials and recorded their responses in a spreadsheet containing the 31 checklist items. At this point, the individual judgements (yes/no) of each expert are not visible to the other evaluators. Three experts assessed the same training sample. After the individual stage, a meeting was scheduled with each trio of experts to assess inter-rater agreement and reach consensus on checklist responses when there was no agreement on item judgements. In the trio meeting, each expert reported the answers to each checklist item, and, in case of disagreement, the training/educational material would be consulted again. If disagreement remained, the discussion would be extended to the other experts in the research group for a final decision. In this case, each trio presented its answers at a separate meeting to reach consensus among the nine experts involved in the research. Trios and the search for group consensus in qualitative assessment are strategies to increase methodological in-

tegrity and the reliability of the results.

The results of the checklists were recorded in spreadsheets, enabling a detailed assessment of instructional quality based on criteria derived from theoretical references and research findings. After final group consensus, the "Yes = 1" numerical responses were summed, the percentages calculated, and the results recorded in **Appendix 1** (Spreadsheet, 2: Consensual experts' assessment on training—Pipeline 1; Spreadsheet 2: Consensual experts' assessment on training—Pipeline 2; Spreadsheet 4: Consensual experts' assessment on training—Pipeline 3; and Spreadsheet 5: Comparative analyse s between virtual and face-to-face leadership training characteristics in the three pipelines).

3.5. Ethical Considerations

The study used documentary and archival sources for information about the training. These documents (teaching materials and other information about the implementation and delivery of training), however, do not include data on the opinions and behaviours of trainees. This gap restricts conclusions to evaluating the instructional quality of materials only based on the resources made available to trainees by education. All in-person training materials recorded and made available to participants in the classroom were also accessed in full by the evaluators. Full access to instructional materials and resources was formally authorised by the organisation where the study was conducted, and all researchers and experts who participated as training evaluators signed individual confidentiality and confidentiality agreements regarding the company's identity.

The experts who participated in this study were informed about the research's objectives and methods, and they voluntarily agreed to participate. The researchers established a commitment to maintain data confidentiality and ensure their anonymity.

4. Results

Regarding the instructional design characteristics, the three pipelines were organized based on hybrid education that combines virtual modality with web-based technology support, and the face-to-face modality was composed of several training sessions, lectures, internships, and workshops. Given the size and geographical dispersion of the target audience throughout Brazil's 27 geographic regions, the number of self-instructional training sessions in the virtual modality is higher than that in the face-to-face modality.

According to document analysis, the researched institution carries out a training needs analysis (TNA) in a non-standardised manner, which limits the accurate identification of skills gaps and the alignment between instructional objectives and expected organisational outcomes. The target audience has the autonomy and freedom to conduct virtual training sessions. The participation of leaders in training sessions is voluntary (95.9%). Students can take the training according to their learning gaps and expected skills development. Likewise, face-to-face training has

a high percentage (91.7%) of voluntary participation but is conditional on the successful completion of the virtual training of the corresponding Pipeline.

Table 2. Comparative analysis of the design and delivery characteristics of virtual and face-to-face leadership training.

Categories	Subcategories	Variables	Virtual		Face-to-face		All	
			F	%	F	%	F	%
Design	Type of participation	Voluntary	47	95.9	11	91.7	58	95.1
		Mandatory	2	4.1	1	8.3	3	4.9
	Spacing effect	Spaced	2	4.1	1	8.3	3	4.9
		Massed	47	95.9	11	91.7	58	95.1
	Leadership Level	High	0	0	1	8.3	1	1.6
		Low	0	0	2	16.7	2	3.3
		All	49	100	9	75.0	58	95.1
	Instructor	Internal	0	0	12	100	12	19.7
		Self-administered	49	100	0	0	49	80.3
Delivery and Implementation	Training Method	Information	32	65.3	0	0	32	52.5
		Information and Practice	5	10.2	5	41.7	10	16.4
		Information and Demonstration	9	18.4	0	0	9	14.8
		Information, Demonstration and Practice	3	6.1	7	58.3	10	16.4
	Feedback	No feedback	30	61.2	0	0	30	49.2
		One single source of feedback	19	38.8	10	83.3	29	47.5
		More than one source	0	0	2	16.7	2	3.3
	Modality	Virtual	49	100	0	0	49	80.3
		Face-to-face	0	0	12	100	12	19.7
Other characteristics	Content	Intrapersonal	18	36.7	3	25.0	21	34.4
		Interpersonal	21	42.9	8	66.7	29	47.5
		Leadership	27	55.1	8	66.7	35	57.4
		Businesses	26	53.1	8	66.7	34	55.7
	Type of learning	Cognitive	30	61.2	1	8.3	31	50.8
		Affective and Cognitive	14	28.6	4	33.3	18	29.5
		Cognitive and Skills-based	3	6.1	5	41.7	8	13.1
		Affective, Cognitive and Skills-based	2	4.1	3	25	5	8.2
	Evaluation level	Reaction	49	100	12	100	61	100
		Learning	20	40.8	0	0	32	52.5

Note. Total training assessed: 61; Number of virtual self-administered trainings assessed: 49; Number of face-to-face trainings assessed: 12; F = Frequency of "yes": calculated by the sum of the "yes" responses, indicating the presence of each characteristic in the trainings, according to the consensus assessment of the evaluators, and (%) Percentage of "yes", indicating the relative frequency of the presence of each characteristic in the assessed training samples.

Table 2 presents the results of analyses of the type of participation, spacing between training sessions, hierarchical level of the target audience, type of instructor, method, feedback, modality, content, type of learning, and level of assessment. These results represent the comparative analyses between virtual and face-to-face leadership training characteristics, calculated after three pipeline-separated analyses (**Appendix 1**, Spreadsheet 5).

The training spacing effect is mainly massed/concentrated, with no time spacing between sessions in the virtual modality (95.9%) and the face-to-face modality (91.7%). Virtual training sessions were developed for all leadership levels: high, medium, and low. Face-to-face training sessions were less offered due to the higher financial investment and more logistical complexity than virtual training. Therefore, only the target audience could attend these trainings, and leaders of other levels could participate only if places were available. Trainings were classified by leadership level, following the target audience description in the corporate university training program. The answer "all" was used when the employee's position was not specified in the instructional program. Training could then be delivered to all hierarchical levels of leadership.

Virtual training sessions are self-administered without monitoring or tutoring. Face-to-face training is delivered by internal instructors with diversified academic backgrounds and expertise in the content area. They are trained to apply active educational methodologies and teaching-learning theories in the classroom and submit to a systematic assessment of their performance as instructors.

The characteristics pertinent to the training delivery and implementation variables of the three training programs reveal that 80.3% are virtual, while 19.7% are face-to-face. Regarding the training location, the corporate university guidelines state that all training sessions (virtual and face-to-face, mandatory and voluntary) should be delivery at the institution to the leaders during working hours.

Regarding the source of feedback, only 38.8% of virtual training sessions offer feedback to the student through automatic and standardized responses on the platform. The feedback indicates whether the participants' answers to objective items of the knowledge assessment are "right" or "wrong". In face-to-face training, feedback is mainly offered by the instructor (83.3%) and, in 16.7% of cases, by multiple sources (instructors and peers) during face-to-face meetings.

The unidirectional transmission of information (65.3%) is the method most used in virtual training. In this method, participants are required to read texts, and in 18.9% of the cases, a combination of two instructional methods is used, namely, transmission of information and demonstration. More diversified instructional designs prevail in face-to-face training, merging three methods: transmission of information, demonstration, and practice (58.3%), and two combined methods: transmission of information and practice, for 41.7% of the cases.

In addition to design, delivery, and implementation characteristics, other characteristics are considered relevant in the instructional design assessment, such as the training content, type of learning, and presence of assessments. When it comes

to content, leadership skills are the most addressed in virtual training sessions (55.1%), followed by business-related content (53.1%), interpersonal skills (42.9%), and intrapersonal skills (36.7%). Leadership, business, and interpersonal skills were addressed in 66.7% of the face-to-face training, while intrapersonal skills were found only in 25% of the training in this modality.

Regarding the type of learning, the cognitive domain (61.2%) prevails in virtual training. The combination of affective and cognitive outcomes is present in 28.6% of cases. In face-to-face training, the combination of cognitive and skills domains accounts for 41.7% of the types of learning, and the combination of affective and cognitive contents stands for 33.3% of the cases.

The evaluation of the 61 leadership trainings showed that face-to-face trainings have more desirable characteristics than self-administered virtual training. The face-to-face training utilized more than one method (practical, demonstrations, and information), offered feedback to participants during the activities carried out in the classroom, presented varied content, delivered spaced training sessions, and selected internal instructors to teach the content based on examples, cases, and activities inspired in real work situations.

On the other hand, self-instructional virtual training has several gaps, including the lack of interactions between participants and instructors, the lack of approximation of examples and activities to the daily work of leaders, and the occurrence of many short trainings with no time spacing between sessions. These results suggest that self-administered training may be less effective than face-to-face training because of the lack of relevant characteristics.

As for the levels of training assessment, the CU applies the assessment of students' reactions at the end of all training sessions. The learning assessment applied at the end of the training was observed in less than half (40.8%) of the virtual training courses, which demanded 70% of correct answers to pass. The instructional design and delivery did not include graded learning assessments, but instructors gave feedback to the participants during the exercises and other face-to-face activities.

5. Discussion

The results of the current study showed that the 61-leadership training conducted in a large Brazilian financial institution has several characteristics of training design, delivery, and implementation that are positively associated with outcomes of better learning, transfer of training, and results. According to the scientific literature, the presence of these characteristics increases the chances of leadership training effectiveness, enables the diagnosis of flaws in the design and delivery of virtual and face-to-face training, and promotes continuous and systematic improvement of results-focused training (training modality, content type, learning domains, instructional methods) (Arthur et al., 2003; Avolio et al., 2009; Bitton & Barnes, 2024; Blume et al., 2010; Hogan & Warrenfeltz, 2003; Kraiger et al., 1993; Kraiger & Ford, 2021; Lacerenza et al., 2017; Latham, 1988; Phillipson et al., 2025;

Reigeluth, 1999; Salas & Cannon-Bowers, 2001; Wexley & Latham, 2002).

As for design characteristics, the lack of a TNA made it difficult to bring content and examples closer to the reality of the participants' work. (Alabdali, 2020; Collins & Holton, 2004; Goldstein & Ford, 2002; Lacerenza et al., 2017). Losses arising from the lack of a TNA were more visible in self-instructional trainings containing content, exercises, and examples with little approximation to the reality of the participants' work and few opportunities to put the skills learned into practice. In face-to-face training, in turn, the lack of TNA may have been compensated by the presence of the internal instructor who prepared materials, exercises and examples based on the participants' work reality (Kraiger & Ford, 2021).

The lack of a systematic TNA capable of disclosing the expected organisational outcomes for the set of training (face-to-face and virtual) decreases the evaluability of trainings at the organisational level. (Arthur et al., 2003; Lacerenza et al., 2017). The virtual and face-to-face training was offered without temporal spacing between sessions, which may affect the retention of the contents learned and decrease the transfer and organisational outcomes (Bitton & Barnes, 2024; Lacerenza et al., 2017; Phillipson et al., 2025).

Soft skills contents, such as interpersonal and intrapersonal skills, were less addressed, especially in virtual training, which may imply lower training effects at the level of organisational outcomes. Phillipson et al. (2025) confirm that content focused on interpersonal skills, self-awareness, emotional intelligence, and communication are most strongly associated with the effectiveness of leadership programs at the reaction, learning, behavior, and results levels. Business content disregards specific situations of the financial institution, presenting generic examples, theories, and techniques applicable in any managerial context, which can hinder learning and transfer of training to work (Lacerenza et al., 2017).

Face-to-face and virtual training presented significant differences concerning the characteristics of delivery and implementation. In virtual training, one single method (transmission of information) prevails, while in face-to-face training, there is a combination of information transmission, demonstration, and practice. The joint use of methods in the face-to-face modality is positively associated with learning, transfer, and the achievement of organisational outcomes. (Lacerenza et al., 2017; Magerko et al., 2005; Sitzmann et al., 2006).

Training based on active teaching methodologies involving information, demonstration, and practice tends to be more effective in leadership training, as learners are closer to situations that fit into the reality of work (Bell et al., 2017; Bitton & Barnes, 2024; Fernandez et al., 2020; Kraiger & Ford, 2021; Phillipson et al., 2025; Weaver et al., 2010). Investment in the diversification of teaching strategies, especially in virtual training, enhance learning, transfer (application in the work environment of the knowledge and skills learned) and the organisational outcomes (Kraiger & Ford, 2021; Lacerenza et al., 2017; Salas & Cannon-Bowers, 2001).

Few of the pipeline trainings assessed in this study provided feedback to the participant, and those that did it were face-to-face, and feedback was from one

single source, i.e., the instructor. The presence of feedback encourages learners to participate in activities, to plan, monitor, and review their behaviour during the training, and enhance learning (Kraiger & Ford, 2021) and transfer (Lacerenza et al., 2017).

Training in both modalities in this study evidenced a prevalence of cognitive skills learning and a proportionally lower offering of intra-, interpersonal, and leadership content. This may reduce the effectiveness of training at the level of transfer and organisational results (Avolio et al., 2009; Lacerenza et al., 2017).

Reaction assessments were identified in all training and learning assessments in some of the virtual training. Other assessment levels (transfer and outcomes) were not identified in the instructional materials and documents, which is a critical gap in the instructional system. This lack of a systematic evaluation process counteracts advances in this area of research, which assess results and all variables that could interfere with the training effects (Borges-Andrade et al., 2012).

6. Conclusion

The present study presented a useful, practical and applicable instrument (checklist) for the process of evaluating the instructional quality of leadership training. This study provides evidence of the content and semantic validity of the checklist's categories and assessment items, which were established following careful cross-cultural adaptation of the definitions of the moderating variables of training effectiveness adopted in the meta-analysis by Lacerenza et al. (2017). Furthermore, evaluations of training materials and instructional resources conducted by judges with training evaluation expertise proved reliable and consistent. There was a process of refining definitions and seeking consensus when evaluators disagreed about the presence of any characteristic of the training. These results were ensured through an agreement analysis of instructional content conducted by a group of experts in evaluating educational programs. The usefulness of this checklist lies in its diagnostic value, which allows it to identify instructional design flaws and assess whether the training has characteristics recommended by scientific literature for effective measurement of learning levels, behaviour, and organisational results before allocating resources to impact measurements. At the same time, it equips work organisations in the process of monitoring and continuous improvement of training, and it encourages new scientific research to confirm the choice of some instructional characteristics during the planning and execution of leadership programs.

Additionally, the use of the checklist and the method of evaluating instructional materials and resources, added to the results of meta-analyses and literature reviews, can inform (through the effect sizes of moderating variables) which are the priority changes to be implemented in training. This study's evidence showed that the use of two or more methods (information, demonstration, and practice) and varied training contents (soft skills—intrapersonal, interpersonal, and leadership, and hard skills as business skills) moderates (amplifies) effectiveness (Lacerenza et

al., 2017; Kraiger & Ford, 2021; Phillipson et al., 2025). This implies that these moderating variables can be prioritised in leadership training optimisation processes.

6.1. Contributions and Practical Implications

The checklist presented in this paper is a valuable methodological tool for evaluating leadership training. It can be utilized in both formative and summative assessments of leadership training programs. The checklist items are derived from findings by Lacerenza et al. (2017) and supported by instructional science. They are a valid and valuable criterion for assessing whether a training program possesses characteristics positively linked to successful outcomes. These outcomes include participant reactions, learning, transfer of training, and results.

Additionally, this checklist offers relevant information for training professionals about the essential features that leadership training should include to improve its effectiveness. It also ensures that the training meets the learning needs of leaders and aligns with organisational expectations regarding the training's impacts, as well as leaders' learning needs and organisational expectations regarding training effects.

The application of instructional theories (Kraiger & Ford, 2021) and meta-analysis results (Avolio et al., 2009; Lacerenza et al., 2017) to assess the characteristics of design, delivery, and implementation is an advance in the field of Training and Development, filling a research gap regarding the applicability of instructional theories to assess and to propose to enhance the effectiveness of instructional systems.

If corporate education managers are to increase instructional system effectiveness, they should strengthen the performance of training needs analysis, use diversified leadership methodologies and contents, provide opportunities for practice in real or simulated scenarios (an approximation to reality), align instructional objectives to the organisation's strategic results, and aim at assessing training transfer and return on investment.

As a scientific contribution, the study conducted in a specific organisation allowed a reliable assessment of the characteristics of several training in a detailed and in-depth way. This may support further empirical studies in which these characteristics can be studied as moderating variables of training effects (reaction, learning, transfer, and outcomes), testing hypotheses in work organisations. Furthermore, combining the expert panel and document analysis to assess the quality of leadership training produced relevant information to suggest organisational strategies for enhanced leadership training effectiveness.

The instructional quality assessment developed in this study can be applied formatively, supporting the planning and pilot testing of new training and, summatively, monitoring the implementation and feedback of the instructional system in search of continuous improvement of leadership training and development programs. The tool for instructional quality assessment can be used in other contexts to assess leadership training, as it is based on robust theories that apply to research

in several organisational contexts.

6.2. Limitations and Research Agenda

The variables investigated in this study, primarily extracted from the meta-analysis by Lacerenza et al. (2017), are considered moderators of leadership training effectiveness. This study presented an instrument for assessing the instructional quality of leadership training, based on scientific evidence indicating which instructional characteristics moderate the expected effects. However, this study did not directly assess the relationship between these characteristics and effects (reactions, learning, transfer, results). One of the limitations is that this study does not measure training outcomes (e.g., participant reactions, learning, behavioural change on the job, or organisational results). The evaluation was only based on scientific evidence on the positive association between training characteristics included in the checklist and effectiveness. However, the results do not test the effects of training in context.

Future studies need to expand the external validity of the moderation effects of the training characteristics findings, analysing the relationship of these variables in other contexts, training, and samples of organisational leaders with different levels of impact (reactions, learning, transfer and results). The instrument discussed in this paper is a valuable tool to evaluate the effectiveness of leadership training. Future studies should employ a mixed-methods research design to explore the relationships between training characteristics and their impacts.

Research is recommended to measure and analyse differences in effects between training conducted in different contents (intrapersonal, interpersonal, leadership skills. business skills), methods (information, demonstration, practice, combinations of methods); locations (internal and external to the organisation), conducted by different instructors (employees and non-employees of the organisation), applied at different levels of leadership (low, middle or high leadership), and evaluated with feedback from different sources (single or multiple sources).

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix 1

This appendix is composed of five spreadsheets originally constructed in Excel:

- **Spreadsheet 1** presents definitions of content categories and subcategories based on Lacerenza et al. (2017) that were used in the checklist to assess leadership training materials and resources. These definitions refer to the training characteristics, according to the scientific literature, associated with the effectiveness of leadership training. These characteristics compose the checklist used by experts to assess leadership pipelines.
- **Spreadsheet 2** presents the consensual results of the documentary analysis of Pipeline 1 carried out in three stages, as described in the method. Pipeline 1 includes 24 training courses: 11 Basic Complexity, 9 Intermediate Complexity, and 4 Advanced Complexity. **Spreadsheet 2** shows the characterisation of these trainings according to the checklist's categories and subcategories presented in **Spreadsheet 1**.
- **Spreadsheet 3** presents the consensual results of the documentary analysis of Pipeline 2 carried out in three stages, as described in the method. Pipeline 2 includes 22 training courses: 10 Basic Complexity, 6 Intermediate Complexity, and 6 Advanced Complexity. This spreadsheet shows the characterisation of the training according to the checklist's categories and subcategories presented in **Spreadsheet 1**.
- **Spreadsheet 4** presents the results of the documentary analysis of Pipeline 3, carried out in three stages, as described in the method. Pipeline 3 includes 15 training courses (Column B), of which 11 are Basic Complexity, 3 are Intermediate Complexity, and 1 is Advanced Complexity. This spreadsheet shows the characterisation of the training according to the checklist's categories and subcategories presented in **Spreadsheet 1**.
- **Spreadsheet 5** presents the comparative analyses between virtual and face-to-face leadership training characteristics in the three pipelines. Describe the frequency and percentages of the characteristics found in the 61 trainings evaluated.

Spreadsheet 1. Definitions of categories and subcategories used in the checklist to assess training characteristics associated with leadership training effectiveness based on Lacerenza et al. (2017).

Categories	Subcategories	Definitions
Other Characteristics	1. Type of learning	Learning outcomes can be categorised into three domains: affective, cognitive, and skill-based.
	Affective	Learning reflects the acquisition or change in an individual's internal states.
	Cognitive	Learning reflects a developmental change on an intellectual or mental basis.
	Skill-based	Psychomotor skills-based learning refers to the acquisition of technical or motor skills.
	2. Training Content	The training content refers to the knowledge, skills, and attitudes necessary to maximise its effectiveness. These skills belong to 4 domains: intrapersonal, interpersonal, leadership, and business.

Continued

	Intrapersonal Skills	Mastery of skills that contain three components: core self-esteem. People with self-esteem have self-confidence, stability, and positive moods and are not easily frustrated. People who lack self-esteem are self-critical, temperamental, unhappy, easily frustrated, difficult to calm, and need reassurance and positive feedback. The 2nd component is attitudes towards authority (follow the rules and respect procedures); the 3rd component is self-control (the ability to restrain impulses, stay focused, and follow routines). Example: dealing with stress, setting goals, and time management
	Interpersonal Skills	It concerns initiating, building, and maintaining relationships with various people who may differ from oneself. Mastering interpersonal skills has 4 components: 1st, empathy; 2nd, anticipating the other person's expectations; 3rd, incorporating the other person's expectations into a person's subsequent behaviours; 4th, self-control to stay focused on the other person's expectations.
	Leadership Skills	Leadership skills are those that enable building and maintaining effective teams. 1st component: attract talented people; 2nd component: retain people; 3rd component: carry out actions to keep people motivated; 4th component: develop, design, and promote a vision for the team.
	Business Skills	Business skills include: planning, monitoring budgets, forecasting costs and revenues, cutting costs, mapping strategies, evaluating performance, running meetings, and organising the necessary reports. They depend on cognitive rather than interpersonal ability, which is why people believe cognitive ability is vital for managerial performance.
Design	3. Instructor presence	Training programmes have three options for instructor presence: self-administered, internally (institutional), or externally (market specialists). The trainer's background can influence the motivation of those trained.
	External	External instructors are specialists hired in the market to provide training to employees.
	Internal	The internal instructors are professionals from the institution itself who provide training to employees.
	Self-administered	These are training sessions that use resources that do not require an instructor's intervention.
Delivery and Implementation	4. Training Method	The training delivery method can be divided into categories depending on the purpose. The use of diverse methods is more effective for leadership training because it allows for interaction with others.
	Information	Lectures, presentations, and most text-based training materials are considered information methods.
	Demonstration	Demonstration-based methods provide trainees with negative or positive examples of the competencies trained through personal media, such as audio, video, or simulation, personal modelling, or computer-generated avatars.
	Practice	The practice-based method includes role-playing, simulations, exercises, guided practice, identical elements between training content and workplace tasks, and others. When the trainee has the opportunity to practise specific skills, he can actively reflect on his experience, find solutions to problems within the training environment, and participate in the learning process. This accelerates the rate of learning from his experience.

Continued

	5. Feedback and source of feedback	Feedback outlines successes and failures, as well as how to correct unsuccessful behaviours. It facilitates learning and transfers by encouraging students to engage in metacognitive activities, i.e., planning, monitoring, and reviewing their behaviour during training.
	Feedback	If there is feedback, what is the strategy for providing it?
	No feedback	There are no comments/feedback.
	Single-source feedback	Feedback comes from a single source, for example, the coach.
	360-feedback	360-degree feedback involves sharing information about the trainee from multiple sources (e.g., supervisors, subordinates, and customers).
Design	6. Training Needs analysis	Process of identifying organisational, group, or individual training needs.
	Needs analyses	Carry out a training needs assessment.
	No needs	Not carrying out a training needs assessment.
	7. Time Spacing	The spacing effect indicates whether there is time space (day, week, month, year) between one training session and another, based on the theory of cognitive load.
	Spaced	Carry out training with a time interval between sessions, known as spacing. The concept is based on cognitive load theory, which states that presenting an excessive amount of information to a student may prevent it from being processed and stored in long-term memory.
	Massed	Carry out training in sessions without time spacing.
Delivery and Implementation	8. Training modality	The training setting can be either face-to-face or virtual.
	Virtual	The training is based on interventions delivered via a computer or similar device, without a facilitator physically present.
	Face-to-face	Training was conducted with a facilitator.
	9. Training Location/Delivery Site	The environment where the training is carried out, whether outside or inside the organization.
	Off-site	Training that takes place in a facility other than the trainee's organization; the level of equipment and environmental fidelity is reduced, leading to a potential reduction in training results.
	On-site	Training on the institution's premises provides an environment similar to, if not identical to, your work environment. As such, they exhibit equipment, environmental, and psychological fidelity under normal working conditions.
Design	10. Type of participation	Participation in training can be voluntary or required by the institution. Volunteer participation enhances the transfer mechanism to a greater extent than mandatory programmes.
	Voluntary	Voluntary participation in training: trainees who voluntarily participate in training.
	Involuntary	The organisation requires participation in compulsory training.
	11. Leadership level	Leadership levels, or the position the leader holds in the organisation, can influence receptivity and the transfer of training.
	High-level	These individuals do not have any managers above them in the hierarchy, except for executives. Training may have less effect at a high level.

Continued

	Middle level	They are managers in charge of multiple subordinates and serve as the link between subordinate groups and other levels of the organisation. Training may have less effect at the medium level.
	Low-level	They are those who interact directly with first-level employees. A low-level leader may be more receptive to change. Training may have more effect at a low level.

Spreadsheet 2. Consensual experts' assessment on training—Pipeline 1.

Training information—pipeline 1		Contents assessed				
Level of complexity	Training Name	Type of Learning	Training Content			
			1—Interpersonal	2—Intrapersonal	3—Leadership	4—Business
Basic	Accountability	2—Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No
	Business Fundamentals	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Task Delegation	2—Cognitive Learning	0—No	1—Yes	1—Yes	0—No
	Time Management	4—Affective and Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No
	Resilience	4—Affective and Cognitive Learning	1—Yes	0—No	0—No	0—No
	Behaviour Change	2—Cognitive Learning	1—Yes	0—No	1—Yes	1—Yes
	Effective Meetings	2—Cognitive Learning	0—No	1—Yes	1—Yes	1—Yes
	Feedback	6—Cognitive and Skill-based Learning	0—No	1—Yes	1—Yes	0—No
	Influence and Active Listening	4—Affective and Cognitive Learning	0—No	1—Yes	1—Yes	1—Yes
	Compliance and Controls	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Intrapreneurship	6—Cognitive and Skill-based Learning	1—Yes	1—Yes	1—Yes	1—Yes
Intermediate	Information Security 2	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Leadership Models	2—Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No
	Professional Orientation	4—Affective and Cognitive Learning	1—Yes	0—No	0—No	0—No
	Organizational Climate	4—Affective and Cognitive Learning	1—Yes	1—Yes	0—No	0—No
	Digital Business	2—Cognitive Learning	0—No	0—No	0—No	1—Yes

Continued

	Operational Efficiency	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Information Security 1	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Results Management	2—Cognitive Learning	0—No	0—No	0—No	1—Yes
	Design Thinking	4—Affective and Cognitive Learning	0—No	1—Yes	1—Yes	1—Yes
Advanced	Contracts Management	6—Cognitive and Skill-based Learning	0—No	1—Yes	0—No	1—Yes
	Didactics for Instructors	6—Cognitive and Skill-based Learning	0—No	1—Yes	1—Yes	0—No
	Lectures and Presentations	6—Cognitive and Skill-based Learning	1—Yes	1—Yes	1—Yes	0—No
	People and Environment Safety	6—Cognitive and Skill-based Learning	0—No	0—No	0—No	1—Yes

Training information—pipeline 1		Contents assessed			
Level of complexity	Training Name	Training Method	Source Feedback	Needs Analysis	Spacing Effect
Basic	Accountability	5—Information and demonstration	1—No feedback	1—Yes	2—Massed
	Business Fundamentals	5—Information and demonstration	1—No feedback	1—Yes	2—Massed
	Task Delegation	5—Information and demonstration	1—No feedback	1—Yes	2—Massed
	Time Management	5—Information and demonstration	1—No feedback	1—Yes	2—Massed
	Resilience	1—Information	1—No feedback	1—Yes	2—Massed
	Behaviour Change	1—Information	1—No feedback	1—Yes	2—Massed
	Effective Meetings	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Feedback	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed
	Influence and Active Listening	7—Information, Demonstration and Practice.	2—Single Source Feedback	1—Yes	2—Massed
	Compliance and Controls	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Intrapreneurship	1—Information	2—Single Source Feedback	1—Yes	2—Massed
Intermediate	Information Security 2	1—Information	1—No feedback	1—Yes	2—Massed
	Leadership Models	1—Information	1—No feedback	1—Yes	2—Massed
	Professional Orientation	4—Information and Practice	1—No feedback	1—Yes	2—Massed
	Organizational Climate	1—Information	1—No feedback	1—Yes	2—Massed
	Digital Business	1—Information	1—No feedback	1—Yes	2—Massed
	Operational Efficiency	1—Information	1—No feedback	1—Yes	2—Massed

Continued

	Information Security 1	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Results Management	1—Information	1—No feedback	1—Yes	2—Massed
	Design Thinking	5—Information and demonstration	2—Single Source Feedback	1—Yes	2—Massed
Advanced	Contracts Management	7—Information, Demonstration and Practice.	2—Single Source Feedback	1—Yes	2—Massed
	Didactics for Instructors	7—Information, Demonstration and Practice.	3—360-feedback	1—Yes	2—Massed
	Lectures and Presentations	7—Information, Demonstration and Practice.	3—360-feedback	1—Yes	2—Massed
	People and Environment Safety	7—Information, Demonstration and Practice.	2—Single Source Feedback	1—Yes	2—Massed

Training information pipeline 1		Contents assessed			
Level of complexity	Training Name	Training Setting	Training Location	Training Attendance Policy	Leadership Level
Basic	Accountability	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Business Fundamentals	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Task Delegation	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Time Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Resilience	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Behaviour Change	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Effective Meetings	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Feedback	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Influence and Active Listening	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Compliance and Controls	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Intrapreneurship	1—Virtual	2—On-site	1—Voluntary	7—All levels
Intermediate	Information Security 2	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Leadership Models	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Professional Orientation	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Organizational Climate	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Digital Business	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Operational Efficiency	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Information Security 1	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Results Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Design Thinking	1—Virtual	2—On-site	1—Voluntary	7—All levels
Advanced	Contracts Management	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	Didactics for Instructors	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	Lectures and Presentations	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	People and Environment Safety	2—Face-to-face	2—On-site	1—Voluntary	7—All levels

Spreadsheet 3. Consensual experts' assessment on training—Pipeline 2.

Training information—pipeline 2		Contents assessed					
Level of complexity	Training	Type of Learning	Training Content				Training Instructor
			1—Interpersonal	2—Intrapersonal	3—Leadership	4—Business	
Basic	Minutes of Leadership	4—Affective and Cognitive Learning	1—Yes	0—No	1—Yes	0—No	4—Self-administered
	Strategic Thinking	2—Cognitive Learning	0—No	0—No	1—Yes	1—Yes	4—Self-administered
	Compliance and Controls	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Balanced Scorecard	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Operational Efficiency	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Leadership	2—Cognitive Learning	0—No	0—No	1—Yes	0—No	4—Self-administered
	Information Security Practices	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Leadership Styles	2—Cognitive Learning	0—No	0—No	1—Yes	1—Yes	4—Self-administered
	The Brain of Leaders	2—Cognitive Learning	0—No	1—Yes	1—Yes	1—Yes	4—Self-administered
	Leadership for Results—paper	2—Cognitive Learning	0—No	0—No	1—Yes	0—No	4—Self-administered
Intermediate	Conflict Mediation for Managers	4—Affective and Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No	4—Self-administered
	Developer Manager and Performance Management	2—Cognitive Learning	1—Yes	0—No	1—Yes	0—No	4—Self-administered
	E-book—Best Practices According to Performance	2—Cognitive Learning	0—No	0—No	1—Yes	0—No	4—Self-administered
	Teams' Organizational Climate	4—Affective and Cognitive Learning	1—Yes	1—Yes	0—No	0—No	4—Self-administered
	Workday Management	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Selection Interview	7—Cognitive, Affective and Skill-based Learning	0—No	0—No	1—Yes	1—Yes	4—Self-administered
Advanced	Professional Counselling - Career Planning - Managers	7—Cognitive, Affective and Skill-based Learning	1—Yes	1—Yes	1—Yes	0—No	2—Internal
	Team Management	4—Affective and Cognitive Learning	1—Yes	1—Yes	1—Yes	1—Yes	2—Internal

Continued

	Selection Interview—Practice 1	7—Cognitive, Affective and Skill-based Learning	0—No	1—Yes	1—Yes	1—Yes	2—Internal
	Organizational Climate Management	4—Affective and Cognitive Learning	0—No	0—No	1—Yes	1—Yes	2—Internal
	People and Environment Safety Management	6—Cognitive and Skill-based Learning	0—No	0—No	0—No	1—Yes	2—Internal
	Strategic Leadership	2—Cognitive Learning	0—No	0—No	1—Yes	1—Yes	2—Internal

Training information—pipeline 2		Contents assessed			
Level of complexity	Training	Training Method	Source Feedback	Needs Analysis	Spacing Effect
Basic	Minutes of Leadership	1—Information	1—No feedback	1—Yes	2—Massed
	Strategic Thinking	1—Information	1—No feedback	1—Yes	2—Massed
	Compliance and Controls	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Balanced Scorecard	5—Information and demonstration	2—Single Source Feedback	1—Yes	2—Massed
	Operational Efficiency	1—Information	1—No feedback	1—Yes	2—Massed
	Leadership	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Information Security Practices	1—Information	1—No feedback	1—Yes	2—Massed
	Leadership Styles	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	The Brain of Leaders	1—Information	1—No feedback	1—Yes	2—Massed
	Leadership for Results—paper	1—Information	1—No feedback	1—Yes	2—Massed
Intermediate	Conflict Mediation for Managers	5—Information and demonstration	2—Single Source Feedback	1—Yes	2—Massed
	Developer Manager and Performance Management	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	E-book—Best Practices According to Performance	1—Information	1—No feedback	1—Yes	2—Massed
	Teams' Organizational Climate	1—Information	1—No feedback	1—Yes	2—Massed
	Workday Management	1—Information	1—No feedback	1—Yes	2—Massed
	Selection Interview	7—Information, Demonstration and Practice	1—No feedback	1—Yes	2—Massed
Advanced	Professional Counselling—Career Planning—Managers	4—Information and Practice	2—Single Source Feedback	1—Yes	1—Spaced
	Team Management	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed
	Selection Interview—Practice 1	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed
	Organizational Climate Management	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed

Continued

	People and Environment Safety Management	7—Information, Demonstration and Practice.	2—Single Source Feedback	1—Yes	2—Massed
	Strategic Leadership	5—Information and demonstration	2—Single Source Feedback	1—Yes	2—Massed

Training information—pipeline 2		Contents assessed			
Level of complexity	Training	Training Setting	Training Location	Training Attendance Policy	Leadership Level
Basic	Minutes of Leadership	1—Virtual	2—On-site	2—Involuntary	7—All levels
	Strategic Thinking	1—Virtual	2—On-site	2—Involuntary	7—All levels
	Compliance and Controls	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Balanced Scorecard	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Operational Efficiency	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Leadership	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Information Security Practices	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Leadership Styles	1—Virtual	2—On-site	1—Voluntary	7—All levels
	The Brain of Leaders	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Leadership for Results—paper	1—Virtual	2—On-site	1—Voluntary	7—All levels
Intermediate	Conflict Mediation for Managers	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Developer Manager and Performance Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	E-book—Best Practices According to Performance	1—Virtual	2—On-site	1—Voluntary	1—High-level
	Teams' Organizational Climate	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Workday Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Selection Interview	1—Virtual	2—On-site	1—Voluntary	7—All levels
Advanced	Professional Counseling—Career Planning—Managers	2—Face-to-face	1—Off-site	2—Involuntary	1—High-level
	Team Management	2—Face-to-face	2—On-site	2—Involuntary	1—High-level
	Selection Interview—Practice 1	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	Organizational Climate Management	2—Face-to-face	2—On-site	1—Voluntary	3—Low-level
	People and Environment Safety Management	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	Strategic Leadership	2—Face-to-face	2—On-site	1—Voluntary	7—All levels

Spreadsheet 4. Consensual experts' assessment on training—Pipeline 3.

Training information—pipeline 3		Contents assessed				
Level of complexity	Training	Type of Learning	Training Content			Training Instructor
			1—Interpersonal	2—Intrapersonal	3—Leadership 4—Business	

Continued

Basic	Leadership Model: Leader of Leader	5—Affective and Skill-based Learning	1—Yes	1—Yes	1—Yes	0—No	4—Self-administered
	The New Leadership	2—Cognitive Learning	0—No	1—Yes	1—Yes	0—No	4—Self-administered
	Compliance and Control Management	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Minutes of Leadership	4—Affective and Cognitive Learning	1—Yes	0—No	1—Yes	0—No	4—Self-administered
	Strategic Thinking	2—Cognitive Learning	0—No	0—No	1—Yes	1—Yes	4—Self-administered
	Conflict Mediation for Managers	4—Affective and Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No	4—Self-administered
	Career Counselling—Leader of Leader	4—Affective and Cognitive Learning	1—Yes	0—No	0—No	0—No	4—Self-administered
	Workday Management	2—Cognitive Learning	0—No	0—No	0—No	1—Yes	4—Self-administered
	Organizational Climate	4—Affective and Cognitive Learning	1—Yes	1—Yes	0—No	0—No	4—Self-administered
	Selection Interview—Leader of Leader	7—Cognitive, Affective and Skill-based Learning	0—No	0—No	1—Yes	1—Yes	4—Self-administered
	Developer Manager and Performance Management	2—Cognitive Learning	0—No	1—Yes	1—Yes	0—No	4—Self-administered
Intermediate	Organizational Climate Management	4—Affective and Cognitive Learning	0—No	1—Yes	1—Yes	1—Yes	2—Internal
	People and Environment Safety	6—Cognitive and Skill-based Learning	0—No	0—No	0—No	1—Yes	2—Internal
	Selection Strategies Management	7—Cognitive, Affective and Skill-based Learning	0—No	1—Yes	1—Yes	1—Yes	2—Internal
Advanced	Mediation Workshop: Restorative Practices	4—Affective and Cognitive Learning	1—Yes	1—Yes	1—Yes	0—No	2—Internal

Training information—pipeline 3		Contents assessed			
Level of complexity	Training	Training Method	Source Feedback	Needs Analysis	Spacing Effect
Basic	Leadership Model: Leader of Leader	1—Information	1—No Feedback	1—Yes	2—Massed
	The New Leadership	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Compliance and Control Management	1—Information	2—Single Source Feedback	1—Yes	2—Massed
	Minutes of Leadership	1—Information	1—No Feedback	1—Yes	2—Massed
	Strategic Thinking	1—Information	1—No Feedback	1—Yes	2—Massed

Continued

	Conflict Mediation for Managers	5—Information and demonstration	2—Single Source Feedback	1—Yes	2—Massed
	Career Counselling—Leader of Leader	4—Information and Practice	1—No Feedback	1—Yes	1—Spaced
	Workday Management	1—Information	1—No Feedback	1—Yes	2—Massed
	Organizational Climate	1—Information	1—No Feedback	1—Yes	2—Massed
	Selection Interview—Leader of Leader	7—Information, Demonstration and Practice	1—No Feedback	1—Yes	2—Massed
	Developer Manager and Performance Management	1—Information	2—Single Source Feedback	1—Yes	2—Massed
Intermediate	Organizational Climate Management	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed
	People and Environment Safety	7—Information, Demonstration and Practice	2—Single Source Feedback	1—Yes	2—Massed
	Selection Strategies Management	4—Information and Practice	2—Single Source Feedback	1—Yes	2—Massed
Advanced	Mediation Workshop: Restorative Practices	7—Information, Demonstration and Practice	2—Single Source Feedback	1—Yes	2—Massed

	Training information—pipeline 3	Contents assessed			
Level of complexity	Training	Training Setting	Training Location	Training Attendance Policy	Leadership Level
Basic	Leadership Model: Leader of Leader	1—Virtual	2—On-site	1—Voluntary	7—All levels
	The New Leadership	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Compliance and Control Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Minutes of Leadership	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Strategic Thinking	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Conflict Mediation for Managers	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Career Counselling—Leader of Leader	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Workday Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Organizational Climate	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Selection Interview—Leader of Leader	1—Virtual	2—On-site	1—Voluntary	7—All levels
	Developer Manager Performance Management	1—Virtual	2—On-site	1—Voluntary	7—All levels
Intermediate	Organizational Climate Management	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	People and Environment Safety	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
	Selection Strategies Management	2—Face-to-face	2—On-site	1—Voluntary	7—All levels
Advanced	Mediation Workshop: Restorative Practices	2—Face-to-face	2—On-site	1—Voluntary	7—All levels

Spreadsheet 5. Comparative analyses between virtual and face-to-face leadership training characteristics in the three pipelines.

		Pipeline 1						Pipeline 2						Pipeline 3					
		Virtual		Face-to-face		All		Virtual		Face-to-face		All		Virtual		Face-to-face		All	
Characteristic	Classification	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%	n	%
Needs Analysis	No	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Yes	20	100.0	4	100.0	24	100.0	18	On	4	100.0	22	100.0	11	100.0	4	100.0	15	100.0
Type of Participation	Voluntary	20	100.0	4	100.0	24	100.0	16	88.9	3	75.0	19	86.4	11	100.0	4	100.0	15	100.0
	Involuntary	0	0.0	0	0.0	0	0.0	2	11.1	1	25.0	3	13.6	0	0.0	0	0.0	0	0.0
Spacing Effect between training sessions	Spaced	0	0.0	0	0.0	0	0.0	1	5.6	1	25.0	2	9.1	1	9.1	0	0.0	1	6.7
	Massed	20	100.0	4	100.0	24	100.0	17	94.4	3	75.0	20	90.9	10	90.9	4	100.0	14	93.3
Leadership Level	High	0	0.0	0	0.0	0	0.0	0	0.0	1	25.0	1	4.5	0	0.0	0	0.0	0	0.0
	Medium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Low	0	0.0	1	25.0	1	4.2	0	0.0	1	25.0	1	4.5	0	0.0	0	0.0	0	0.0
	High and Medium	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Medium and Low	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	All	20	100.0	3	75.0	23	95.8	18	100.0	2	50.0	20	90.9	11	100.0	4	100.0	15	100.0
Trainer	External	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Internal	0	0.0	4	100.0	4	16.7	0	0.0	4	100.0	4	18.2	0	0.0	4	100.0	4	26.7
	Tutoring/ Monitoring	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Self-administered	20	100.0	0	0.0	20	83.3	18	100.0	0	0.0	18	81.8	11	100.0	0	0.0	11	73.3
Training Method	Information	12	60.0	0	0.0	12	50.0	12	66.7	0	0.0	12	54.5	8	72.7	0	0.0	8	53.3
	Demonstration	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Practice	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Information and Practice	2	10.0	0	0.0	2	8.3	2	11.1	3	75.0	5	22.7	1	9.1	2	50.0	3	20.0
	Information and Demonstration	5	25.0	0	0.0	5	20.8	3	16.7	0	0.0	3	13.6	1	9.1	0	0.0	1	6.7
	Demonstration and Practice	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Information, Demonstration and Practice	1	5.0	4	100.0	5	20.8	1	5.6	1	25.0	2	9.1	1	9.1	2	50.0	3	20.0
Feedback	None	13	65.0	0	0.0	13	54.2	11	61.1	0	0.0	11	50.0	6	54.5	0	0.0	6	40.0
	Single source	7	35.0	2	50.0	9	37.5	7	38.9	4	100.0	11	50.0	5	45.5	4	100.0	9	60.0
	More than one source	0	0.0	2	50.0	2	8.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Site	Off-site	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	On-site	20	100.0	4	100.0	24	100.0	18	100.0	4	100.0	22	100.0	11	100.0	4	100.0	15	100.0
Modality	Virtual	20	100.0	0	0.0	20	83.3	18	100.0	0	0.0	18	8N1.8	11	100.0	0	0.0	11	73.3
	Face-to-face	0	0.0	4	100.0	4	16.7	0	0.0	4	100.0	4	18.2	0	0.0	4	100.0	4	26.7

Continued

Content	Intrapersonal	No	12	60.0	3	75.0	15	62.5	13	72.2	3	75.0	16	72.7	6	54.5	3	75.0	9	60.0
		Yes	8	40.0	1	25.0	9	37.5	5	27.8	1	25.0	6	27.3	5	45.5	1	25.0	6	40.0
	Interpersonal	No	10	50.0	1	25.0	11	45.8	12	66.7	2	50.0	14	63.6	6	54.5	1	25.0	7	46.7
		Yes	10	50.0	3	75.0	13	54.2	6	33.3	2	50.0	8	36.4	5	45.5	3	75.0	8	53.3
	Leadership	No	10	50.0	2	50.0	12	50.0	8	44.4	1	25.0	9	40.9	4	36.4	1	25.0	5	33.3
		Yes	10	50.0	2	50.0	12	50.0	10	55.6	3	75.0	13	59.1	7	63.6	3	75.0	10	66.7
	Business	No	8	40.0	2	50.0	10	41.7	9	50.0	1	25.0	10	45.5	6	54.5	1	25.0	7	46.7
		Yes	12	60.0	2	50.0	14	58.3	9	50.0	3	75.0	12	54.5	5	45.5	3	75.0	8	53.3
Type of Learning	Affective		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Cognitive		12	60.0	1	25.0	13	54.2	12	66.7	0	0.0	12	54.5	6	54.5	0	0.0	6	40.0
	Skill-based		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Affective and Cognitive		6	30.0	0	0.0	6	25.0	4	22.2	1	25.0	5	22.7	4	36.4	2	50.0	6	40.0
	Affective and Skill-based		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Cognitive and Skill-based		2	10.0	3	75.0	5	20.8	1	5.6	1	25.0	2	9.1	0	0.0	1	25.0	1	6.7
	Affective, Cognitive and Skill-based		0	0.0	0	0.0	0	0.0	1	5.6	2	50.0	3	13.6	1	9.1	1	25.0	2	13.3
Reaction assessment	No		0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
	Yes		20	100.0	4	100.0	24	100.0	18	100.0	4	100.0	22	100.0	11	100.0	4	100.0	15	100.0
Learning assessment	No		11	55.0	4	100.0	15	62.5	10	55.6	4	100.0	14	63.6	8	72.7	4	100.0	0	0.0
	Yes		9	45.0	0	0.0	9	37.5	8	44.4	0	0.0	8	36.4	3	27.3	0	0.0	15	100.0
Total			20	100.0	4	100.0	24	100.0	18	100.0	4	100.0	22	100.0	11	100.0	4	100.0	15	100.0

		Compiled											
		Virtual		Face-to-face		All		Virtual		Face-to-face		All	
Characteristic	Classification	n	%	n	%	n	%	Mean	SD	Mean	SD	Mean	SD
Needs Analysis	No	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Yes	49	100.0	12	100.0	61	100.0	16.3	4.7	4.0	0.0	20.3	4.7
Type of Participation	Voluntary	47	95.9	11	91.7	58	95.1	15.7	4.5	3.7	0.6	19.3	4.5
	Involuntary	2	4.1	1	8.3	3	4.9	0.7	1.2	0.3	0.6	1.0	1.7
Spacing Effect between training sessions	Spaced	2	4.1	1	8.3	3	4.9	0.7	0.6	0.3	0.6	1.0	1.0
	Massed	47	95.9	11	91.7	58	95.1	15.7	5.1	3.7	0.6	19.3	5.0
Leadership Level	High	0	0.0	1	8.3	1	1.6	0.0	0.0	0.3	0.6	0.3	0.6
	Medium	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Low	0	0.0	2	16.7	2	3.3	0.0	0.0	0.7	0.6	0.7	0.6

Continued

	High and Medium	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Medium and Low	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All	49	100.0	9	75.0	58	95.1	16.3	4.7	3.0	1.0	19.3	4.0
Trainer	External	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Internal	0	0.0	12	100.0	12	19.7	0.0	0.0	4.0	0.0	4.0	0.0
	Tutoring/Monitoring	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Self-administered	49	100.0	0	0.0	49	80.3	16.3	4.7	0.0	0.0	16.3	4.7
Training Method	Information	32	65.3	0	0.0	32	52.5	10.7	2.3	0.0	0.0	10.7	2.3
	Demonstration	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Practice	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Information and Practice	5	10.2	5	41.7	10	16.4	1.7	0.6	1.7	1.5	3.3	1.5
	Information and Demonstration	9	18.4	0	0.0	9	14.8	3.0	2.0	0.0	0.0	3.0	2.0
	Demonstration and Practice	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Information, Demonstration and Practice	3	6.1	7	58.3	10	16.4	1.0	0.0	2.3	1.5	3.3	1.5
Feedback	None	30	61.2	0	0.0	30	49.2	10.0	3.6	0.0	0.0	10.0	3.6
	Single source	19	38.8	10	83.3	29	47.5	6.3	1.2	3.3	1.2	9.7	1.2
	More than one source	0	0.0	2	16.7	2	3.3	0.0	0.0	0.7	1.2	0.7	1.2
Site	Off-site	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	On-site	49	100.0	12	100.0	61	100.0	16.3	4.7	4.0	0.0	20.3	4.7
Modality	Virtual	49	100.0	0	0.0	49	80.3	16.3	4.7	0.0	0.0	16.3	4.7
	Face-to-face	0	0.0	12	100.0	12	19.7	0.0	0.0	4.0	0.0	4.0	0.0
Content	Intrapersonal												
	No	31	63.3	9	75.0	40	65.6	10.3	3.8	3.0	0.0	13.3	3.8
	Yes	18	36.7	3	25.0	21	34.4	6.0	1.7	1.0	0.0	7.0	1.7
	Interpersonal												
	No	28	57.1	4	33.3	32	52.5	9.3	3.1	1.3	0.6	10.7	3.5
	Yes	21	42.9	8	66.7	29	47.5	7.0	2.6	2.7	0.6	9.7	2.9
	Leadership												
	No	22	44.9	4	33.3	26	42.6	7.3	3.1	1.3	0.6	8.7	3.5
	Yes	27	55.1	8	66.7	35	57.4	9.0	1.7	2.7	0.6	11.7	1.5
	Business												
	No	23	46.9	4	33.3	27	44.3	7.7	1.5	1.3	0.6	9.0	1.7
	Yes	26	53.1	8	66.7	34	55.7	8.7	3.5	2.7	0.6	11.3	3.1
Type of Learning	Affective	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cognitive	30	61.2	1	8.3	31	50.8	10.0	3.5	0.3	0.6	10.3	3.8
	Skill-based	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Affective and Cognitive	14	28.6	3	25.0	17	27.9	4.7	1.2	1.0	1.0	5.7	0.6

Continued

	Affective and Skill-based	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cognitive and Skill-based	3	6.1	5	41.7	8	13.1	1.0	1.0	1.7	1.2	2.7	2.1
	Affective, Cognitive and Skill-based	2	4.1	3	25.0	5	8.2	0.7	0.6	1.0	1.0	1.7	1.5
Reaction assessment	No	0	0.0	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Yes	49	100.0	12	100.0	61	100.0	16.3	4.7	4.0	0.0	20.3	4.7
Learning assessment	No	29	59.2	12	100.0	29	47.5	9.7	1.5	4.0	0.0	9.7	8.4
	Yes	20	40.8	0	0.0	32	52.5	6.7	3.2	0.0	0.0	10.7	3.8
Total		49	100.0	12	100.0	61	100.0						