

Workplace training transfer: a systematic scoping review of evaluation tools for adult learning

Journal of
Workplace
Learning

Mirco Ardondi

*Department of Primary Care, Azienda Unità Sanitaria Locale di Ferrara,
Ferrara, Italy*

Elisa Fortunato

*Department of Internal Medicine, Azienda USL – IRCCS di Reggio Emilia,
Reggio Emilia, Italy*

Corrado Ruozi

*Human Resources Development, Azienda USL – IRCCS di Reggio Emilia,
Reggio Emilia, Italy*

Pasquale Di Fronzo

Department of Medicine and Surgery, University of Parma, Parma, Italy

Angelina Saffioti

*Department of Health Professions, Azienda USL – IRCCS di Reggio Emilia,
Reggio Emilia, Italy*

Ilaria Ferrari

*Human Resources Development, Azienda USL – IRCCS di Reggio Emilia,
Reggio Emilia, Italy*

Maria Chiara Bassi

Medical Library, Azienda USL – IRCCS di Reggio Emilia, Reggio Emilia, Italy

Luca Ghirotto

*Qualitative Research Unit, Azienda USL– IRCCS di Reggio Emilia,
Reggio Emilia, Italy, and*

Cristina Pedroni

*Department of Health Professions, Azienda USL – IRCCS di Reggio Emilia,
Reggio Emilia, Italy*

Received 13 March 2025
Revised 11 July 2025
9 September 2025
Accepted 10 September 2025

Abstract

Purpose – Training transfer refers to the extent to which knowledge, skills and attitudes acquired during training are effectively applied in the workplace. Tools designed to assess transfer either measure its outcomes directly or capture the factors that enable or hinder this process. Despite their relevance, such instruments remain heterogeneous and fragmented. This study aims to systematically map and analyze both categories of tools in the context of workplace learning.

Declaration of competing interest: The authors declare no competing interests.



Journal of Workplace Learning
© Emerald Publishing Limited
1366-5626
DOI 10.1108/JWL-03-2025-0068

Design/methodology/approach – The authors adopted a systematic approach and scoping review. The search was conducted across seven databases (MEDLINE, Embase, Cinahl, Scopus, Web of Science, ERIC and PsycINFO). The reviewers' group assessed the retrieved articles to determine whether the studies met the inclusion criteria, ultimately including 45 studies. Data extraction was performed using a structured data extraction table, which enabled the identification of common characteristics based on the information collected.

Findings – Most studies originate from the USA and feature mixed contexts, including both public and private sectors, as well as industrial and managerial domains, and profit and non-profit settings. Eight studies primarily examined health-care environments, and six of these were exclusively developed in the nursing field. The total participant count across included studies is 24,096. Three significant categories of evaluation tools emerged: standalone instruments, composed tools and tailored instruments. The Learning Transfer System Inventory stood out as the most used standalone instrument, while other studies used multifactorial instruments or developed tailored tools specific to their contexts.

Originality/value – The review underscores the ongoing need for methodological innovation and interdisciplinary collaboration in training transfer research. By advancing our understanding of the factors influencing training transfer research and developing robust assessment tools, we can enhance the effectiveness of training programs and contribute to organizational success in today's dynamic work environments.

Keywords Education, Learning, Questionnaire, Review, Transfer of learning, Transfer of training

Paper type Literature review

Introduction

The transfer of training (TT), or “transfer of learning,” is about applying new skills in the workplace during training (Bell *et al.*, 2017). According to Baldwin and Ford (1988), TT is when individuals successfully use knowledge, skills and attitudes learned in training in practical, on-the-job situations, involving integrating knowledge and addressing professional challenges (Kauffeld *et al.*, 2025). TT highlights the real-world impact of training, including transfer, retention and practical use of skills.

The concept of TT, thus, corresponds to a behavioral measure for evaluating training effectiveness (Alvarez *et al.*, 2004), standing out as one of the most pivotal criteria within desired organizational training standards (Park and Wentling, 2007). Organizations heavily invest in training initiatives for their personnel (Baldwin *et al.*, 2017; Sarfraz *et al.*, 2021), making the transfer concept a valuable indicator of the effectiveness of developmental activities. It is a significant gauge of the practical application of acquired skills and knowledge in the workplace. This, in turn, provides insights into the return on investment of resources dedicated to training endeavors (Avolio *et al.*, 2010; Burke and Hutchins, 2007; Kim and Belzer, 2021; Nakash and Bouhnik, 2022), indicating that the concept of TT not only considers the behavioral outcomes of training but also may serve as a critical approach for organizations seeking to evaluate the tangible impact of their training and development initiatives (Blume *et al.*, 2024; Mehner *et al.*, 2025).

Earlier literature claimed that only 10%–15% of training was effectively used in the workplace; however, recent research (Ford *et al.*, 2011; Lim and Morris, 2006) indicates that approximately 51% of training leads to positive employee changes, and 47% benefits the organization. These figures may be optimistic, as they rely on trainer self-assessments. The transfer issue persists: about 40% of participants do not apply learning immediately, rising to nearly 70% after a year. Overall, around half of training investments produce real improvements, making the traditional 10% figure outdated and needing revision (Saks, 2002).

TT has been studied since the 1980s, notably by Baldwin and Ford (1988), who identified input factors like training design, trainee traits and workplace environment to understand transfer. Many studies examined factors influencing transfer and effective interventions

(Aguinis and Kraiger, 2009). These variables underpin transfer models that help professionals support long-term transfer and retention of skills (Thalheimer, 2018).

The “transfer problem” highlights connecting training with workplace demands. Baldwin and Ford (1988) categorized transfer literature into three areas based on input factors of training (Blume *et al.*, 2010; Burke and Hutchins, 2007). Many studies focus on designing training (Burke and Hutchins, 2007; Warr and Bunce, 1995), workplace aspects (Tracey *et al.*, 1995) or personal factors affecting transfer (Gist *et al.*, 1991).

However, starting from the late 1990s and the early 2000s, a fourth strand emerged, specifically dedicated to exploring tools useful for measuring transfer in workplace settings (Holton *et al.*, 2000; Pisanu and Fraccaroli, 2007). TT is then understood as not only the extent to which newly acquired knowledge, skills and attitudes are enacted on the job but also the interplay of factors that facilitate or impede this process – such as motivation, training design, organizational support and contextual conditions (Blume *et al.*, 2010; Nīmante *et al.*, 2025). This approach demonstrates that training effectiveness is influenced by factors such as program design, organizational context, individual traits and measurement tools. Understanding these helps develop evidence-based training practices. Kirkpatrick’s (1959) model, with four levels – reaction, learning, behavior and results – is often used to assess outcomes, particularly behavioral changes following training. The third level can be viewed as an indirect transfer measure (Saks and Burke, 2012), although it is not a direct evaluation tool.

Objective

Organizations invest heavily in employee training, making understanding the utility and impact of training projects on performance vital. Using a reliable tool to assess transfer and its factors is crucial. Training transfer is multidimensional, involving both on-the-job application and enabling conditions. TT and its factors are interconnected; understanding transfer requires insight into these conditions. Evaluation tools should measure either learning application or transfer-influencing factors like motivation, well-being, organizational support and context. Both are essential, as assessing transfer alone is partial, and measuring influences without outcomes risks missing the training’s purpose.

Schoeb *et al.* (2021) provided a systematic review on TT conceptualization and measurement, highlighting issues like inconsistent definitions, reliance on *ad hoc* instruments and limited reporting on context. However, their review only covered studies until 2016 and mainly described measurement practices without structured classification or psychometric analysis. Since then, research has expanded with new tools, cross-cultural validation and sector-specific adaptations. An updated synthesis is needed to include these developments and guide researchers and practitioners. Our scoping review aims to systematically map existing instruments, covering those measuring transfer outcomes and factors influencing it, offering a comprehensive overview.

Methods

Design

We used a systematic scoping review to map tools measuring training transfer. Scoping reviews synthesize knowledge by mapping literature, highlighting concepts, theories, evidence sources and research gaps (Arksey and O’malley, 2005; Tricco *et al.*, 2018). This method suited our broad field, which includes diverse tools across disciplines, helping examine the research scope (Arksey and O’malley, 2005; Munn *et al.*, 2018). It also aids in identifying evidence types and defining key concepts, crucial for classifying measurement tools (Peters *et al.*, 2015). Unlike systematic reviews focused on intervention effectiveness,

ours was exploratory, aiming to overview existing training transfer measurement tools. The framework followed [Arksey and O'Malley \(2005\)](#), enhanced by [Levac et al. \(2010\)](#) and reported per PRISMA-ScR guidelines ([Tricco et al., 2018](#)).

Search strategy

A literature search was conducted involving the consultation of seven databases (up to May 2025): MEDLINE, Embase, Cinahl, Scopus, Web of Science, ERIC and PsycINFO. The search strategy used combined terms using the Boolean operators “AND” and “OR” with the following string: (training transfer OR transfer of learning) AND (assessment OR validation OR instrument* OR evaluation OR tool* OR scale). Documents with full text in languages other than Italian or English were excluded. No filters were applied based on the year of publication, as TT has been a well-known concept in the literature since 1901, initially discussed in psychological studies conducted by [Thorndike and Woodworth \(1901\)](#).

Inclusion and exclusion criteria

Suitable publications met research criteria and included studies on TT, focusing on methods, measurement tools, validation and reliability testing (e.g. Cronbach's alpha and factor analysis). Exclusions covered academic settings, models/theories, qualitative studies, non-relevant TT descriptions and official manuals. Publications like volumes or manuals were also excluded.

Study selection

The process involved a structured sequence with six co-authors reviewing studies independently for eligibility. All records were first screened by title and abstract, ensuring at least two researchers evaluated each. Then, three researchers independently assessed full texts against criteria. If consensus was not reached, then a third researcher gave an opinion for a final decision.

Charting the data

EF, MA, PDF and CP extracted data from the included articles using a data extraction table including the following information: date, country and author, method/research design, research setting, item numbers, data collection strategy, sample, theory/model of TT, definition of TT and validation process. All authors commented on the data extraction table and agreed on its final version. Please see the data extraction table in the Supplementary Materials (Table S1).

Collating, summarizing and reporting results

LG, MA, PDF, EF and CR analyzed articles to identify common characteristics, using data from a previous table. They found differences in instruments, especially in construction, validation and interpretation. Instruments were categorized into three types: standalone, composed and tailored, based on their features. Standalone instruments are fully developed and validated tools. Composed tools combine items from existing instruments, often without full validation. Tailored instruments are custom-made for specific contexts, prioritizing relevance over broad applicability. This classification helped analyze each tool's rigor, theoretical foundation and practical use.

Results

Search outcomes

The search involved seven databases, initially finding 1,748 records. After removing duplicates, 1,252 records remained, with 320 eligible for review. The reviewers examined full texts and included 45 studies. The PRISMA flowchart is shown in [Figure 1](#).

Countries of the studies

Most studies originate from the USA, with 9 of 45, and the country also leads in international collaborations, including with South Korea, Iran, Portugal, Jordan, Belgium, Ukraine,

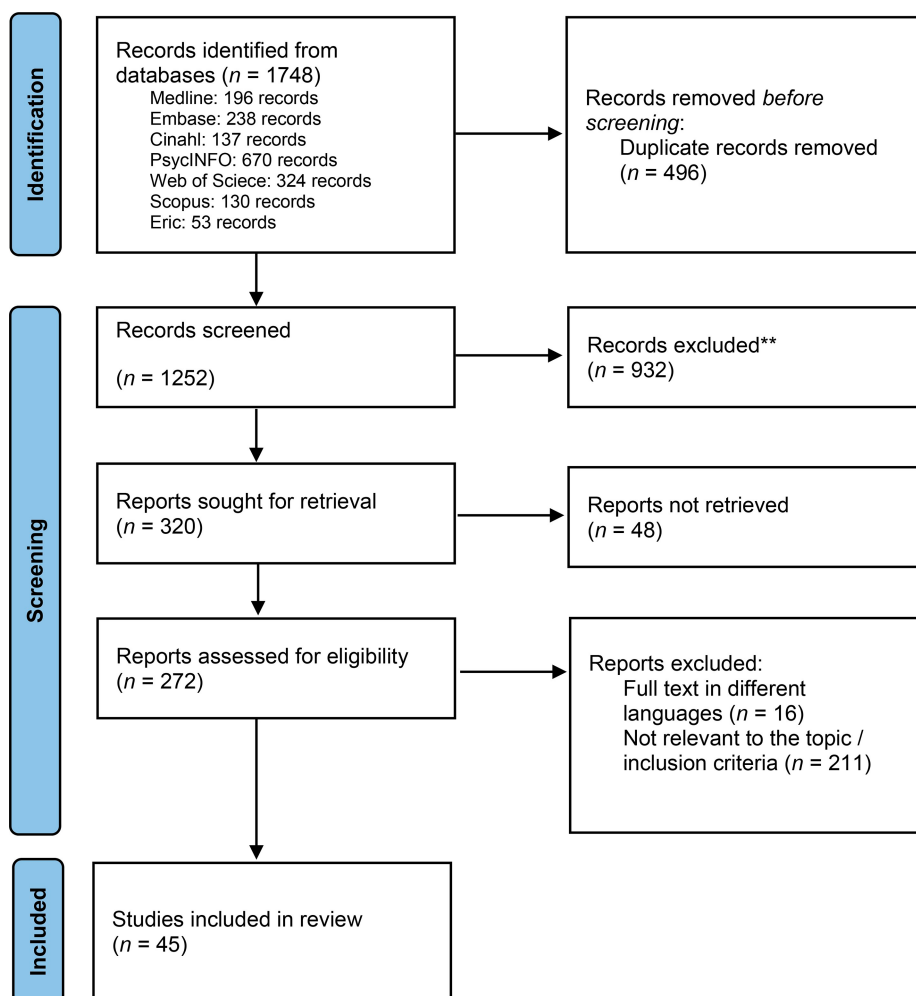


Figure 1. PRISMA flowchart

Source: Authors' own work

Taiwan and Cyprus. Seven studies are from Spain, with collaborations involving Thailand, Germany, Mexico, South Korea and China. Nearly all continents are represented (Figure 2).

Research methods of the studies

Ten studies report cross-cultural validations, five use mixed-methods, three are survey-based and six are longitudinal. Almost all are from 2000 onward, except Facteau et al. (1995).

Studies' population

Most studies were mixed ($n = 13$), encompassing both public/private sectors, as well as industrial/managerial domains, and profit/non-profit settings. Four studies (9%) involved health care. Six engaged government/public employees, four in education targeting teachers, three in banking and eight (18%) in healthcare professionals, such as nurses, physicians, pharmacists and midwives, six exclusively in nursing. Two studies focused on agriculture. The studies included are listed in Table 1.

A total of 24,096 participants are included across studies. The largest study had 5,990 participants (Bates et al., 2012). Data were from organizations in 17 countries, using 14 languages of the Learning Transfer System Inventory (LTSI). Respondents worked in health care, banking, insurance, IT, government, manufacturing, engineering, higher education, telecommunications, petroleum, retail, hotel and transportation. Roles included nurses, teachers, engineers, technicians and more. The smallest group involved 46 nurse specialists in training programs in the Chinese Indonesian study by Hanum et al. (2024).

Application of the training transfer assessment

Nine studies commenced administration of the TT evaluation tool immediately after the conclusion of the training course or within approximately two weeks thereafter. Ten administered it at least three months post-course completion, four articles administered it

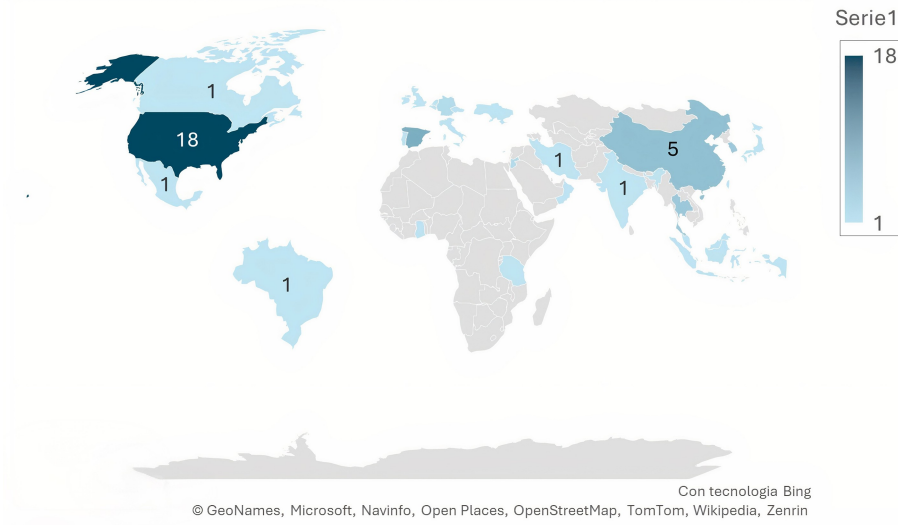


Figure 2. Geographical map of the studies
Source: Authors' own work

Table 1. Studies included

Author/Year	Country	Tool/Items	Context
Kim <i>et al.</i> (2019)	South Korea/The USA	LTSI Version 4, 48 items	Industry
Celestin and Yunfei (2018)	China/Thailand	LTSI Version 4, 48 items	School
Zamani <i>et al.</i> (2016)	Iran/The USA	LTSI, unclear the number of items	Agriculture
Bates <i>et al.</i> (2012)	The USA	LTSI Version 3, 89 items	Mixed
Velada <i>et al.</i> (2009)	Portugal/The USA	LTSI Version 3, 89 items	Mixed
Yaghi <i>et al.</i> (2008)	Jordan/The USA	LTSI Version 3, 89 items	Mixed
Devos <i>et al.</i> (2007)	Belgium/The USA	Composed with LTSI	Mixed
Yankovenko <i>et al.</i> (2007)	Ukraine/The USA	LTSI Version 3, 89 items	Mixed
Khasawneh <i>et al.</i> (2006)	Jordan/The USA	LTSI Version 3, 89 items	Mixed
Kirwan and Birchall (2006)	Ireland/The UK	LTSI Version 2	Nursing
Chen <i>et al.</i> (2005)	Taiwan/The USA	LTSI Version 3, 89 items	Mixed
Yamhill and McLean (2005)	Thailand	LTSI Version 3, 89 items	Mixed
Holton <i>et al.</i> (2000)	The USA	LTSI Version 2, 112 items	Mixed
Moon <i>et al.</i> (2019)	South Korea	LTSI Version 2	Industry
Celestin <i>et al.</i> (2023)	China/Ghana	LTSI version 4, 48 items	School
Bai <i>et al.</i> (2018)	China	FITT, 53 items	Nursing
Hanum <i>et al.</i> (2024)	Indonesia/China	FITT, 53 items	Nursing
Quesada-Pallarés <i>et al.</i> (2018)	Spain/Mexico	Transfer Questionnaire, 32 items	School
Sseguya <i>et al.</i> (2018)	Tanzania	The Likert scales (predictor variables) for measurement of training transfer, 30 items	Agriculture
Lee <i>et al.</i> (2017)	South Korea	The measurement training transfer tool	Government/public administration
Nafukho <i>et al.</i> (2017)	USA	The transfer of learning instrument	Unclear
Park <i>et al.</i> (2017)	South Korea		Mixed
Awais Bhatti <i>et al.</i> (2014)	Malaysia		Banking
Ciraso (2012)	Spain	54 items	School
Lawler <i>et al.</i> (2012)	The USA	HSTEP + TPQ, 68 items	Psychological support/social work
Pilati and Borges (2012)	Brazil		Banking
Quesada-Pallares (2012)	Spain	MEVIT, 28 items	Government/public administration

(continued)

Table 1. Continued

Author/Year	Country	Tool/Items	Context
Mann <i>et al.</i> (2009)	Canada	Three-month follow-up questionnaire	Healthcare
Chiaburu and Lindsay (2008)	The USA	36 items	Unclear
Liebermann and Hoffmann (2008)	Germany		Banking
Hutchins and Burke (2007)	The USA	32 items	Mixed
El-Said <i>et al.</i> (2020)	Oman	27 items	Tourism
Kontoghiorghe (2004)	Cyprus/The USA	109 items	Industry
Nickerson <i>et al.</i> (2019)	The USA		Psychological support/social work
Kodwani (2017)	India		Government/public administration
Facteau <i>et al.</i> (1995)	The USA	85 items	Government/public administration
Hakvoort <i>et al.</i> (2025)	The Netherlands	LTSI + LCQ, 58 items combined	Nursing
Schettino <i>et al.</i> (2024)	Italy/Czech Republic	16 items	Healthcare
Lin <i>et al.</i> (2024)	China	The training transfer scale of stroke specialist nurses, 37 items	Nursing
González Ortiz de Zárate <i>et al.</i> (2024)	Spain/Thailand	FPT and Cde, 30 + 7 items	Government/public administration
Dominguez-Falcón <i>et al.</i> (2021)	Spain/Thailand	FPT, 30 items	Industry
Opatha and Takahashi (2024)	Spain	20 items	Mixed
Arabi and Garza (2023)	Japan	126 items combined	Government/public administration
Gegenfurtner and Quesada-Pallarés (2022)	The USA	Trainee perception questionnaire (LTEM model)	Nursing
	Germany/Spain	TMQ	Mixed

Source(s): Authors' own work

from 1 to 3 months after course and three from one to 12 or 24 months after course. The remaining 19 (42%) either did not provide information or lacked clarity regarding the timing of tool administration.

Evaluation tools

From the instruments identified, three main categories emerge:

- (1) standalone instruments (mostly questionnaires created and tested by the studies themselves, $n = 24$), with 62.5% ($n = 15$) focusing on the LTSI;
- (2) multifactorial questionnaires using items from different studies ($n = 18$); and
- (3) tailored instruments related to specific training courses ($n = 3$).

Standalone instruments. In all, 15 articles (33%) used or validated the LTSI, with ten validating it in other languages through cross-cultural validation and two focusing on the psychometric testing of different versions for reliability and structure. Three studies used the LTSI without new validation. The main tool, the LTSI by [Holton et al. \(2000\)](#), comprises 89 items across 16 factors that affect training transfer, developed from [Rouiller and Goldstein's \(1993\)](#) 63-item questionnaire. [Bai et al. \(2018\)](#) developed the 53-item Factors Influencing Training Transfer (FITT) scale, validated in Chinese hospitals, based on [Baldwin and Ford's \(1988\)](#) model. [Hanum et al. \(2024\)](#) used FITT with 46 nurses.

Lv's 2021 Training Transfer Scale for Stroke Specialist Nurses has 37 items in five areas, scored on a five-point scale. [Ciraso \(2012\)](#) used a mixed-methods approach to develop a tool for assessing teachers' training transfer factors, based on a literature review and expert input, resulting in a 54-item questionnaire on a four-point Likert scale with six open-ended questions. [Quesada-Pallares \(2012\)](#) validated the MEVIT model, a questionnaire initially of 40 items on a five-point Likert scale, later reduced to 28, with five relevant factors, tested among Catalan public employees. [Lawler et al. \(2012\)](#) created the HSTEP, a five-item questionnaire covering the main areas of Kirkpatrick's training evaluation model. [González Ortiz de Zárate \(2024\)](#) and [González Ortiz de Zárate and McLean \(2022\)](#) used two original instruments, the Factors Predicting Transfer questionnaire (FPT) and the Questionnaire of Efficacy (CdE), in different contexts. The FPT comprises 30 items across four factors: satisfaction with training (10 items), content relevance (9 items), accountability (7 items) and motivation to transfer (4 items). The CdE has seven items on a single factor to assess transfer or the perceived application of knowledge and skills from training in the workplace. In the Learning-Transfer Evaluation Model, [Arabi and Garza \(2023\)](#) developed and validated the Trainee Perception Questionnaire (Table 2). Based on constructivist principles, it focuses on perception and feedback, using multiple-choice questions that are scored on various scales.

Composed tools. In all, 18 articles identified as using multifactorial instruments composed of item groups from different studies, typically associating each factor with a specific study/model. Seven of these also included LTSI items from [Holton et al.](#), making 22 studies using at least one LTSI item. Five articles ([Chiaburu and Lindsay, 2008](#); [Domínguez-Falcón et al., 2021](#); [El-Said et al., 2020](#); [Kodwani, 2017](#); [Nickerson et al., 2019](#)) cited items from Xiao's study in training transfer assessment.

Tailored instruments. Three studies developed and tested a tool to assess TT in a work context. The first ([Lee et al., 2017](#)) included general transfer questions based on literature and a transfer factors measure aligned with learning objectives, with reliability tested via Cronbach's alpha. Articles using at least one LTSI item totaled 23 (51%). The second ([Mann et al., 2009](#)) used a Three-Month Follow-Up Questionnaire to identify clinical practice changes and professional interactions, listing common change intentions. The third

Table 2. Factors included in the standalone evaluation tools

Tool	Item No.	Type of question	Timing	Factors
LTSI (version III)	89 items	Item is rated on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree)	Not reported	11-factor program-specific domain (63 items), these constructs include Learner Readiness, Motivation to Transfer Learning, Positive and Negative Personal Outcomes, Personal Capacity for Transfer, Peer Support, Supervisor Support, Supervisor Sanctions, Perceived Content Validity, Transfer Design and Opportunity to Use Learning; the five-factor training domain (26 items) are: Transfer Effort – Performance Expectations, Performance – Outcomes Expectations, Resistance/Openness to Change, Performance Self-Efficacy and Feedback/Performance Coaching
FITT	53 items	A seven-point Likert scale (1 = strongly disagree, 7 = strongly agree)	The nurses attended a wide variety of training programs one to three months before the administration of the survey	Five subscales: managerial support, hindrances in the organization, validity of training program, organizational and personal facilitators and personal attitude toward training transfer
MEVIT	28 items	A five-point Likert rating scale (1 strongly disagree and 5 strongly agree)	The tool was applied just before the end of training	From the analysis a model of five factors emerged: elements of control over transfer opportunities, motivational elements, elements of training and social context, attitudinal elements and elements of work context
HSTEP	5 items	Not reported	Three months after the training sessions	Designed to incorporate the four major areas or levels of training evaluation in Kirkpatrick's: 1) reaction/satisfaction, 2) learning, 3) behavior/TOL and 4) results of TOL

(continued)

Table 2. Continued

Tool	Item No.	Type of question	Timing	Factors
Cirasó's (2012)	60 items	Likert items, measured on a scale of four points (1: agree; 4: disagree) and six open-ended questions	Not reported	School organizational structures, school willingness to change, school planning, school climate, training design, link between training and school projects, motivation to transfer, personal implication, legitimacy of the change, usefulness of the change, role of the zone educational services; individual transfer; and center transfer
The training transfer scale of stroke specialist nurses	37 items	A Likert five-level scoring method was used to score the scale	Not reported	Five dimensions: attitude change, clinical nursing practice transformation, management education optimization, professional development and interpersonal communication
Factors predicting transfer questionnaire (FPT) and questionnaire of efficacy (CdE)	The FPT instrument contains 30 items; the CdE contains 7 items	Responses use a Likert-type scale of five points where 1 meant strongly disagree and 5 meant strongly agree for both questionnaire	FPT was administered at the end of training; four months later, the CdE instrument was applied to those participants who completed the first questionnaire	The FPT instrument contains four factors first, satisfaction with the training contains, second, content relevance, third, accountability and, finally, motivation to transfer; the CdE organized around a single factor; it assesses transfer
Trainee perception questionnaire	Not reported	The items were multiple-choice rather than developed in Likert scales (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree)	It was administered online one month after the training	The instruments included assessments for pre-, post- and delayed posttests, based on Tier 4: Knowledge, Tier 5: Decision-making competence, Tier 6: Task competence, two perception questionnaires based on Tier 3: Learner perceptions and a competency evaluation form based on Tier 7: Transfer

Source(s): Authors' own work

(Schettino *et al.*, 2024) used an online questionnaire to measure the Theory of Planned Behavior constructs – transfer intention, attitude, norms and perceived control – and variables related to massive open online courses (MOOCs), professionalism and organizational learning.

Definitions of and factors involved in training transfer. In this review, 17 articles did not define TT or assign it to an author. The most used definition is Baldwin and Ford (1988), describing TT as “the degree to which trainees apply their gained knowledge, skills, behaviors, and attitudes to their jobs.” Similar definitions appeared in 14 studies (El-Said *et al.*, 2020; González Ortiz de Zárate *et al.*, 2024; González Ortiz de Zárate and McLean, 2022; Hakvoort *et al.*, 2025; Hutchins and Burke, 2007; Kodwani, 2017; Lee *et al.*, 2017; Lin *et al.*, 2024; Nafukho *et al.*, 2017; Park *et al.*, 2017; Pilati and Borges, 2012; Quesada-Pallares, 2012; Quesada-Pallarès *et al.*, 2018; Yamkovenko *et al.*, 2007).

Table 2 summarizes key training transfer assessment tools, outlining their structure, focus and theories. The LTSI has 16 factors across two domains – program-specific and general environment – covering individual, relational and organizational influences. Tools like FITT and MEVIT evaluate support, perceived value, motivation and self-efficacy. HSTEP aligns with Kirkpatrick’s framework, being more concise. Sector-specific tools for education and health care include constructs like organizational climate and change legitimacy. These tools offer diverse, validated options for various settings and populations.

Core dimensions considered by the tools. A detailed analysis of TT tools shows convergence on core dimensions that underpin transfer, providing a nuanced understanding of their scope and relevance. These are five main themes: learner characteristics, training design and validity, support systems, contextual factors and outcome measures.

The first domain encompasses constructs such as learner readiness, motivation to transfer, self-efficacy and personal attitudes – factors that reflect the learner’s internal disposition and perceived capacity to apply training. For instance, instruments like the FITT (Bai *et al.*, 2018) and MEVIT (Quesada-Pallares, 2012) include measures of personal attitudes toward transfer and perceived self-efficacy, while the LTSI distinguishes both domain-specific and general motivational variables (Bates *et al.*, 2012; Holton *et al.*, 2000).

The second domain pertains to the perceived relevance, coherence and instructional quality of the training itself, often operationalized through constructs like content validity and transfer design. This is especially emphasized in tools like the LTSI (Bates *et al.*, 2012; Holton *et al.*, 2000), MEVIT (Quesada-Pallares, 2012) and the instrument designed by Ciraso (2012), which assess how well the training content aligns with real-world job tasks and expectations.

The third domain captures the influence of the social environment, including peer and supervisor support, managerial encouragement and feedback mechanisms. These are widely represented in the LTSI (Bates *et al.*, 2012; Holton *et al.*, 2000) and FITT (Bai *et al.*, 2018), where constructs such as supervisory sanctions or performance feedback are central to measuring perceived transfer climate.

The fourth domain encompasses broader contextual and structural elements, including organizational culture, planning, systemic facilitators or barriers and access to resources. These are often assessed using tailored instruments and composed tools assembled for sector-specific evaluations, such as those in public administration or education. Ciraso’s questionnaire (2012), for example, considers the legitimacy and usefulness of change within institutional settings.

Finally, the fifth domain concerns evaluative outcomes often linked to Kirkpatrick’s framework (Kirkpatrick, 1959). While this model includes four levels – reaction (satisfaction), learning, behavior and results – only Level 3 (behavior) directly reflects TT, as

it measures changes in on-the-job performance. Level 4 (results) represents the organizational consequences of transfer rather than transfer itself. Although outcome measures appear less frequently in transfer instruments than process-related factors, some tools – such as HSTEP – incorporate elements aligned with these higher levels, thereby connecting individual behavioral change to organizational performance indicators.

Discussion

TT assessment is essential for measuring how training programs affect workplace performance. As organizations aim to maximize their training investments and improve employee skills, understanding the factors that influence TT is crucial. In this thorough review, we examined the current TT assessment tools, highlighted main challenges and suggested directions for future research and improvement. TT is a complex phenomenon (Baldwin and Ford, 1988; Ford and Weissbein, 1997; Holton *et al.*, 2000; Kauffeld *et al.*, 2025; Mehner *et al.*, 2025; Noe, 1986; Rouiller and Goldstein, 1993; Schoeb *et al.*, 2021). The process spans from pre-training to applying skills beyond initial goals (Bates *et al.*, 2012). Holton's "transfer system" highlights perceptions (motivation, self-efficacy and expectations), training factors (content and activities) and context (super support, norms and rewards) as key to understanding learning transfer. Knowing this system helps promote learning outcomes (Bates *et al.*, 2012).

The review revealed diverse TT assessment tools, ranging from standalone instruments to tailored approaches designed for specific contexts. Notable instruments include the LTSI (Bates *et al.*, 2012; Holton *et al.*, 2000), the Factors Influencing the Training Transfer questionnaire (Bai *et al.*, 2018), the MEVIT (Quesada-Pallares, 2012), the HSTEP (Lawler *et al.*, 2012), the questionnaire designed by Ciraso (2012), the FPT and the CdE (González Ortiz de Zárate *et al.*, 2024; González Ortiz de Zárate and McLean, 2022), the Training Transfer Scale of Stroke Specialist Nurses (Lin *et al.*, 2024) and the Trainee Perception Questionnaire (Arabi and Garza, 2023). Each instrument offers unique insights into the factors influencing TT, encompassing managerial support, organizational obstacles, program validity and individual attitudes toward training transfer.

A notable oversight in research is the lack of focus on adult learning's context-specificities and objectives (Bates *et al.*, 2012). These environments are complex, shaped by culture, organizations and personal experiences (Knowles, 1980; Merriam and Caffarella, 1999). Validation challenges arise from context-specific epistemology, limiting generalizability (Bai *et al.*, 2018; Ciraso, 2012). Small samples and representativeness issues necessitate better validation (Arabi and Garza, 2023; Quesada-Pallares, 2012). Though the LTSI is popular, validating mainly in industrial sectors raises questions about its broader use (Bai *et al.*, 2018). Experts call for "situation-specific scales" because of limited validation in diverse fields, such as nursing (Hakvoort *et al.*, 2025).

Besides, balancing specificity and generalizability necessitates a nuanced approach to validation, considering diverse contexts and populations (Bai *et al.*, 2018; Stremersch *et al.*, 2023).

The discussion on TT assessment tools highlights concepts like validity generalization and situational specificity, emphasizing behavioral variability across situations (Tiffany and Tiffany, 2007). Validity generalization informs on generalizability but may miss cross-situational behavior nuances. Both approaches have pros and cons, but their combined use can illuminate behavioral patterns in organizations (LeBreton *et al.*, 2017), especially regarding TT at work. Incorporating mixed methods and collaborative research can deepen understanding of TT dynamics and ensure cultural sensitivity (Grand-Guillaume-Perrenoud *et al.*, 2023). Cross-cultural validation is vital to adapt tools across diverse contexts (Devos *et al.*, 2007). While validated instruments provide certainty, *ad hoc* tools may be necessary in specific settings, highlighting the importance of assessing factors that influence TT beyond

training programs. The development of instruments in transversal settings represents a positive trend, particularly in health-care and nursing contexts (Bai *et al.*, 2018; Hakvoort *et al.*, 2025; Lin *et al.*, 2024). However, critical considerations such as pre-training analyses and longitudinal application warrant attention. While prevalent, proposals related to LTSI face challenges, including discrepancies in factor solution and limited validation in diverse contexts. Collaboration and methodological innovation are essential for addressing these challenges and advancing TT assessment methods effectively.

Bridging theory and practice: Selecting and applying training transfer assessment tools

Organizations aiming to maximize training investments must accurately assess TT on workplace performance. TT assessment tools vary; some are suited to specific contexts, while others have broader applications. Bridging theory and practice requires careful selection of tools, design of training and evaluation of outcomes. The LTSI is widely adopted and validated, used across diverse organizations and cultures. It encompasses factors such as individual readiness, motivation, peer and supervisor support, transfer design and organizational environment, emphasizing both individual and contextual elements. Its main strengths are extensive validation and versatility; however, some concerns remain about its psychometric properties, particularly construct validity and reliability across different populations (Bai *et al.*, 2018; Hakvoort *et al.*, 2025). While the LTSI is a strong instrument, its effectiveness is most evident in the contexts for which it was initially developed and validated. Recent studies reveal new assessment tools suited for nursing, developed to match health-care needs and organizational dynamics, aiding accurate training transfer evaluation. The FITT Questionnaire (Bai *et al.*, 2018), used by Hanum *et al.* (2024), is tailored for nursing, addressing Chinese health-care context. While validated for nursing, its limited cross-cultural validation restricts broader application. Organizations in different cultures should be cautious in applying FITT without further validation.

Within nursing, domain-specific needs have led to tools like the Training Transfer Scale for Stroke Specialist Nurses by Lin *et al.* (2024), designed for stroke care challenges but limited outside this setting. Additionally, Hakvoort *et al.* (2025) validated the LTSI in nursing, along with the Learning Climate Questionnaire, which assesses organizational support, autonomy and feedback that affect transfer. These tools enhance the understanding of individual and contextual factors that influence transfer in health care, especially among nurses.

In Spain, the FPT and CdE instruments, using general referent items, have been validated and used by González Ortiz de Zárate *et al.* (2024) and González Ortiz de Zárate and McLean (2022). These tools could apply across various settings, but further research is needed to verify their relevance in different cultural contexts. Also in Spain, Quesada-Pallares (2012) created an instrument within the MEVIT for Public Administration employees, which, with cross-cultural adaptation, could be used in similar contexts. For schools, Ciraso (2012) developed an instrument to assess training transfer among teachers in Barcelona, showing relevance there but requiring adaptation for other settings.

Contribution to theory

This review enhances TT measurement understanding in three ways. First, by mapping instruments and their constructs, it clarifies the boundaries between transfer outcomes and determinants, addressing prior ambiguity (Schoeb *et al.*, 2021). This distinction is vital, as transfer is both a behavioral outcome and a process influenced by individual, training and organizational factors. Second, classifying tools as standalone, composed and tailored offers a framework for linking measurement strategies to validity and transfer models. Third, identifying gaps in cross-cultural validation and sector-specific adaptation emphasizes the

need for context-aware theory, as moderators like norms, resources and culture influence transfer's feasibility and meaning. Future work should incorporate measurement–context interactions to better explain transfer variability.

Future research implications

Addressing these challenges requires a multifaceted approach with rigorous validation, cultural sensitivity and broader context considerations. Cross-cultural validation efforts are needed to ensure TT assessment tools work across diverse settings (Hitchcock *et al.*, 2006). International collaborations can develop culturally sensitive instruments that capture TT nuances. Methodological innovations, such as mixed-methods approaches combining quantitative and qualitative methods (Onwuegbuzie and Hitchcock, 2017), can enhance reliability and validity. Longitudinal studies can assess the sustainability of TT outcomes. Future research should develop adaptive tools tailored to organizational needs, providing more accurate insights. Reviews should include multilingual studies, different regions, grey literature and focus on low- and middle-income countries to ensure a comprehensive evidence base.

Practical implications

Organizations can use TT assessment tools to enhance workplace learning by identifying barriers and enablers, such as motivation, training quality and support, then making evidence-based adjustments, including active learning and coaching. These results help shape policies and resource allocation to strengthen the transfer climate, boosting ROI and fostering continuous improvement. In education, TT assessment supports adjustments to curriculum and instruction, linking classroom learning to workplace practice. Overall, TT tools support evidence-based decisions, fostering a culture of continuous learning that enhances employee performance and organizational effectiveness.

Strengths and limitations

This scoping review has several strengths, including a rigorous and transparent methodology aligned with the PRISMA-ScR guidelines (Tricco *et al.*, 2018), as well as a comprehensive search across six databases from diverse disciplines. It offers valuable insights for decision-makers and training managers on measuring workplace TT. However, it primarily focuses on English-language literature, which may introduce a geographic bias by overlooking studies in other languages. The exclusion of grey literature and older studies limits the scope, and most research originates from high-income countries, particularly the USA, so the findings may not be applicable globally.

Conclusions

This review of 45 studies mapped instruments measuring TT and its factors in workplace learning, identifying three types (standalone, composed and tailored) and five key domains for transfer: learner traits, training design, organizational support, contextual factors and outcomes. It confirms that TT measurement remains fragmented, with variability in clarity, validity and applicability. While LTSI dominates, concerns about its validity and scope exist. The review reveals gaps: few tools cover all domains, mainly relying on self-report, risking bias. Addressing this involves improving methodologies – longitudinal, mixed methods and multi-source – and creating adaptive tools that blend core concepts with context. This will bolster TT research and practical application, helping organizations, policymakers and educators.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

References

- Aguinis, H. and Kraiger, K. (2009), "Benefits of training and development for individuals and teams, organizations, and society", *Annual Review of Psychology*, Vol. 60 No. 1, pp. 451-474.
- Alvarez, K., Salas, E. and Garofano, C.M. (2004), "An integrated model of training evaluation and effectiveness", *Human Resource Development Review*, Vol. 3 No. 4, pp. 385-416.
- Arabi, E. and Garza, T. (2023), "Training design enhancement through training evaluation: effects on training transfer", *International Journal of Training and Development*, Vol. 27 No. 2, pp. 191-219.
- Arksey, H. and O'malley, L. (2005), "Scoping studies: towards a methodological framework", *International Journal of Social Research Methodology*, Vol. 8 No. 1, pp. 19-32.
- Avolio, B.J., Avey, J.B. and Quisenberry, D. (2010), "Estimating return on leadership development investment", *The Leadership Quarterly*, Vol. 21 No. 4, pp. 633-644.
- Awais Bhatti, M., Ali, S., Mohd Isa, M.F. and Mohamed Battour, M. (2014), "Training transfer and transfer motivation: the influence of individual, environmental, situational, training design, and affective reaction factors", *Performance Improvement Quarterly*, Vol. 27 No. 1, pp. 51-82.
- Bai, Y., Li, J., Bai, Y., Ma, W., Yang, X. and Ma, F. (2018), "Development and validation of a questionnaire to evaluate the factors influencing training transfer among nursing professionals", *BMC Health Serv. Res.*, Vol. 18, pp. 1-9.
- Baldwin, T.T. and Ford, J.K. (1988), "Transfer of training: a review and directions for future research", *Personnel Psychology*, Vol. 41 No. 1, pp. 63-105.
- Baldwin, T.T., Kevin Ford, J. and Blume, B.D. (2017), "The state of transfer of training research: moving toward more consumer-centric inquiry", *Human Resource Development Quarterly*, Vol. 28 No. 1, pp. 17-28.
- Bates, R., Holton, E.F., III, and Hatala, J.P. (2012), "A revised learning transfer system inventory: factorial replication and validation", *Human Resource Development International*, Vol. 15 No. 5, pp. 549-569.
- Bell, B.S., Tannenbaum, S.I., Ford, J.K., Noe, R.A. and Kraiger, K. (2017), "100 Years of training and development research: what we know and where we should go", *Journal of Applied Psychology*, Vol. 102 No. 3, p. 305.
- Blume, B.D., Ford, J.K. and Huang, J.L. (2024), "Transfer of informal learning: the role of manager support in linking learning to performance", *Business Horizons*, Vol. 67 No. 2, pp. 125-136.
- Blume, B.D., Ford, J.K., Baldwin, T.T. and Huang, J.L. (2010), "Transfer of training: a meta-analytic review", *Journal of Management*, Vol. 36 No. 4, pp. 1065-1105.
- Burke, L.A. and Hutchins, H.M. (2007), "Training transfer: an integrative literature review", *Human Resource Development Review*, Vol. 6 No. 3, pp. 263-296.
- Celestin, B.N. and Yunfei, S. (2018), "The impact of learner characteristics on training transfer expectation: a survey of Thai teachers' perception of cloud computing tools", *International Journal of Training and Development*, Vol. 22 No. 4, pp. 256-273.
- Celestin, B.N., Emmanuel, T. and Dorcas, K.D. (2023), "Validation of learning transfer inventory system (LTIS) in Cameroon teachers: measurement invariance and latent mean difference across sex", *Journal of Psychology in Africa*, Vol. 33 No. 3, pp. 276-285.
- Chen, H.-C., Holton, E.F. III, and Bates, R. (2005), "Development and validation of the learning transfer system inventory in Taiwan", *Human Resource Development Quarterly*, Vol. 16 No. 1, pp. 55-84.

- Chiaburu, D.S. and Lindsay, D.R. (2008), "Can do or will do? The importance of self-efficacy and instrumentality for training transfer", *Human Resource Development International*, Vol. 11 No. 2, pp. 199-206.
- Ciraso, A. (2012), "An evaluation of the effectiveness of teacher training: some results from a study on the transfer factors of teacher training in Barcelona area", *Procedia – Social and Behavioral Sciences*, Vol. 46, pp. 1776-1780.
- Devos, C., Dumay, X., Bonami, M., Bates, R. and Holton, E. III, (2007), "The learning transfer system inventory (LTSI) translated into French: internal structure and predictive validity", *International Journal of Training and Development*, Vol. 11 No. 3, pp. 181-199.
- Domínguez-Falcón, C., Fernández-Monroy, M., Galván-Sánchez, I. and Ballesteros-Rodríguez, J.L. (2021), "Training as an internal marketing tool within the franchise system", *Journal of Service Theory and Practice*, Vol. 31 No. 3, pp. 396-422.
- El-Said, O.A., Al Hajri, B. and Smith, M. (2020), "An empirical examination of the antecedents of training transfer in hotels: the moderating role of supervisor support", *International Journal of Contemporary Hospitality Management*, Vol. 32 No. 11, pp. 3391-3417.
- Facteau, J.D., Dobbins, G.H., Russell, J.E., Ladd, R.T. and Kudisch, J.D. (1995), "The influence of general perceptions of the training environment on pretraining motivation and perceived training transfer", *Journal of Management*, Vol. 21 No. 1, pp. 1-25.
- Ford, J.K. and Weissbein, D.A. (1997), "Transfer of training: an updated review and analysis", *Performance Improvement Quarterly*, Vol. 10 No. 2, pp. 22-41.
- Ford, J.K., Yelon, S.L. and Billington, A.Q. (2011), "How much is transferred from training to the job? The 10% delusion as a catalyst for thinking about transfer", *Performance Improvement Quarterly*, Vol. 24 No. 2, pp. 7-24.
- Gegenfurtner, A. and Quesada-Pallarès, C. (2022), "Toward a multidimensional conceptualization of motivation to transfer training: validation of the transfer motivation questionnaire from a self-determination theory perspective using bifactor-ESEM", *Studies in Educational Evaluation*, Vol. 73, p. 101116.
- Gist, M.E., Stevens, C.K. and Bavetta, A.G. (1991), "Effects of self-efficacy and post-training intervention on the acquisition and maintenance of complex interpersonal skills", *Pers. Psychol.*, Vol. 44, pp. 837-861.
- González Ortiz de Zárate, A. and McLean, G.N. (2022), "General vs. Specific-referent instruments to measure training transfer in a transportation organization in Canada", *Educar*, Vol. 58 No. 1, pp. 85-101.
- González Ortiz de Zárate, A., Alonso García, M.A., Quesada-Pallarès, C., Berrocal Berrocal, F. and McLean, G.N. (2024), "What is the relation between training transfer evaluation factors and training transfer when measured in the Spanish public administration?", *The International Journal of Human Resource Management*, Vol. 35 No. 18, pp. 3112-3144.
- Grand-Guillaume-Perrenoud, J.A., Geese, F., Uhlmann, K., Blasimann, A., Wagner, F.L., Neubauer, F.B., Huwendiek, S., Hahn, S. and Schmitt, K.-U. (2023), "Mixed methods instrument validation: Evaluation procedures for practitioners developed from the validation of the Swiss instrument for evaluating interprofessional collaboration", *BMC Health Services Research*, Vol. 23 No. 1, p. 83.
- Hakvoort, L., Dikken, J., van der Schaaf, M. and Schuurmans, M. (2025), "Integrated measure for training transfer in nursing practice: development and validation study", *Nurse Education Today*, Vol. 144, p. 106482.
- Hanum, A.L., Hu, Q., Wei, W. and Ma, F. (2024), "A longitudinal assessment of factors affecting training transfer among new clinical nurse specialists", *International Journal of Nursing Sciences*, Vol. 11 No. 3, pp. 308-314.
- Hitchcock, J.H., Sarkar, S., Nastasi, B.K., Burkholder, G., Varjas, K. and Jayasena, A. (2006), "Validating culture and gender-specific constructs: a mixed-method approach to advance assessment procedures in cross-cultural settings", *Journal of Applied School Psychology*, Vol. 22 No. 2, pp. 13-33.

- Holton, E.F. III, Bates, R.A. and Ruona, W.E. (2000), "Development of a generalized learning transfer system inventory", *Human Resource Development Quarterly*, Vol. 11 No. 4, pp. 333-360.
- Hutchins, H.M. and Burke, L.A. (2007), "Identifying trainers' knowledge of training transfer research findings—closing the gap between research and practice", *International Journal of Training and Development*, Vol. 11 No. 4, pp. 236-264.
- Kauffeld, S., Decius, J. and Graßmann, C. (2025), "Learning and transfer in organisations: how it works and can be supported", *European Journal of Work and Organizational Psychology*, Vol. 34 No. 2.
- Khasawneh, S., Bates, R. and Holton, E.F. III, (2006), "Construct validation of an Arabic version of the learning transfer system inventory for use in Jordan", *International Journal of Training and Development*, Vol. 10 No. 3, pp. 180-194.
- Kim, J. and Belzer, A. (2021), "Return on investment for adult basic education: existing evidence and future directions", *Adult Education Quarterly*, Vol. 71 No. 4, pp. 356-372.
- Kim, J., Bates, R.A. and Song, J.H. (2019), "Validation of the learning transfer system inventory (LTSI) in the Korean corporate context", *Human Resource Development International*, Vol. 22 No. 3, pp. 217-234.
- Kirkpatrick, D.L. (1959), "Techniques for evaluating training programs", *J. Am. Soc. Train. Dir.*, Vol. 13, pp. 21-26.
- Kirwan, C. and Birchall, D. (2006), "Transfer of learning from management development programmes: testing the Holton model", *International Journal of Training and Development*, Vol. 10 No. 4, pp. 252-268.
- Knowles, M.S. (1980), "From pedagogy to andragogy", *Relig. Educ.*
- Kodwani, A.D. (2017), "Decoding training effectiveness: the role of organisational factors", *Journal of Workplace Learning*, Vol. 29 No. 3, pp. 200-216.
- Kontoghiorghes, C. (2004), "Reconceptualizing the learning transfer conceptual framework: empirical validation of a new systemic model", *International Journal of Training and Development*, Vol. 8 No. 3, pp. 210-221.
- Lawler, M.J., Curry, D., Donnenwirth, J., Mangrich, M.E. and Times, T.N. (2012), "Assessing transfer-of-learning potential with human services professionals", *Journal of Social Service Research*, Vol. 38 No. 3, pp. 402-412.
- LeBreton, J.M., Schoen, J.L. and James, L.R. (2017), "Situational specificity, validity generalization, and the future of psychometric meta-analysis, in: handbook of employee selection", *Routledge*, pp. 93-114.
- Lee, C., Jeon, D., Kim, W. and Lee, J. (2017), "Evaluating training for new government officials: a case study using the success case method", *Public Personnel Management*, Vol. 46 No. 4, pp. 419-444.
- Levac, D., Colquhoun, H. and O'Brien, K.K. (2010), "Scoping studies: advancing the methodology", *Implement. Sci.*, Vol. 5, pp. 1-9.
- Liebermann, S. and Hoffmann, S. (2008), "The impact of practical relevance on training transfer: evidence from a service quality training program for German bank clerks", *International Journal of Training and Development*, Vol. 12 No. 2, pp. 74-86.
- Lim, D.H. and Morris, M.L. (2006), "Influence of trainee characteristics, instructional satisfaction, and organizational climate on perceived learning and training transfer", *Human Resource Development Quarterly*, Vol. 17 No. 1, pp. 85-115.
- Lin, W., Zhang, P., Li, Y., Li, S., Fang, Z. and Zhang, H. (2024), "Enhancing training transfer among stroke specialist nurses: Insights from latent profile analysis", *Nurse Education in Practice*, Vol. 81, p. 104180.
- Mann, K., Sargeant, J. and Hill, T. (2009), "Knowledge translation in interprofessional education: what difference does interprofessional education make to practice?", *Learning in Health and Social Care*, Vol. 8 No. 3, pp. 154-164.
- Mehner, L., Rothenbusch, S. and Kauffeld, S. (2025), "How to maximize the impact of workplace training: a mixed-method analysis of social support, training transfer and knowledge sharing", *European Journal of Work and Organizational Psychology*, Vol. 34 No. 2, pp. 201-217.

-
- Merriam, S.B. and Caffarella, R.S. (1999), *Learning in Adulthood: A Comprehensive Guide*, 2nd ed Jossey-Bass Publishers, San Francisco.
- Moon, H., Ryu, D. and Jeon, D. (2019), "The evaluation of learning transfer of industry skills council (ISC) training programs using success case method: reinforcing role and function of ISC", *European Journal of Training and Development*, Vol. 43 Nos 5-6, pp. 570-591.
- Munn, Z., Stern, C., Aromataris, E., Lockwood, C. and Jordan, Z. (2018), "What kind of systematic review should I conduct? A proposed typology and guidance for systematic reviewers in the medical and health sciences", *BMC Med. Res. Methodol*, Vol. 18, pp. 1-9.
- Nafukho, F.M., Alfred, M., Chakraborty, M., Johnson, M. and Cherrstrom, C.A. (2017), "Predicting workplace transfer of learning: a study of adult learners enrolled in a continuing professional education training program", *European Journal of Training and Development*, Vol. 41 No. 4, pp. 327-353.
- Nakash, M. and Bouhnik, D. (2022), "Can return on investment in knowledge management initiatives in organizations be measured?", *Aslib Journal of Information Management*, Vol. 74 No. 3, pp. 417-431.
- Nickerson, A.B., Cook, E.E., Cruz, M.A. and Parks, T.W. (2019), "Transfer of school crisis prevention and intervention training, knowledge, and skills: training, trainee, and work environment predictors", *School Psychology Review*, Vol. 48 No. 3, pp. 237-250.
- Nimante, D., Kokare, M., Baranova, S. and Surikova, S. (2025), "Transferring results of professional development into practice: a scoping review", *Education Sciences*, Vol. 15 No. 1, p. 95.
- Noe, R.A. (1986), "Trainees' attributes and attitudes: neglected influences on training effectiveness", *The Academy of Management Review*, Vol. 11 No. 4, pp. 736-749.
- Onwuegbuzie, A.J. and Hitchcock, J.H. (2017), "A meta-framework for conducting mixed methods impact evaluations: implications for altering practice and the teaching of evaluation", *Studies in Educational Evaluation*, Vol. 53, pp. 55-68.
- Opatha, I.M. and Takahashi, Y. (2024), "Does social and organizational support moderate emotional intelligence training effectiveness?", *Behavioral Sciences*, Vol. 14 No. 4, p. 276.
- Park, J.-H. and Wentling, T. (2007), "Factors associated with transfer of training in workplace e-learning", *Journal of Workplace Learning*, Vol. 19 No. 5, pp. 311-329.
- Park, Y., Lim, D.H. and Chang, J. (2017), "Trainee versus supervisor assessment of training transfer: mediational analysis of transfer variables", *Asia Pacific Journal of Human Resources*, Vol. 55 No. 2, pp. 192-212.
- Peters, M.D., Godfrey, C.M., Khalil, H., McInerney, P., Parker, D. and Soares, C.B. (2015), "Guidance for conducting systematic scoping reviews", *International Journal of Evidence-Based Healthcare*, Vol. 13 No. 3, pp. 141-146.
- Pilati, R. and Borges, J. (2012), "Training effectiveness: Transfer strategies, perception of support and worker commitment as predictors", *Revista De Psicología Del Trabajo y De Las Organizaciones*, Vol. 28 No. 1, pp. 25-35.
- Pisanu, F. and Fraccaroli, F. (2007), "Il transfer dalla formazione al lavoro: modelli teorici e misurazione", *Psicol. DELLEDUCAZIONE E DELLA FORMAZIONE*, Vol. 9, pp. 7-32.
- Quesada-Pallares, C. (2012), "Training transfer evaluation in the public administration of Catalonia: the MEVIT factors model", *Procedia - Social and Behavioral Sciences*, Vol. 46, pp. 1751-1755.
- Quesada-Pallarès, C., Rebollar-Sánchez, E.M., Fernández-de-Álava, M. and Ciraso, A. (2018), "Is in-service teacher training useful? Applying the transfer of learning factors model in Mexican schools", *Teachers and Teaching: Global Practices, Challenges and Prospects*, 1 ed., pp. 1-24.
- Rouiller, J.Z. and Goldstein, I.L. (1993), "The relationship between organizational transfer climate and positive transfer of training", *Human Resource Development Quarterly*, Vol. 4 No. 4, pp. 377-390.
- Saks, A.M. (2002), "So what is a good transfer of training estimate? A reply to Fitzpatrick", *Ind.-Organ. Psychol*, Vol. 39, pp. 29-30.

- Saks, A.M. and Burke, L.A. (2012), "An investigation into the relationship between training evaluation and the transfer of training", *International Journal of Training and Development*, Vol. 16 No. 2, pp. 118-127.
- Sarfraz, M., Hussain, Z., Syed, N., Rehman, F., Rollah Bin Abdul Wahab, S. and Salihuiddin, M. (2021), "Work environment and training transfer intentions: does organizational justice moderate their relationship?", *Sage Open*, Vol. 11 No. 4, p. 21582440211046941.
- Schettino, G., Hodačová, L., Caso, D. and Capone, V. (2024), "Physicians' adoption of massive open online courses content in the workplace: an investigation on the training transfer process through the theory of planned behavior", *Computers in Human Behavior*, Vol. 154, p. 108151.
- Schoeb, G., Lafrenière-Carrier, B., Lauzier, M. and Courcy, F. (2021), "Measuring transfer of training: review and implications for future research", *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences De L'Administration*, Vol. 38 No. 1, pp. 17-28.
- Sseguya, H., Bekunda, M., Muthoni, F., Flavain, F. and Masigo, J. (2018), "Training transfer for sustainable agricultural intensification in Tanzania: critical considerations for scaling-up".
- Stremersch, S., Gonzalez, J., Valenti, A. and Villanueva, J. (2023), "The value of context-specific studies for marketing", *Journal of the Academy of Marketing Science*, Vol. 51 No. 1, pp. 50-65.
- Thalheimer, W. (2018), "The learning-transfer evaluation model. Work. Com viewed <https://www.work.com/wp-content/uploads/201802/Thalheimer-learn.-transf.-eval.-Model-Rep.-LTEM-V11a-002.pdf> visit. Sept. 30, 2018".
- Thorndike, E.L. and Woodworth, R.S. (1901), "The influence of improvement in one mental function upon the efficiency of other functions. II. The estimation of magnitudes", *Psychological Review*, Vol. 8 No. 4, p. 384.
- Tiffany, D.W. and Tiffany, P.G. (2007), "Notes on problems of 'validity generalization' and situational specificity", *Psychological Reports*, Vol. 100 No. 3, pp. 924-926.
- Tracey, J.B., Tannenbaum, S.I. and Kavanagh, M.J. (1995), "Applying trained skills on the job: the importance of the work environment", *Journal of Applied Psychology*, Vol. 80 No. 2, p. 239.
- Tricco, A.C., Lillie, E., Zarin, W., O'Brien, K.K., Colquhoun, H., Levac, D., Moher, D., Peters, M.D., Horsley, T. and Weeks, L. (2018), "PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation", *Annals of Internal Medicine*, Vol. 169 No. 7, pp. 467-473.
- Velada, R., Caetano, A., Bates, R. and Holton, E. (2009), "Learning transfer-validation of the learning transfer system inventory in Portugal", *Journal of European Industrial Training*, Vol. 33 No. 7, pp. 635-656.
- Warr, P. and Bunce, D. (1995), "Trainee characteristics and the outcomes of open learning", *Personnel Psychology*, Vol. 48 No. 2, pp. 347-375.
- Yaghi, A., Goodman, D., Holton, E.F. and Bates, R.A. (2008), "Validation of the learning transfer system inventory: a study of supervisors in the public sector in Jordan", *Human Resource Development Quarterly*, Vol. 19 No. 3, pp. 241-262.
- Yamkovenko, B.V., Holton, E. III, and Bates, R.A. (2007), "The learning transfer system inventory (LTSI) in Ukraine: the cross-cultural validation of the instrument", *Journal of European Industrial Training*, Vol. 31 No. 5, pp. 377-401.
- Yamnull, S. and McLean, G.N. (2005), "Factors affecting transfer of training in Thailand", *Human Resource Development Quarterly*, Vol. 16 No. 3, pp. 323-344.
- Zamani, N., Ataei, P. and Bates, R. (2016), "The use of the Persian translation of the learning transfer system inventory in the context of agricultural sustainability learning in Iran", *International Journal of Training and Development*, Vol. 20 No. 1, pp. 92-104.

Further reading

- Holton, E.F. III. and Baldwin, T.T. (2003), *Improving Learning Transfer in Organizations*, John Wiley and Sons.

- Mdhloso, D. (2022), "Transfer of training: the revised review and analysis", *Open Journal of Business and Management*, Vol. 10 No. 06, pp. 3245-3265.
- Nielsen, K. and Shepherd, R. (2022), "Understanding the outcomes of training to improve employee mental health: a novel framework for training transfer and effectiveness evaluation", *Work and Stress*, Vol. 36 No. 4, pp. 377-391.
- O'Neill, A. (2025), "Transfer of workplace e-learning: a systematic literature review", *Soc. Sci. Humanit. Open*, Vol. 11, p. 101407.
- Saks, A.M. and Gruman, J.A. (2014), "What do we really know about employee engagement?", *Human Resource Development Quarterly*, Vol. 25 No. 2, pp. 155-182.
-

Supplementary material

The supplementary material for this article can be found online.

Corresponding author

Mirco Ardondi can be contacted at: mirco.ardondi@ausl.fe.it