Foundations of Instructional Design: Methodology and Learning Theories

atd Association for Talent Development

Introduction to Instructional Design

When an organization needs training solutions, the instructional designer must understand the business and individual needs that underlie the training initiative. This requires defining the business drivers for training program development and the organizational results needed or desired.

Once the designer has taken that critical first step, instructional design models and learning theories enter the picture to provide a systematic approach (or plan) for crafting effective and efficient training solutions that meet organizational and individual needs.

These plans are referred to as instructional systems design (ISD) models. ISD models are based on the systems approach; the output from one model phase provides the input for the next phase.

Instructional designers are then responsible for creating the course design and developing all instructional materials, including presentation materials, participant guides, handouts, and job aids. They are commonly also responsible for evaluating training, including assessing what was learned and whether the learning solution led to measurable behavior change.

This e-book will provide an overview of common instructional design models for those who are beginning their careers as instructional designers.

What Are the Common Types of Instructional Design?

ADDIE is the most recognizable example of a theoretical ISD model. In recent research conducted by the Association for Talent Development (2015), more than 1,300 respondents listed the ADDIE model as the one they use most often. ADDIE has become the gold standard in ISD models because it reflects the most common elements of the ISD process—analysis, design, development, implementation, and evaluation. Almost all other ISD models contain these five core elements, but they're usually called something else, combined in some way, or have added elements of complexity connected to the ADDIE core. More streamlined models that amalgamate the elements into fewer individual elements while still retaining the ADDIE core as a foundation are also appearing.

Some practitioners misinterpret the ADDIE model to suggest that the five elements are to be performed in a linear pattern, starting with analysis and ending with evaluation. Strictly conforming to that rendering of the model, however, will usually net a simplistic design process with little in the way of dynamic responsiveness to the complexities and unique aspects of each specific set of variables in a project.

ADDIE at a Glance

Analysis

Analysis is the first, or entry, stage of the ADDIE model and is considered the data-gathering element. During this stage, instructional designers assemble all the information they can possibly gather about content, populations, delivery systems and methods, and budgets before they consider anything else. In this model, it is assumed that analysis is the first step and that it takes place in each instructional design process, which is not always true.

Design

Design is the blueprinting stage of instructional systems, during which instructional designers create the blueprint for a project with all the specifications necessary to complete it. During this stage, instructional designers write the objectives, construct course content, and complete a design plan.

Development

Materials production and pilot testing are the hallmarks of development. At this stage, most non-designers who aren't working directly on a project begin to see progress. Everything from lecture notes to virtual reality is brought from design to deliverable.

Implementation

The most familiar of the elements is implementation. At implementation, the design plan meets the learner and the content is delivered. The evaluation process that most designers and learners are familiar with takes place in this element. Evaluation is used to gauge the degree to which learners meet objectives and facilitators or technologies deliver the project.

Evaluation

Although evaluation is the ADDIE model, evaluation should be part of every element of this design process. Evaluation is the process of determining the learners' mastery of the material and the quality of a course design. It is generally seen as encompassing four basic types of evaluation, sometimes called levels, with many more layers of evaluation possible in any given scenario. Kirkpatrick (1959) named the four types of evaluation as reaction, learning, behavior, and results. Others have added a fifth type, named, among others, return on expectation or investment.

Source: Hodell, C. *ISD From the Ground Up*, 3rd ed. 2015. Alexandria, VA: ATD Press.

SAM (Success Approximation Model)

SAM is a design model that emerged as an alternative to ADDIE. It is especially useful when the designer needs to create e-learning solutions to drive performance improvement. This approach challenges the accountability of roles and ownership of deliverables as well as flies in the face of current multitasking project work. The primary difference in this approach is that smaller chunks are finished through locked-down teams in a fixed period of time (sprints). This is not prototyping; the deliverables are complete, useable components. The steps in SAM are to evaluate first, then design and develop the course, then repeat the process by evaluating the first iteration of the course.

Iteration 1

The process repeats at least three times, starting and ending with evaluation. The initial evaluation looks at the situation, need, and alternative solutions. After each successive cycle of design and development, the emerging solution is evaluated to determine appropriateness and effectiveness. Information gathered in the initial evaluation is also re-examined for accuracy and sufficiency.

In the first iteration, design is kept to just listing objectives, sketching representative instructional treatments, and proposing methods to measure progress. Development is kept to preparing only representative content for each proposed delivery medium and instructional paradigm. Subsequent iterations will refine the work in terms of breadth, depth, and polish.

1. Evaluate: Begin with a quick evaluation (analysis) of the situation, need, and goals.

   - Who are the learners and what needs to change about their performance?

   - What can they do now? Are we sure they can't already do what we want?

   - What is unsatisfactory about the current instructional programs (if any exist)?

   - Where do learners go for help?

   - What forms of delivery are available to us?

   - How will we know whether the new program is successful?

   - What is the budget and schedule for project completion?

   - What resources are available, human and otherwise?

   - Who is the key decision-maker and who will approve deliverables?
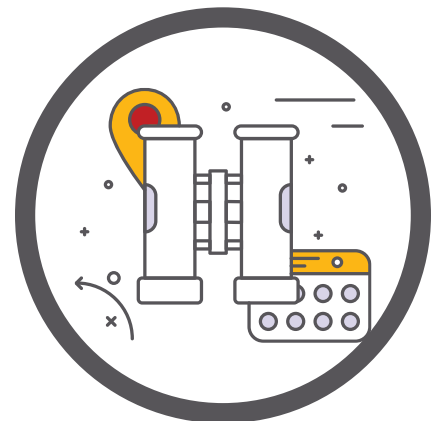
2. Design: Quickly, but thoughtfully, prepare a rough design for discussion.

- List and organize obvious goals.

- List behavioral objectives for each.

- List ways learner performance can be appraised.

- Select practical and appropriate delivery media.

- Sketch a few sample designs that appear to fit the situation and could reasonably be expected to achieve the goals. Be as visual as possible. (Sketching is an important activity we will return to in some detail later.)

3. Develop: Prepare prototypes using whatever tools can quickly provide a sense of the design idea in application.

- Select representative content to flesh out some of the sketches (just enough for understanding). Filler text can be used.

- Stay in sketch mode (nothing fancy here). Prepare bullet points rather than paragraphs; use rough art, snapshots, and homemade video rather than illustrations, professional photos, and commercial video.

- Assemble props that instructors or learners may use to perform activities.

- Focus on prototyping learner activities instead of presentation content.

Iteration 2

The iterative process returns to evaluation, one notch up.
On the next go around, it's time to:

1. Evaluate: Determine the success of the first iteration.

- Was enough known about the situation, need, and goals? If not, it's time for some additional information gathering and analysis.

- What would and wouldn't work? Get some learners involved to help you decide. If instructors will deliver the instruction, conduct a mock class. Don't think it's too early.

- Where do alternatives need to be explored? Perhaps in this iteration, the team needs to sketch two or more alternative designs addressing the same content to compare.

2. Design: Sketch new alternatives or refine previous ideas. If evaluation determines that the previous cycle should be repeated, it's important to do it. A cycle that clarifies needs or discards initial ideas is a success and an important step forward but only if taken advantage of. Repeat iteration 1 if needed. When it's time to move on:

- Force a new design. Try creating one that does not incorporate the design from the first iteration. It may be hard and frustrating at first, but people nearly always find that by imposing the restriction of doing something different, they create something better—and something they wouldn't otherwise have created.

- Identify content that previous designs didn't accommodate well and create initial designs for them.

- Flesh out more thoroughly those ideas retained from previous iterations to be sure the designs can serve as a solid foundation. Representative content should be used, but it's not yet time to work with the full bulk of it. If there are different types of content, however, representative chunks should be chosen and the design expanded as necessary.

3. Develop: Prototypes need to more thoroughly represent the final product.

- Prepare learner materials. Prepare a set of learner materials using a format close to the format under consideration for the final materials.

- Test delivery. The means of delivery need to be tested soon, in either the next evaluation or the one in the cycle after that. The type of delivery determines the specific tasks.

- If instructor-led delivery is planned, prepare instructor notes and support materials to a sufficient level that an instructor who has not been involved in the project could deliver a segment of instruction.

- If using e-learning, prepare some interactive segments to test user interface designs and instructional approach.

- If using distance learning, test compatibility of presentation materials and learner responses with the communications system.

Iteration 3

Iteration 3 is similar to iteration 2, although as confidence builds that issues have been properly handled, issues must cease to be re-examined. The iterations become much more focused on development than design.

Additional iterations often seem attractive if not compelling, but if all content areas have been included in the first three, it's rare that additional iterations would return results worthy of the time and effort. It's usually much better to put the product in use, get experience with it, and then consider another round of improvements.

Source: Allen, M. *Leaving ADDIE for SAM.* 2012. Alexandria, VA: ATD Press.

LLAMA and Other Agile Methods

LLAMA (Lot Like Agile Methods Approach) is another Agile design methodology that many instructional designers have begun to embrace. Agile project management is an iterative, incremental process and approach for guiding the design and build of projects in a highly flexible and interactive manner. In addition, Agile focuses on maximizing customer value and fostering high team engagement. What's more, LLAMA presents a framework of values that enables teams of programmers to develop software in ways that accommodate changes to underlying needs and a continuous discovery of requirements throughout the project effort.

LLAMA makes some adjustments to the traditional Agile methodology by taking into consideration the syntax and structure of learning objectives as well as the idea that instructional designers are likely to be working on multiple projects at one time.

Applying Agile to ID

With the success of the Agile project management in the software industry, it's unsurprising that L&D practitioners have sought to adopt it. Indeed, many of its guidelines probably sound familiar to instructional designers, such as:

- Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.

- Frequently deliver working software from a couple of weeks to a couple of months, with a preference to the shorter timescale.

- Businesspeople and developers must work together daily throughout the project.

- Build projects around motivated individuals. Give them the environment and support they need and trust them to finish the job.

- The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

- Working software is the primary measure of progress.

- Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

- Continuous attention to technical excellence and good design enhances agility.

- Simplicity—the art of maximizing the amount of work not done—is essential.

- The best architectures, requirements, and designs emerge from self-organizing teams.

- At regular intervals, the team reflects on how to become more effective then tunes and adjusts its behavior accordingly.

In many respects, the design-build aspect of software design and development is akin to that of instructional design and development, and this similarity holds even stronger when we're developing e-learning or other digital learning experiences.

There are several key differences between the two types of work, though. Some distinctions include:

- Instructional designers need to focus on learning objectives and performance outcomes in addition to functions and features.
- Most instructional designers work on several projects at once, while software developers usually are dedicated to a single team.
- Instructional designers often need to wait for content or input from subject matter experts and must account for that downtime in their project plans.

Instructional Design Project Management: A Checklist for Getting Started

Identify a business goal.
Define the business goal in as much detail as is useful for the project. Think along the lines of business strategies, such as increasing revenue or income, decreasing costs, improving quality, or expanding the capacity of the organization. Connecting the project and its goals with the bigger picture and vision of the organization helps everyone stay motivated when challenges arise.

Start with the learner in mind.
Identifying a primary learner persona (PLP) will help the ISD project management team make sometimes-tough decisions about the direction of the project as it progresses, such as how regularly the PLP would use the training and in what context.

Define the scope of the project with learner stories.
"Using traditional Agile story mapping for training projects tends to result in information-driven courses," notes Torrance, which can be frustrating for the project team. LLAMA, by contrast, incorporates Cathy Moore's action mapping, which uses proposed user actions to generate stories for project planning.

Chunk the work effort.
Break the project into workable chunks. You can do this by taking each of the user stories—independent units of scope that can be prioritized, assigned, developed, and tested along the project's path to completion—and breaking it into the tasks required to complete the story, such as identifying a location for the photo shoot or selecting the SME for the shoot.

Plan the work and work the plan.
Include frequent reviews of the project and avoid scheduling release dates for multiple projects all at once, suggests Torrance. "Remember that the project schedule is an estimate. The further out it goes, the less likely it is to be completely accurate, so plan accordingly."

Source: Torrance, Megan, 2014. "Agile and LLAMA for ISD Project Management." *TD at Work*, November. Alexandria, VA: ATD Press.

How Do You Determine Which Design to Use?

No two projects are the same and you will easily find yourself using each of these methods for different training projects that you manage. The Agile methods are ideal for smaller projects, while ADDIE is more commonly used for long-term events.

Begin with a thorough needs assessment plan to determine your specific needs and choose the design that works best for your program goal.

Needs Assessment Checklist

This checklist will help you ensure that you've thoroughly explored everything within your needs assessment. Refer to this checklist periodically to help guide you through the process.

☐ Identify gaps

☐ Consider data collection sources

☐ Identify or create data collection tools

☐ Identify stakeholders and decision makers

☐ Identify required resources

☐ Identify target audience, prior knowledge, and demographics

☐ Identify, sequence, and prioritize tasks involved

☐ Gather data

☐ Analyze data

☐ Summarize findings

☐ Identify potential solutions

☐ Prioritize solutions

☐ Propose solutions

☐ Generate report

Next Steps for Instructional Design

Visit td.org/new-to-training to find conferences, courses, publications, and other resources that are designed for professionals who are just beginning their career in talent development. These resources can help you build your instructional design expertise and give you a strong foundation for your talent development career.

Foundations of Measurement and Evaluation

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Demonstrating the impact of training initiatives is a crucial component of talent development professionals' work. Measurement and evaluation show that training has achieved its desired outcomes. Effective measurement is entwined with every aspect of the instructional design process. Talent development professionals collect baseline data when conducting a needs assessment at the start of the instructional design process, and effective learning objectives specify what training will accomplish and how it will be measured.

Despite its importance, effective measurement does not happen as often as it should. ATD's 2016 research report *Evaluating Learning: Getting to Measurements That Matter* found that only 35 percent of the 199 talent development professionals surveyed reported that their organizations evaluated the business results of learning programs to any extent. Only 44 percent of participants thought their evaluation efforts were helping their business reach its organizational learning goals compared to the 36 percent who thought their efforts were helping to a large extent.

Effective measurement continues to be a top challenge for talent development professionals. A pulse survey conducted at the 2019 ATD International Conference & Exposition asked attendees to identify their biggest pain points in talent development. Measuring results and outcomes was the top challenge at 16 percent.

While talent development professionals may understand the importance of evaluation, they often have questions about what is included in effective evaluation and how to measure training in a way that can help prove its impact. This is especially true for instructional designers and trainers who are new to their roles. This e-book will provide an overview of how to measure and evaluate training's success for people who are new to the talent development profession.

What Is Measurement and Evaluation?

Measurement and evaluation is the systematic method of gathering information about the effectiveness and impact of training programs. Results of the measurements can be used to improve the offering, determine whether the learning objectives have been achieved, and assess the value of the training to the organization. Evaluation should always be tied to a business problem.
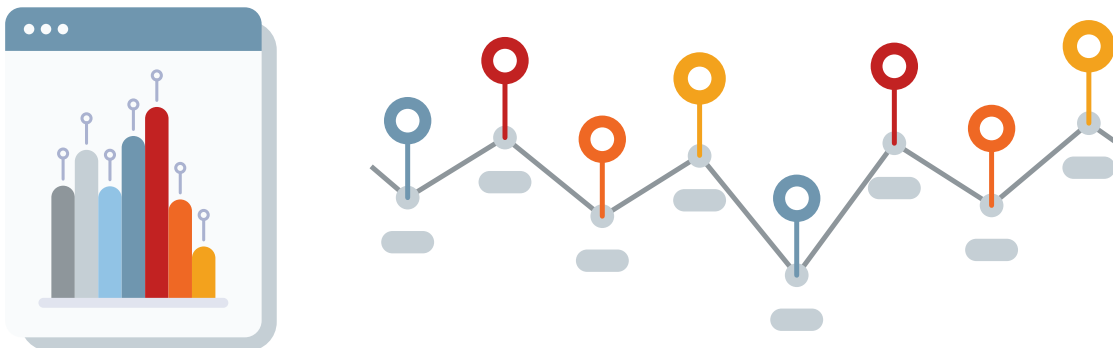
What Are the Benefits of Effective Measurement?

Talent development professionals can benefit from effective measurement in many ways. These benefits generally fall under demonstrating value or improving effectiveness.

Demonstrating Value
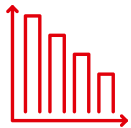
Measurement helps talent development professionals demonstrate whether their training has had the desired effect and whether it has justified their organizations' investment of time and resources. Leadership will almost always want to know the impact of training. Talent development professionals who can share relevant data and analytics establish themselves as business advisors able to provide effective solutions to business challenges.

Talent development professionals who are working as consultants benefit from having data about the effectiveness of training and can use it to acquire new clients and grow their business. For those who work internally at an organization, data demonstrates credibility and proves value to internal clients

Improving Effectiveness

Measurement helps identify aspects of a training that are working well and those that need to be revised. Effective measurement can help determine the relevance and appropriateness of the content, whether the instructional strategies reinforced content in their intended way, and whether specific learning objectives were met.

Measurement provides an opportunity to verify whether the needs assessment conducted at the start of the training provided the right information and point toward ways of improving the assessment process.

Some forms of measurement, like knowledge checks or quizzes, can help reinforce learning for the training participants. This can also help participants self-assess what content they have mastered and what content they still need to work on.
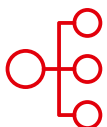
Measurement provides information that can be shared with instructional designers and facilitators to help them improve their performances. Post-training evaluations often gauge how much participants enjoyed the training, which yields information about a facilitator's presentation style, the pacing at which the information was covered, and other facilitator effectiveness factors.

What Are the Primary Measurement Models?

The best-known measurement and evaluation models are the Kirkpatrick and the Phillips. The Kirkpatrick model, first published by ASTD in 1959, has been refined throughout the years. Four levels comprise this model:
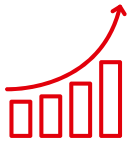
Level 1: Reaction measures the degree to which participants find the training favorable, engaging, and relevant to their jobs. Reactions are usually captured in smile sheets that ask learners to rate the training and the presenter when the training has ended.

Level 2: Learning measures the degree to which participants acquire the intended knowledge, skills, attitude, confidence, and commitment based on their participation in the training. Learning can be assessed through knowledge or performance tests or by observing learners' skills and behavior.

Level 3: Behavior measures the degree to which participants apply what they learned during the training when they return to their jobs. There are many ways to measure desired behaviors, including observation, certification, and self-assessment.
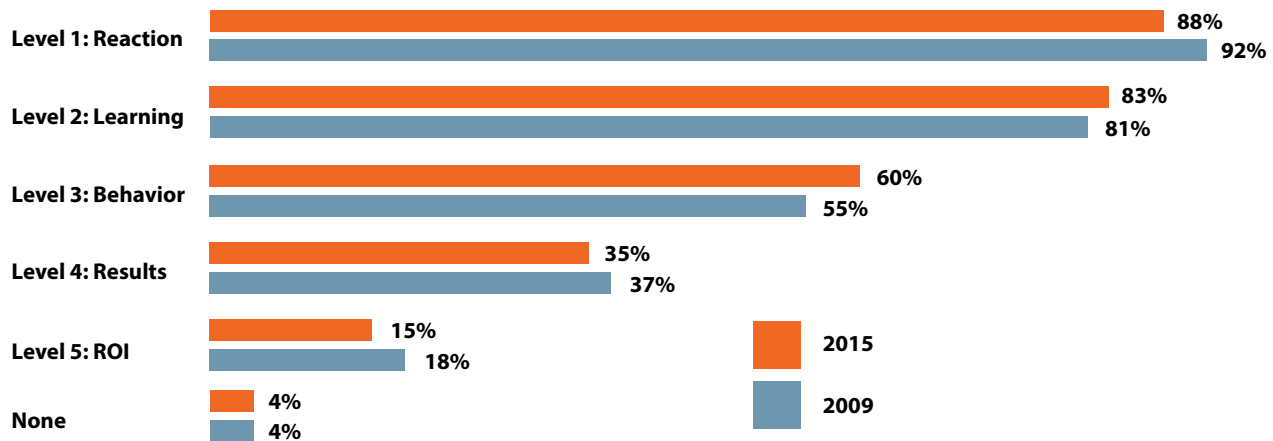
Level 4: Results measure the degree to which targeted outcomes occur as a result of training, support, and accountability. This level of evaluation can be accomplished only if well-defined targeted outcomes are identified prior to designing the training.

The Phillips model adds a fifth level known as return on investment (ROI). To calculate ROI, many talent development professionals convert Kirkpatrick Level 4 data to monetary values and compare them with program costs. Jack and Patricia Phillips have developed a formula to measure training ROI. This formula is the net benefit (benefit minus cost) divided by the program cost and multiplied by 100 to achieve a percentage.

Evaluating Learning found that lower levels of evaluation are more common than higher level ones. In 2015, 88 percent of respondents said that their organization measures reaction, and 83 percent said that their organization measures learning. The percentage drops to 60 when it comes to measuring behavior, however, and to 35 when it comes to measuring results. Only 15 percent of respondents reported that their organization measures ROI. Moreover, none of the five levels experienced a statistically significant change in usage since ATD published a research report about the topic in 2009.

	2015	2009
Level 1: Reaction	88%	92%
Level 2: Learning	83%	81%
Level 3: Behavior	60%	55%
Level 4: Results	35%	37%
Level 5: ROI	15%	18%
None	4%	4%

While organizations may measure some levels more than others, each level comes with challenges. In her *TD* magazine article "Testing Knowledge," Nanette Miner discusses an organization that paid employees for developing new skills. Miner's job was to develop Level 2 tests that accurately assessed whether employees had learned these new skills. She offers several recommendations for Level 2 test design, such as measuring what is taught. If employees have been taught to install software, for example, the test should involve them installing software; it should not be a pen-and-paper test on how to install software. When designing pen-and-paper tests, the exact way a question is asked can affect how it is answered. It's important to ensure that test results are an accurate indicator of employees' knowledge and skills—especially when, as in Miner's case, it effects employee compensation.

In his *TD* magazine article "Secrets of Level 3 Survey Design," Ken Phillips advises on the content, format, and measurement of surveys designed to measure employees' behavior change. Among his recommendations are to focus survey items on behaviors rather than thoughts and motives; to collect data from multiple observers or from one observer multiple times; and to provide the best chance of observing behavior change.

What Are Common Measurement Challenges and Mistakes?

Talent development professionals are challenged by creating effective measurement even though its importance is recognized. Some challenges are based on designing effective test questions or observations that are credible and valid. Another challenge involves finding the time and resources an organization needs to devote to its training department, particularly to evaluation efforts. Talent development professionals do not always have a background in or fluency with data, which can also pose a challenge to measurement.

Another challenge involves analyzing the concrete relationship between behavior change and business impact. Even if a business achieves its desired training result, it is difficult to isolate the extent to which training—as opposed to employee incentives and motivation, changes in the competitive landscape, and other internal and external factors of an organization—led to the result.

In their article "Evaluation Blunders and Missteps to Avoid," Jim and Wendy Kirkpatrick outline some common mistakes made by talent development professionals, including:

- addressing evaluation only after the training or programming is launched, instead of including evaluation as a part of the initial training design

- spending the majority of resources on Levels 1 and 2 and neglecting Levels 3 and 4

- relying solely on surveys instead of including other evaluation methods such as focus groups or observation

- disregarding data that has already been collected.

Other Evaluation Models

While the Kirkpatrick and Phillips models are foundational to measurement and evaluation, they are not the only models. The Success Case Method (SCM) developed by Robert Brinkerhoff involves identifying and examining in detail the most and least successful cases in a program (usually an organizational development program such as training or coaching). Examining the most extreme positive and negative cases can help organizations identify what is and is not working. There are five steps in SCM:

1. Focus and plan a Success Case study.

2. Create an impact model that defines what success should look like.

3. Design and implement a survey to search for the best and worst cases.

4. Interview and document success cases.

5. Communicate findings, conclusions, and recommendations.

Another evaluation model is the Learning-Transfer Evaluation Model (LTEM) developed by Will Thalheimer. LTEM has eight levels of learning evaluation, starting with the least adequate method for evaluating learning (tier 1, attendance) and ending at the ultimate goal of learning (tier 7, transfer, and tier 8, effects of transfer).

While evaluation will continue to be a challenge, avoiding the mistakes the Kirkpatricks outlined will help talent development professionals improve how they evaluate their training initiatives.

How Should Learning and Development Use Data and Analytics?

As Gene Pease and Caroline Brant explain in their *TD at Work* article "Fuel Business Strategies With L&D Analytics," talent development teams have not undertaken significant data collection or training evaluation. Previously collected information was usually in the form of post-training paper surveys. Today, technology has allowed talent development to start using learning management systems (LMSs) to collect and analyze data. Many talent development professionals, however, still use their LMSs primarily to track how many learners attended a course, how many completed the course, and their Level 1 reactions to the course.

L&D has an opportunity to use analytics to demonstrate learning impact. Pease and Brant outline four primary categories of analytics that talent development can leverage:

Descriptive analytics answer "What happened?" They summarize historical data that focuses on what happened in the past. For talent development, this includes information on the number of learners, how many learners completed the course, and how much time was spent on learning.

Diagnostic analytics answer "Why did it happen?" by drilling down on data to establish underlying behavior. For talent development, this includes doing a deeper dive into learners' strengths, weaknesses, motivations, and interactions with content.

Predictive analytics answer "What's going to happen?" They draw on descriptive and diagnostic analytics to help predict what will happen next. This can help talent development create scaffolded learning that is personalized to each learner and provides introductory learning that advances in complexity when the learner is ready for it.

Prescriptive analytics answer the question "How can we make it happen?" They can help influence behavior to achieve a specific outcome. For talent development, this involves synthesizing information about learner preference and engagement to create personalized learning.

Analytics for L&D
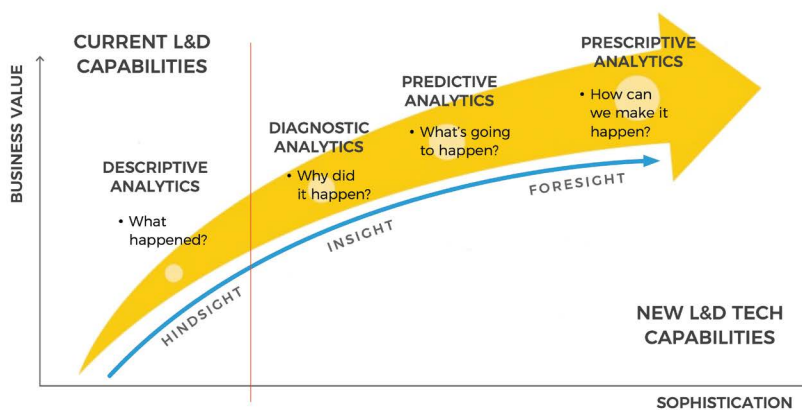
In her *TD* magazine article "It's All About the Impact," Martha Soehren shares how analytics have been used at Comcast, where she leads the talent development function. Their analytics have revealed that program results improve when a peer mentor and supervisor work with a trainer and learner. Comcast plans to use these analytics to help predict retention and performance for new employees who have a dedicated mentor and supervisor.

Building a dashboard is a powerful way for talent development to harness the power of these different types of analytics and create more effective training. Some talent development teams may bring in outside experts to help build a learning dashboard; other teams may feel equipped to build a dashboard on their own. Some larger departments may have a specific position devoted to learning analytics. For talent development professionals at any organization, fluency with data and analytics will be a valuable professional skill to cultivate. Beyond just analyzing and displaying data, talent development will need to communicate data in compelling ways to multiple audiences, including the C-suite.

Next Steps for Evaluating Learning

When it comes to evaluation, it's advisable to start with a small project first then build up to more complex evaluation initiatives. Talent development professionals can begin by evaluating discrete trainings using lower levels of evaluation. From there, they can begin evaluating larger training initiatives at higher levels.

Talent development professionals should build relationships with people throughout their organization, particularly frontline managers. Evaluating training's impact at higher levels will often require information about learners' on-the-job performance or a team's financial data. Managers will be more willing to provide that information if they have a relationship with the talent development team and understand why training is important. It's also valuable to develop relationships with senior leaders and, ideally, find one or more senior leader champions who can help embed learning evaluation into the organization's culture.

Effective evaluation should begin during the instructional design process, as talent development professionals analyze the performance gap and develop targeted learning objectives aimed at helping close the performance gap. Being clear about what training should accomplish during the design process sets up post-training evaluation for success.

Visit td.org/new-to-training to find conferences, courses, publications, and other resources that are designed for professionals who are just beginning their career in talent development. These resources can help you get started on your journey toward effective evaluation.