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Performance Technology

Jill Stefaniak

The goal for all instructional designers is to facilitate learning and improve performance regardless of learning environments and assigned tasks. When working within professional organizations particularly, the goal is often to develop interventions that yield measurable outcomes in improving employee performance. This may be accomplished through conducting needs assessments and learner analyses, designing and developing instructional materials to address a gap in performance, validating instructional materials, developing evaluation instruments to measure the impact of learning, and conducting evaluations to determine to what extent the instructional materials have met their intended use.

Depending on their level of involvement in implementing change with their organization, instructional designers may need to apply concepts from the field of human performance technology. By definition, “human performance technology is the study and ethical practice of improving productivity in organizations by designing and developing effective interventions that are results-oriented, comprehensive, and systemic” (Pershing, 2006, p. 6). Instructional design and human performance technology are similar in that they are rooted in general systems and behavioral psychology theoretical bases. Specifically, the International Society for Performance Improvement (ISPI) has established 10 performance standards for doing effective performance improvement design (see callout box).

ISPI Standards

Standard 1: Focus on Results or Outcomes
Standard 2: Take a Systemic View
Standard 3: Add Value
Standard 4: Work in Partnership with Clients and Stakeholders
Standard 5: Determine Need or Opportunity
Standard 6: Determine Cause
Standard 7: Design Solutions including Implementation and Evaluation
Standard 8: Ensure Solutions' Conformity and Feasibility
Standard 9: Implement Solutions
Standard 10: Evaluation Results and Impact
(ISPI, Standards of Performance, 2018)

Instructional designers should recognize that they perform a number, if not all, of these standards in their assigned projects. However, there are subtle but important differences between performance technology/improvement and instructional design. This chapter presents an overview for how instructional designers can use performance analysis and non-instructional interventions. . It also discusses how a relationship between instructional design and human performance technology can leverage the impact of instructional design activities. It concludes with an overview of professional resources available related to the topic of human performance technology.

Differentiating Between Human Performance Technology and Instructional Design

Human performance technology emerged in the 1960s with publications and research promoting systematic processes for improving performance gaining traction in the 1970s. The foundations of human performance technology are grounded in behaviorism, with the *father of HPT*, Thomas Gilbert, being a student of B.F. Skinner. Seminal works of human performance technology include Gilbert's (1978) Behavioral Engineering Model; Rummler's (1972) anatomy of performance, Mager and Pipe's (1970) early introduction of measurable learning objectives, and Harless' (1973) approach to systematic instruction in the workplace. All of these contributions were grounded in behaviorism and sought to create a systematic approach to measuring employee performance in the workplace. While these concepts can be applied to school settings, the majority of research exploring the application of human performance technology strategies has been predominant in workplace environments.

When differentiating between human performance technology and instructional design, HPT focuses on applying systematic and systemic processes throughout a system to improve performance. Emphasis is placed on analyzing performance at multiple levels within an organization and understanding what processes are needed for the organization to work most effectively. Systemic solutions take into account how the various functions of an organization interact and align with one another. Through organizational analyses, performance technologists are able to identify gaps in performance and create systematic solutions (Burner, 2010).

While instruction may be one of the strategies created as a result of a performance analysis, it is often coupled with other non-instructional strategies. Depending on an instructional designer's role in a project or organization, they may not be heavily involved in conducting performance assessments. When given the opportunity, it is good practice to understand how performance is being assessed within the organization in order to align the instructional solutions with other solutions and strategies.

While human performance technology and instructional design have two different emphases, they do share four commonalities: (1) evidence-based practices, (2) goals, standards, and codes of ethics, (3) systemic and systematic processes, and (4) formative, summative, confirmative evaluations (Foshay, Villachica, Stepich, 2014). Table 1 provides an overview of how these four commonalities are applied in human performance technology and instructional design.

Table 1

Four commonalities shared across human performance technology and instructional design

Commonalities	**Human Performance Technology**	**Instructional Design**
Evidence-based practices	Organizational analyses are conducted to collect data from multiple sources to evaluate workplace performance.	Emphasis is placed on learner assessment to ensure instruction has been successful.
Goals, standards, and codes of ethics	ISPI and ATD are two professional organizations that have created workplace standards and professional certification programs.	AECT and ATD are two professional organizations that have created standards for learning and performance.
Systematic and systemic processes	Systematic frameworks have been designed to conduct needs assessments and other performance analyses throughout various levels of an organization.	Systematic instructional design models have been designed to guide the design of instruction for a variety of contexts.

Formative, summative, and confirmative evaluations	Multiple evaluation methods are utilized to measure workplace performance throughout the organization.	Multiple assessments are conducted throughout the design phase of instruction as well as afterwards to ensure the instructional solutions have been successful.

The Role of Systems in Instructional Design Practice

Instructional designers understand that anytime they are designing, they are operating within a system. Many of our instructional design models, for example, promote a systematic process and take into account a variety of elements that must be considered for design (Dick, Carey, & Carey, 2009; Merrill, 2002; Smith & Ragan, 2005). Similarly, human performance technology originates from behavioral psychology but also general systems theory. "General systems theory refers to one way of viewing our environment" (Richey, Klein, & Tracey, 2011, p. 11). Through this theoretical lens, instructional designers or performance technologists must take into account the whole environment and organization in which they are working.

In general terms, a "system is a set of objects together with relationships between the objects and between their attributes" (Hall & Fagen, 1975, p. 52). Systems can be open or closed (Bertalanffy, 1968). Open systems operate in a manner where they rely on other systems or can be modified based on actions occurring outside of a system. Closed systems are contained and can demonstrate resistance to changes or actions occurring outside the system in order to keep their value (Richey et al., 2011). Examples of systems could include the instructional design or training department within a larger organization. While the department is a system, it is also viewed as a subsystem functioning within something much larger. In addition, those receiving human performance training also work within systems. For example, an instructional designer may be asked to provide training based on values espoused by the CEO, but which may conflict with culture within an individual department in the organization. Other times, they may be asked to identify other instructional solutions to address performance gaps identified in a needs assessment. Or they may seek to improve employees' performance in one area, when that performance depends on the success of another department in the organization—something outside of the employees' control. Thus, seeking to improve organizational performance requires a broader understanding of the organization than is sometimes typical in instructional design practices.

Systems thinking impacts instructional design practices by promoting systematic and systemic processes over narrower solutions. A systems view has three characteristics:

1. "It is holistic.
2. It focuses primarily on the interactions among the elements rather than the elements themselves.

3. It views systems as “nested” with larger systems made up of smaller ones” (Foshay et al., 2014, p. 42).

These characteristics affect instruction design practices in a variety of ways. Designers must take the holistic nature of the system and consider the effects on learning from all elements that exist within the system. Not only does this consider the specific instructional design tasks that learners are currently completing, but also various layers of the organization including the people, politics, organizational culture, and resources—in other words, the inputs and outputs that are driving the development and implementation of a project (Rummler & Brache, 2013). Regardless of their role on a project, the instructional designer must be aware of all the various components within their system and how it affects the instruction they create. For example, an instructional designer may be asked by senior leadership of an organization to develop health and safety training for employees working on the frontline of a manufacturing plant. It would be advantageous to understand the unique tasks and nuances associated with the frontline work responsibilities to ensure they are developing training that will be beneficial to the employees. Another example where it would be important for an instructional designer to be aware of an organization’s system or subsystems would be if they were asked to design instruction for a company that has multiple locations across the country or world. The instructional designer should clarify whether or not there are distinct differences (i.e. organizational culture, politics, processes) among these various locations and how these differences may impact the results of training.

In addition, considering that the fundamental goals of instructional design are to facilitate learning and improve performance, the instructional designer working within organizations should strive to create design solutions that promote sustainability. As stated by the second systems characteristic, it is important to not only be aware of the various elements within a system, but also develop an understanding of how they interact with each other. The instructional designer should be aware of how their work may influence or affect, positively or negatively, other aspects of the organization. For example, if an organization is preparing to launch training on a new organizational philosophy, how will that be perceived by other departments or divisions within the organization? If an organization is changing their training methods from instructor-led formats to primarily online learning formats, what considerations must the instructional design team be aware of to ensure a smooth transition? Does the organization have the infrastructure to support online learning for the entire organization? Is the information technology department equipped with uploading resources and managing any technological challenges that may arise over time? Does the current face to face training provide opportunities for relationship-building that may not seem critical to the learning, but are important to the health and performance of the organization? If so, how can this be accounted for online? These are examples of some questions an instructional designer may ask in order to take a broader view of their instruction besides just whether it achieves learning outcomes.

Performance Analysis

Regardless of context or industry, all instructional design projects fulfill one of three needs within organizations: (1) addressing a problem; (2) embracing quality improvement initiatives; and (3) developing new opportunities for growth (Pershing, 2006). The instructional designer must be able to validate project needs by effectively completing a performance analysis to understand the contextual factors contributing to performance problems. This allows the instructional designer to appropriately identify and design solutions that will address the need in the organization—what is often called the performance gap or opportunity.

The purpose of performance analysis is to assess the desired performance state of an organization and compare it to the actual performance state (Burner, 2010; Rummler, 2006). If any differences exist, it is important for the performance improvement consultant (who may sometimes serve as the instructional designer as well) to identify the necessary interventions to remove the gap between the desired and actual states of performance.

Performance analysis can occur in multiple ways, focusing on the organization as a whole or one specific unit or function. Organizational analysis consists of "an examination of the components that strategic plans are made of. This phase analyzes the organization's vision, mission, values, goals, strategies and critical business issues" (Van Tiem et al., 2012, p. 133). Items that are examined in close detail when conducting an organizational analysis include organizational structure, centrally controlled systems, corporate strategies, key policies, business values, and corporate culture (Tosti & Jackson, 1997). All of these can impact the sustainability of instructional design projects either positively or negatively.

An environmental analysis not only dissects individual performance and organizational performance, it also expands to assess the impact that performance may have outside the system. Rothwell (2005) proposed a tiered environmental analysis that explores performance through four lenses: workers, work, workplace, and world. The worker level dissects the knowledge, skills, and attitudes required of the employee (or performer) to complete the tasks. It assesses the skillsets that an organization's workforce possesses. The work lens examines the workflow and procedures; how the work moves through the organizational system. The workplace lens takes into account the organizational infrastructure that is in place to support the work and workers. Examples of items taken into consideration at this phase include checking to see if an organization's strategic plan informs the daily work practices, the resources provided to support work functions throughout the organization, and tools that employees are equipped with to complete their work (Van Tiem et al., 2012). World analysis expands even further to consider performance outside of the organization, in the marketplace or society. For example, an organization might consider the societal benefits of their products or services.

While instructional designers do not have to be experts in organizational design and performance analysis, they should be fluent in these practices to understand how various

types of performance analyses may influence their work. Whether an analysis is limited to individual performance, organizational performance, or environmental performance, they all seek to understand the degree to which elements within the system are interacting with one another. These analyses vary in terms of scalability and goals. Interactions may involve elements of one subsystem of an organization or multiple subsystems (layers) within an organization. For example, an instructional design program would be considered a subsystem of a department with multiple programs or majors. The department would be another system that would fall under a college, and a university would be comprised of multiple colleges, each representing a subsystem within a larger system.

Cause Analysis

A large part of human performance technology is analyzing organizational systems and work environments to improve performance. While performance analysis helps to identify performance gaps occurring in an organization, it is important to identify the causes that are contributing to those performance gaps. The goal of cause analysis is to identify the root causes of performance gaps and identify appropriate sustainable solutions.

While conducting a cause analysis, a performance technologist will consider the severity of the problems or performance gaps, examine what types of environmental supports are currently in place (i.e. training, resources for employees) and skillsets of employees (Gilbert, 1978). The performance technologist engages in troubleshooting by examining the problem from multiple viewpoints to determine what is contributing to the performance deficiencies (Chevalier, 2003).

Non-instructional Interventions

Once a performance technologist has identified the performance gaps and opportunities, they create interventions to improve performance. “Interventions are deliberate, conscious acts that facilitate change in performance” (Van Tiem, Moseley, & Dessinger, 2012, p. 195). Interventions can be classified as either instructional or non-instructional. Table 2 provides an overview of the various types of interventions common to instructional design practice.

Table 2

Instructional and Non-instructional Interventions

Instructional Interventions	Non-Instructional Interventions

E-learning Classroom Training Web-based Tutorials On-the-Job Training Games and Simulations	Electronic Performance Support System Workplace Design Knowledge Management Just-in-Time Support Communities of Practice Corporate Culture Changes Process Re-engineering Job Aids

As mentioned in the discussion of general systems theory, it is imperative that the instructional designer is aware of how they interact with various elements within their system. In order to maintain positive interactions between these organizational elements, non-instructional interventions are often needed to create a supportive infrastructure. Considering politics within an organization and promoting an organizational culture that is valued by all departments and individuals within the system and carried out in processes and services are examples of infrastructural supports needed for an organization (or system) to be successful. While there are a variety of different strategies that may be carried out to promote stability within an organization, the non-instructional strategies most commonly seen by instructional designers include job, analysis, organizational design, communication planning, feedback systems, and knowledge management. Table 3 provides examples of how non-instructional strategies may benefit the instructional design process.

Table 3

Non-instructional strategies

Non-Instructional Strategies	**Benefit to the Instructional Design Process**
Job analysis	Up to date job descriptions with complete task analyses will provide a detailed account for performing tasks conveyed in training.
Organizational design	A plan that outlines the organizational infrastructure of a company. Details are provided to demonstrate how different units interact and function with one another in the organization.
Communication planning	Plans that detail how new initiatives or information is communicated to employees. Examples may include listservs, company newsletters, training announcements, performance reviews, and employee feedback.
Feedback systems	Detailed plans to provide employees feedback on their work performance. This information may be used to identify individual training needs and opportunities for promotion.
Knowledge management	Installation of learning management systems to track learning initiatives throughout the organization. Electronic performance support systems are used to provide just-in-time resources to employees.

Organizational design and job analysis are two non-instructional interventions that instructional designers should be especially familiar with especially, if they are involved with projects that will result in large scale changes within an organization. They should have a solid understanding of the various functions and departments within the organization and the interactions that take place among them. Organizational design involves the process of identifying the necessary organizational structure to support workflow processes and procedures (Burton, Obel, & Hakonsson, 2015). Examples include distinguishing the roles and responsibilities to be carried out by individual departments or work units, determining whether an organization will have multiple levels of management or a more decentralized approach to leadership, and how these departments work together in the larger system.

Job analyses are another area that can affect long term implications of instructional interventions. A job analysis is the process of dissecting the knowledge, skills, and abilities required to carry out job functions listed under a job description (Fine & Getkate, 2014). Oftentimes, a task analysis is conducted to gain a better understanding of the minute details of the job in order to identify what needs to be conveyed through training (Jonassen, Tessmer, & Hannum, 1999). If job analyses are outdated or have never been conducted, there is a very good chance that there will be a misalignment between the instructional materials and performance expectations, thus defeating the purpose of training.

Feedback systems are often put in place by organizations to provide employees with a frame of reference in regards to how they are performing in their respective roles (Shartel, 2012). Feedback, when given properly, can "invoke performance improvement by providing performers the necessary information to modify performance accordingly" (Ross & Stefaniak, 2018, p. 8). Gilbert's (1978) Behavioral Engineering Model is a commonly referenced feedback analysis tool used by practitioners to assess performance and provide feedback as it captures data not only at the performer level but also at the organizational level. This helps managers and supervisors determine the degree of alignment between various elements in the organization impacting performance (Marker, 2007).

The most recognizable non-instructional interventions may be electronic performance support systems (EPSSs) and knowledge management systems. These are structures put in place to support the training and performance functions of an organization. Often times EPSSs are used as a hub to house training and supports for an employee. Examples extend beyond e-learning modules to also include job aids, policies and procedures, informative tools or applications, and other just-in-time supports that an employee may need to complete a task. Knowledge management systems serve as a repository to provide task-structuring support as well as guidance and tracking of learning activities assigned or provided to employees (Van Tiem et al., 2012).

Other examples of supportive systems could also include communities of practice and social forums where employees can seek out resources on an *as needed* basis. Communities of practice are used to bring employees or individuals together who perform similar tasks or

have shared common interests (Davies et al., 2017; Wenger, 2000; Wenger, McDermott, & Snyder, 2002). When selecting an intervention, it is important to select something that is going to solve the problem or address a particular need of the organization. Gathering commitment from leadership to implement the intervention and securing buy-in from other members of the organization that the intervention will work is also very important (Rummler & Brache, 2013; Spitzer, 1992; Van Tiem et al., 2012).

Whether the intervention to improve performance is instructional or non-instructional, Spitzer (1992) identified 11 criteria for determining whether an intervention is successful:

1. Design should be based on a comprehensive understanding of the situation. This is where previous performance and cause analyses come together.
2. Interventions should be carefully targeted. Target the right people, in the right setting, and at the right time.
3. An intervention should have a sponsor. A sponsor is someone who will champion the activity.
4. Interventions should be designed with a team approach. The ability to draw upon expertise from all areas of the organization is vital to successful intervention selection.
5. Intervention design should be cost-sensitive.
6. Interventions should be designed on the basis of comprehensive, prioritized requirements, based on what is most important to both the individual and the organization.
7. A variety of intervention options should be investigated because the creation of a new intervention can be costly.
8. Interventions should be sufficiently powerful. Consider long-term versus short-term effectiveness. Use multiple strategies to effect change.
9. Interventions should be sustainable. Thought must be given to institutionalizing the intervention over time. To really be successful, the intervention must become ingrained in the organization's culture.
10. Interventions should be designed with viability of development and implementation in mind. An intervention needs human resources and organizational support.
11. Interventions should be designed using an iterative approach. This occurs during the formative evaluation stage (discussed under the evaluation component of the HPT Model) when multiple revisions will generate interventions to fit the organization.

Forging a Relationship between Human Performance Technology and Instructional Design

While it is not necessary for instructional designers to engage in human performance technology, they may find themselves frequently in their careers working more like performance technologists than they originally supposed they would. In addition, those that use human performance technology thinking may be better positioned to design sustainable solutions in whatever their organization or system. Human performance technology offers a systems view that allows for the instructional designer to consider their design decisions

and actions. By recognizing the systemic implications of their actions, they may be more inclined to implement needs assessment and evaluation processes to ensure they are addressing organizational constraints while adding value. With the growing emphasis of *design thinking* in the field of instructional design, we, as a field, are becoming more open to learning about how other design fields can influence our practice (i.e. graphic design, architecture, and engineering), and human performance, as another design field in its own right, is one more discipline that can improve how we do our work as instructional designers.

Professional Resources

There are a variety of resources available for instructional designers who are interested in learning more about how they can utilize concepts of human performance technology in their daily practice. This section provides an overview of professional associations, journals, and important books related to the field.

Professional Associations

"A professional association is an organization devoted to furthering the goals and development of a profession as well as providing professional development and networking opportunities for members of the association" (Surry & Stanfield, 2008). Founded in 1962, the International Society for Performance Improvement (ISPI) is the premiere organization for the field of human performance technology. Members of ISPI represent academia, government, non-profit, industry, and independent consulting sectors around the world. ISPI has a number of local chapters spread out globally. The organization offers a certification for Certified Performance Technologists (CPT) for individuals in the field to emphasize their level of proficiency in the field of human performance technology.

Founded in 1943, The Association for Talent Development [formerly known as the American Society for Training and Development (ASTD)], is the largest professional organization for workplace learning and performance. Similar to ISPI, they also have local chapters in most of the United States. Their members are comprised of instructional designers, performance consultants, talent development managers, and workplace learning professionals (ATD, n.d.), representing more than 120 countries and industries of all sizes. ATD also offers a certification for individuals interested in workplace learning and performance through their Certified Professional in Learning and Performance (CPLP) designation.

The Association of Educational Communications and Technology (AECT) has a division, Organizational Training and Performance, that focuses on performance improvement initiatives experienced by the instructional designer. As credited on their website, the division's mission is to "*bridge the gap* between research and practice, facilitating communication, collaboration and sharing between academics, students and practitioners across multiple disciplines interested in applying current theory and research to training and performance improvement initiatives" (AECT, n.d).

All of the abovementioned organizations host annual conferences that offer workshops, presentations, and discussions on a variety of topics related to workplace performance, performance improvement, and instructional design. More information about each of the professional organizations discussed in this section can be found online at:
Association for Talent Development (ATD) http://atd.org
Association for Educational Communications and Technology (AECT) http://aect.org
International Society for Performance Improvement (ISPI) http://ispi.org

Books

Compared to other disciplines, the field of human performance technology is considered a relatively young field dating back to the early 1960s. The following is a list of books that may be of interest to individuals who are interested in learning more about human performance technology:

- Gilbert, T.F. (1978). *Human competence: Engineering worthy performance.* New York, NY: McGraw-Hill.
- Moseley, J.L., & Dessinger, J.C. (2010). *Handbook of improving performance in the workplace. Volume 3: Measurement and evaluation.* San Francisco, CA: Pfeiffer.
- Pershing, J.A. (2006). *Handbook of human performance technology* (3rd ed.). San Francisco, CA: Pfeiffer.
- Rossett, A. (1999). *First things fast: A handbook for performance analysis*. San Francisco, CA: Pfeiffer.
- Rummler, G. A., & Brache, A. P. (2013). *Improving performance: How to manage the white space on the organization chart* (3rd ed.). San Francisco, CA: Jossey-Bass.
- Silber, K.H., & Foshay, W.R. (2010). *Handbook of improving performance in the workplace. Volume 1: Instructional design and training delivery.* San Francisco, CA: Pfeiffer.
- **Stefaniak, J.** (Ed.). (2015). *Cases on human performance improvement technologies.* Hershey, PA: IGI Global.
- Van Tiem, D., Moseley, J.L., & Dessinger, J.C. (2012). *Fundamentals of performance improvement: A guide to improving people, process, and performance* (3rd ed.). San Francisco, CA: Pfeiffer.
- Watkins, R., & Leigh, D. (2010). *Handbook of improving performance in the workplace. Volume 2: Selecting and implementing performance interventions.* San Francisco, CA: Pfeiffer.

Journals

While a number of instructional design journals will publish articles on trends related to the performance improvement, the following is a list of academic journals focused specifically on the mission of human performance technology:

- *Performance Improvement Journal* is published 10 times a year by the International Society for Performance Improvement and John Wiley & Sons, Inc. (Articles tend to be

practitioner and application oriented.)
- *Performance Improvement Quarterly* is a peer-reviewed scholarly journal published by the International Society for Performance Improvement.
- *Human Resource Development Quarterly* is a peer-reviewed scholarly journal published by John Wiley & Sons, Inc.
- *International Journal of Training and Development* is a peer-reviewed scholarly journal published by John Wiley & Sons, Inc.
- *Journal of Workplace Learning* is a peer-reviewed scholarly journal published by Emerald, HR, Learning and Organizational Studies eJournal Collection.
- *TD (Training + Development)* is a monthly magazine published by the Association for Talent Development.

Additional Reading

Another useful chapter on performance technology is available in *The Foundations of Instructional Technology,* available at https://edtechbooks.org/-cx

References

Association for Educational Communications and Technology (n.d.). Organizational training and performance. Retrieved from https://aect.org/ on August 1, 2018.

Association for Talent Development (n.d.). Retrieved from https://atd.org/ on August 1, 2018.

Bertalanffy, L. von (1968). *General systems theory: Foundations, development, applications.* New York, NY: George Braziller.

Burner, K.J. (2010). From performance analysis to training needs assessment. In K.H. Silber, W.R. Foshay (Eds.), *Handbook of improving performance in the workplace: Instructional design and training delivery* (vol. 1, pp. 144-183). San Francisco: Pfeiffer.

Burton, R. M., Obel, B., & Håkonsson, D. D. (2015). *Organizational design: A step-by-step approach*. London: Cambridge University Press.

Chevalier, R. (2003). Updating the behavior engineering model. *Performance Improvement, 42*(5), 8-14.

Davies, C., Hart, A., Eryigit-Madzwamuse, S., Stubbs, C., Aumann, K., Aranda, K. (2017). Communities of practice in community-university engagement: Supporting co-productive resilience research and practice. In J. McDonald, A. Cater-Steel (Eds.), *Communities of*

practice: Facilitating social learning in higher education (pp. 175-198). New York, NY: Springer.

Dick, W., Carey, L., & Carey, J.O. (2009). *The systematic design of instruction* (7th ed.). Upper Saddle River, NJ: Pearson.

Fine, S. A., & Getkate, M. (2014). *Benchmark tasks for job analysis: A guide for functional job analysis (FJA) scales*. New York, NY: Psychology Press.

Foshay, W.R., Villachica, S.W., & Stepich, D.A. (2014). Cousins but not twins: Instructional design and human performance technology in the workplace. In J.M. Spector, M.D. Merrill, J.

Elen, & M.J. Bishop (Eds.), *Handbook of research on educational communications and technology* (4th ed., pp. 39-49). New York, NY: Springer.

Gilbert, T.F. (1978). *Human competence: Engineering worthy performance*. New York, NY: McGraw-Hill.

Hall, A.D., & Fagen, R.E. (1975). Definition of system. In B.D. Ruben & J.Y. Kin (Eds.), *General systems theory and human communications* (pp. 52-65). Rochelle Park, NJ: Hayden Book Company, Inc.

Harless, J. (1973). An analysis of front-end analysis. *Improving Human Performance: A Research Quarterly, 4*, 229-244.

International Society for Performance Improvement (n.d.). Standards of performance. Retrieved from https://ispi.org/ on August 1, 2018.

Jonassen, D.H., Tessmer, M., Hannum, W.H. (1999). *Task analysis methods for instructional design.* New York, NY: Routledge.

Mager, R.F., & Pipe, P. (1970). *Analyzing performance problems: Or you really oughta wanna.* Belmont, CA: Fearson.

Marker, A.. (2007). Synchronized analysis model: Linking Gilbert's behavioral engineering model with environmental analysis models. *Performance Improvement, 46*(1), 26-32.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development*, *50*(3), 43-59.

Pershing, J.A. (2006). Human performance technology fundamentals. In J.A. Pershing (Ed.), *Handbook of human performance technology* (3rd ed., pp. 5-26). San Francisco: Pfeiffer.

Richey, R.C., Klein, J.D., & Tracey, M.W. (2011). *The instructional design knowledge base: Theory, research, and practice.* New York, NY: Routledge.

Rummler, G.A. (1972). Human performance problems and their solutions. *Human Resource Management, 11*(4), 2-10.

Ross, M., & Stefaniak, J. (2018). The use of the behavioral engineering model to examine the training and delivery of feedback. *Performance Improvement, 57*(8), p. 7-20.

Rothwell, W. (2005). *Beyond training and development: The groundbreaking classic on human performance enhancement* (2nd ed.). New York, NY: Amacom.

Rummler, G.A. (2006). The anatomy of performance: A framework for consultants. In J.A. Pershing (Ed.), *Handbook of human performance technology* (3rd ed., pp. 986-1007). San Francisco, CA: Pfeiffer.

Rummler, G. A., & Brache, A. P. (2013). *Improving performance: How to manage the white space on the organization chart* (3rd ed.). San Francisco, CA: Jossey-Bass.

Schartel, S.A. (2012). Giving feedback—An integral part of education. *Best Practice & Research Clinical Anaesthesiology, 26*(1), 77-87.

Smith, P.A., & Ragan, T.L. (2005). *Instructional design* (3rd ed.). Hoboken, NJ: Wiley.

Spitzer, D.R. (1992). The design and development of effective interventions. In H.D. Stolovitch & E.J. Keeps (Eds.), *Handbook of human performance technology* (pp. 114-129). San Francisco, CA: Pfeiffer.

Surry, D. W., & Stanfield, A. K. (2008). Performance technology. In M. K. Barbour & M. Orey (Eds.), *The Foundations of Instructional Technology*. Retrieved from https://edtechbooks.org/-cx

Tosti, D., & Jackson, S. D. (1997). The organizational scan. *Performance Improvement*, *36*(10), 2-26.

Van Tiem, D., Moseley, J.L., & Dessinger, J.C. (2012). *Fundamentals of performance improvement: A guide to improving people, process, and performance* (3rd ed.). San Francisco, CA: Pfeiffer.

Wenger, E. (2000). Communities of practice and social learning systems. *Organization*, *7*(2), 225-246.

Wenger, E., McDermott, R. A., & Snyder, W. (2002). *Cultivating communities of practice: A guide to managing knowledge*. Boston, MA: Harvard Business Press.

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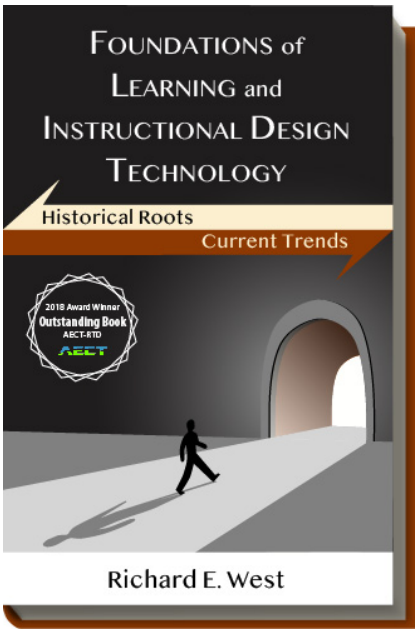

West, R. E. (2018). *Foundations of Learning and Instructional Design Technology: The Past, Present, and Future of Learning and Instructional Design Technology* (1st ed.). EdTech Books. Retrieved from https://edtechbooks.org/lidtfoundations