

A System for Learning by Performance (LxP)

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Abstract

Learning by Performance (LxP) is a system for learning by performing and performing by learning rather than a specific teaching approach. The LxP system synthesizes key elements of learning-by-doing, active learning, situated learning, mastery learning, self-regulated learning, problem-based learning, competency-based education, performance management, performance-based learning, and Process Education. As the name suggests, performers learn by performing to meet specific outcomes by working through seven stages: 1. sizing up a performance, 2. planning a performance, 3. practicing and preparing for the performance, 4. performing, 5. being evaluated, 6. being coached, and 7. accepting feedback. During these seven stages, self-coaching and external coaching generate feedback to improve aspects of the performance. Coaching creates a safe, low-stakes improvement-oriented environment. Because grades, raises, promotions, and other decisions depend on evaluation, LxP can also be used to provide feedback and motivation for personal development. The systems model identifies the key elements essential to learning and development that also support performing. Learning, growing, and performing are distinguished as separate improvements to highlight the impacts from each. The result is a system that may be applied within informal learning, education, the workplace, and other contexts to achieve the benefits of LxP.

Introduction

If you do something often enough, you get better at it — simple and obvious. When people really care about what they are doing, they may even learn how to do their jobs better than anyone had hoped. They themselves wonder how to improve their own performance.

— Roger Schank (1995)

Individuals value many things in life, such as earning a living, taking a walk, reading a good book, spending time with loved ones, or just being. Individuals are both receivers and producers of valued things, such as products, experiences, state of affairs, interactions, thoughts and development. During our wakeful hours, people are either passive or active. When activity occurs, with the intention of producing a valued thing, it is called *performing*. A *performance* consists of performing with its valued products, and all the preparation, people, evaluation, and resources involved. Following Popper's (1978) *Three Worlds*, performing may produce a product in one or more of the physical, personal, or cultural worlds. Examples of physical world products include making a pot, building a house, or exercising. Examples of cultural world performances include singing, painting, writing, buying, coaching, or talking. We perform learning and reflecting to create changes in our personal worlds. One activity can affect multiple worlds, for example, typing creates products in the physical (e.g., pages with letters), cultural (e.g., books), and personal worlds (e.g., organizing the author's mind).

Since performing involves anything done with the intent of creating value, much of learning is classifiable as developing one's capability to perform. When the learner values what is being learned, learning is performing, as described in *Learning How to Learn: Improving the Performance of Learning* (Apple & Ellis, 2015). When performing is as Roger Schank suggests in the opening quote, performers may improve performance outcomes and may even become intentional about improving performance. Much of formal learning suffers from the learning transfer paradox, identified by Robert Haskell (2000), which states that transfer of learning is the aim of education and yet what it does so poorly in general. A related problem is the teaching and testing in formal settings of lower-order knowledge with respect to Bloom's (1956) taxonomy, primarily memorization and understanding. At a minimum, application to several contexts must be practiced to achieve transfer of knowledge as well as to learn the implicit knowledge and gain the experience required to use the new knowledge outside the formal setting (Haskell, 2000; D. Jonassen, 2006; Schank, 1995).

As a result of these limitations, this research began with the exploration of how to integrate performance with learning to support higher-order learning, particularly the application and the transfer of learning. The intentional improvement of learning performance and the learning structure itself is termed *Learning by Performing* or LxP. Placing performing at the center, LxP enforces the application of learning while also providing the platform for developing the transfer of learning. The transfer of

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learning also depends on proper design of experiences, so while LxP enables the transfer of learning it is not guaranteed. Performing has the additional advantage of producing results that can be evaluated to show learning has occurred and in what contexts it has been applied.

The goal of this research is to provide a structure that learners, facilitators, and developers can follow and improve. We intentionally included formal, informal, and personal learning within its scope. We aligned our research approach with Education Design Research (EDR), as defined by McKenney & Reeves (2018), with the aim to create an adaptable systems model for LxP. This model, while informed by key research in learning and performance areas, is also constrained to span education, workplace learning, self-development, communities of practice, and informal learning. The LxP model development synthesized the key features of proven learning approaches with existing performance improvement frameworks.

In what follows, the literature contributing to LxP from education and management including learning-by-doing, active learning, performance-based learning, situated learning, performance management and performance studies is discussed. Next, the methods, goals and criteria that were followed in the development of the LxP are delineated. The resulting performance framework is then described in detail followed by an analysis of how the resulting LxP model meets the established goals and criteria. Finally, current and potential applications of the model and plans for future work are presented.

Literature Review

The literature identifying learning approaches and their features that contribute to learning by performing are presented in this section. These elements are synthesized into the final systems model, LxP. While approaches within formal education are discussed, additional approaches outside of education that provide insight into what has worked well in the real world are also discussed.

Learning-by-Doing

Learning and doing have a long history together. The first flint-knapper making a stone knife learned by experimentation, and then passed that knowledge on by coaching new flint-knappers engaged in making their own stone knives. The learning was done without benefit of written learning resources. The key elements are an example of a knife, the tools used to create it, a model demonstration of the process, learning by doing, a comparison of the result to the desired result, and coaching to perfect one's technique. Likely, the learner started by learning other useful activities like excavating nodules, shaping nodules for

others, and creating larger flakes before learning to create simpler objects, such as a hide scraper ("Ancient Craft—Flintknapping," n.d.). Those who excelled could go on to make such wonders as arrow points, spearheads, corner-tang knives, and decorative items (Whittaker, 1994). The value of the performance to survival provided the necessary motivation for suffering through cuts, abrasions, and even silicosis.

As early as the works of Aristotle recognized *doing's* importance to *learning*. Aristotle (1994) wrote,

"The same is true with skills, since the things we have to learn before we can do them, we learn by doing them, e.g., men become builders by building and lyre players by playing the lyre; so too we become just by doing just acts, temperate by doing temperate acts, brave by doing brave acts."

Learning-by-doing works because it facilitates learning both explicit and implicit knowledge that is critical to performance. Schank (1995) reported,

"Learning by doing works because it teaches implicitly rather than explicitly. Things that are learned implicitly need only be experienced in the proper way at the proper time...What students learn when they learn by doing often remains implicit. Micro-scripts, participation strategies, explicit functional knowledge, and lessons from cases are often the kind of knowledge that people don't really know they have. The knowledge comes up when they need it and people can sometimes explicitly state what they know."

Learning-by-doing, however, is not universally practiced as noted by educational psychologist John Dewey (1916) stating:

"That education is not an affair of "telling" and being told, but an active constructive process, is a principle almost as generally violated in practice as conceded in theory...But its enactment in practice requires that the school environment be equipped with agencies for doing...to an extent rarely attained." (p. 46)

Active Learning

In their seminal work *Active Learning: Creating Excitement in the Classroom*, Bonwell and Eison (1991) compiled a set of strategies for creating excitement in the classroom. They termed these strategies *active learning* and defined them as "instructional activities involving students in doing things and thinking about what they are doing." (p.19) Since their work in 1991, the evidence in the literature has grown that active learning helps students learn more effectively than utilizing traditional approaches such as lecturing. Freeman et al. (2014) conducted a meta-analysis

of 225 studies comparing constructivist and expository approaches in the STEM disciplines. They report that students with traditional lecture courses failed 1.5 times more than students in courses with active learning, and that on average, student performance on exams or other assessments increased by almost half a standard deviation when some active learning was included in the course design. Moreover, these results were consistent across disciplines in STEM and psychology.

Other studies found potentially replicable benefits of active learning. The achievement gap for under-served students in STEM courses was halved (Haak et al., 2011). The gender gap was improved and under “high doses” of active learning, eliminated (Lorenzo et al., 2006). Other studies showed improvements in exam scores, skills, and motivation from active learning rather than lecture-based courses (Anderson et al., 2012; Kember & Leung, 2005; Thaman et al., 2013).

Mastery Learning and Competency-Based Learning

Group-based mastery learning was introduced by Bloom (1968) as a solution to the problem of learners progressing to mastery at their own pace, and not to some level of proficiency in a fixed time environment. As Bloom described it, the approach allows learners to engage in learning with the support of their peers and to periodically be assessed, be given feedback, and continue to learn until mastery is reached. As a result of the research, Bloom stated, “Most students (perhaps over 90 percent) can master what we have to teach them, and it is the task of instruction to find the means which will enable our students to master the subject under consideration” (p. 1). Ellis and Bond (2016) conducted a meta-study and reported that group mastery learning produced an effect size of 1.0, “so great that one researcher called group-based mastery learning the educational equivalent of penicillin” (p. 125–126).

Competency-based education (CBE) is related to mastery learning in that competencies are criterion-referenced learning objectives, uses formative assessment and flexible time for mastery, and often, though not exclusively, uses performance-based assessment to verify competence. Patrick and Sturgis (2011) described performance-based learning as a competency-based education model. Lurie et al. (2019) indicated that a program can be defined as CBE if it exhibits one or more of these characteristics:

1. Learning is measured in competencies, and either quantified without reference to seat time or mapped to measures of seat time
2. Students advance from the course or complete the program based on mastering all required competencies

3. Courses or programs can be substantially “self-paced” by students. (p. 5)

Leasure et al. (2018) also describe a system for competency-based education generalized from the model used at Western Governors University, the largest enrollment competency-based university in the world. Notably, their model emphasizes coaching through formative assessment; however, it does not emphasize performing as the driver of learning. Instead, it focused on learning from gaps between the competency and the quality of the performance product. Further, their model does not coach nor evaluate the process that produced the product.

Self-Regulated Learning

There are many theories of self-regulated learning (SRL). Winne and Hadwin (1998) describe an information-processing oriented theoretical model. Their model identifies four phases of learning: task (or performance) definition, goal setting and planning, studying tactics (a narrow form of performing), and adaptations. Further, the model deals with external and internal conditions, operations, products, evaluations, and standards. Their model and subsequent research such as Greene and Azevedo (2007), theorize how cognition, affect, and metacognition operate across the phases and conditions. SRL makes clear the importance of meta-cognition and learning skills to overall learning performance.

Problem-Based Learning (PBL)

Originally developed for medical schools, problem-based learning (PBL) has a long history of using open-ended problems to develop content and skill expertise (Hung et al., 2008). Jonassen & Hung (2008) developed a taxonomy of problem solving types from simple word problems up to complex policy problems and dilemmas in multifaceted contexts. A meta-analysis of PBL research (Strobel & Barneveld, 2009) demonstrates that PBL supports superior long-term retention, skill development, and satisfaction among learners and teachers in contrast with traditional learning techniques that excel at developing only short-term retention for enhanced performance on standardized exams.

Performance-Based Learning and Assessment

In the 1990s, performance-based education and performance-based learning entered the taxonomy in education. Hibbard et al. (1996) wrote a practical guide to performance-based learning based on their implementation experience indicating that “performance-based learning and assessment represent a set of strategies for the acquisition and application of knowledge, skills, and work habits through the performance of tasks that are meaningful

and engaging to students” (p. 5). They developed an eight stage “Cycle of Learning” that includes five performing stages (1) Stating Task, Audience, and Purpose (Accessing and Acquiring Information, (3) Processing Information, (4) Producing a Product and (5) Disseminating Product. These stages may be formatively assessed (Stage 6) at any time. This self-assessment may lead to Stage 7, self-evaluation, which will lead to Stage 8, self-regulation where the learner makes plans to improve their performance based on the results of Stages 6 and 7.

Process Improvement and Performance Management

The Society for Human Resource Management (2019) posts a practical definition for managing individual performance: “Managing employee performance deals with an organization's strategy, policy and practices with respect to establishing performance expectations for its employees, along with measuring and monitoring the results.” This definition is in line with Bussin’s (2013) Phases of Performance Management which include: (1) Define goals, standards and measures; (2) Provide ongoing coaching and feedback; (3) Conduct performance appraisal and evaluation discussion (the formal process); (4) Determine performance recognition, rewards or consequences and (5) Conduct annual development and career opportunities evaluation and discussion.

The International Society of Performance Improvement developed criteria for individuals to become a Certified Performance Technologist if they meet the standards delineated in Table 1. The first four standards are treated as principles that apply to every phase of a performance improvement project. Standards 5 through 10 define a process to be followed to improve performance.

Table 1 ISPI Phases of Performance Management (2013, p. 3)

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:	Evaluate Results and Impact

Six Sigma Process Improvement

The six-sigma quality improvement process was developed at Motorola to improve the quality of any process (Harry et al., 2011). A performance includes a formal or informal process to guide performing. Improving the process improves the performance. A general framework called DMAIC is at the heart of six-sigma process improvement and stands for the following sequence of steps to improve the quality of any process (and hence, performance).

1. Define the problem to be addressed
2. Measure the important quality aspects of the products produced
3. Analyze the process and the products to determine opportunities to improve
4. Improve make the process improvements
5. Control the process during future performances

These steps have been used by General Electric to improve their manufacturing and other processes (Tennant, 2001). Six sigma in its full implementation is not appropriate for all applications (Kwak & Anbari, 2006). While complete implementation of DMAIC requires a full statistical quality control approach, LxP will use the basic outline of DMAIC as an organizing approach.

Situated Learning

Lave and Wenger (1991) wrote the now classic book *Situated learning: Legitimate peripheral participation* to explain the often strong results that apprenticeship programs achieve in preparing people for the workforce. The central concept is that apprentices learn-by-doing legitimate work in the actual context of work. By so doing, all workers in the field form a community of practice. Workers start on the periphery and advance in standing within the community by the quality of their experience and influence on the practices of others. To support this advance, the performance area is scaffolded by real-world performance challenges.

Performance in Process Education

Elger (2007) introduced the Theory of Performance as a framework used to explain the quality of a given performance and to support improvement coaching. He identified six components that can affect a performance: context, identity, level of knowledge, level of learning skills, and the dynamic (personal) and fixed factors of the performer. When used with a set of performance criteria and measures, the components help a coach explain the observed quality of a specific performance.

A coach provides effective feedback, with coaching expertise, to help improve future performances when it is structured using the SII methodology (Wasserman & Beyerlein, 2007). The SII methodology reinforces the strengths that contributed the most to the quality of the observed performance so they are repeated in future performances. Additionally, it identifies improvements that would most increase the quality of future performances and establishes action plans to implement these improvements.

The Theory of Performance has been utilized and expanded in the Process Education literature. It has been utilized in how to best prepare students for a planned performance (Apple, Morgan, and Hintze, 2013), for faculty development (Beyerlein et al., 2007) and professional growth in any field (Apple, Ellis, & Leasure, 2018). Apple, Ellis, & Hintze (2016), present a Performance Model that combines the Theory of Performance with other elements of performance. The authors delineate thirteen aspects of performance as related to identity, knowledge, learning skills, context of performance and personal skills. Beyerlein, et al. (Beyerlein et al., sec. 2.3.1) list the elements leading to higher level performance:

...self-growers demonstrate a high level of performance across a spectrum of learning skills, including the construction of understanding, problem solving, personal and interpersonal development to progressively higher levels of performance. They continually grow their capabilities by using strong self-assessment to enrich and enhance their future performance. While self-growers can usually cite many significant mentors in their lives, they are not dependent on mentors for ongoing personal development.

Finally, Duncan-Hewitt (in Beyerlein et al., sec. 2.3.2), provides a preliminary systems concept map showing how these elements are integrated to support learning.

To summarize and further delineate the features that will contribute to the development of the LxP model, Table 2 lists the top five features of each learning approach discussed within this literature review. In what follows, these features will be traced and their contribution to a specific element(s) of LxP discussed.

Table 2: Top 5 Features of Each Learning / Performance Strategy

Learning Approach (Reference)	
Learning-by-Doing (Dewey, 1916; Schank, 1995)	
Top Five Features	<ol style="list-style-type: none"> 1. Doing ranges from unstructured, brief activity to a sequence of scaffolded performances 2. Deliberate practice is the heart of learning by doing 3. Performance context is critical in the design of learning by doing 4. Implicit learning occurs during doing and assessed via the result 5. May be coached or self-regulated; benefits from master performer
Active Learning (Freeman et al., 2014)	
Top Five Features	<ol style="list-style-type: none"> 1. Emphasizes actively thinking to promote higher levels of engagement, feedback, and learning 2. Broad range of individual, cooperative/collaborative activities, projects, reflection, problems, and presentations 3. Minimize time when learners are passive (e.g., lecture) and maximize active learning time 4. Evidence of promoting equitable outcomes by gender and minority status 5. Effect size of 0.5
Mastery Learning and Competency-Based Education (Bloom, 1968; Guskey, 2010 Competency-Based Education Network 2017; D. E. Leasure et al., 2018)	
Top Five Features	<ol style="list-style-type: none"> 1. Holds level of expected learning constant while letting learning time vary with built in low-stakes coaching cycles 2. Evaluated using criteria- referenced levels of learning & performance 3. CBE: mastery-based model built around authentic competencies 4. Competence may be facilitated, coached, or self-directed 5. ML: Effect size of 1.0

Learning Approach (Reference)

Self-regulated Learning (Winne & Hadwin, 1998, 2008)

Top Five Features

1. Learners use metacognition and self-regulation to monitor and control learning performances
2. The learning process has 4 phases: definition of the task, set goals & plans, employ studying tactics, and adapt performance
3. The phases of learning integrate COPES - task & cognitive conditions, operations, products, evaluations, & standards
4. Learners evaluate the evolving products, compare them to standards, and integrate external evaluations to adapt performing to meet learning goals.
5. Motivation and personal factors are monitored and regulated during performing to ensure progress toward goals

Problem-based Learning (PBL) (Jonassen, 2000; Jonassen & Hung, 2008; Strobel & Barneveld, 2009)

Top Five Features

1. Uses problems of varying difficulty in various contexts to foster integrated, higher-order learning
2. Different problems types may have different solution approaches
3. Problems are scaffolded by difficulty within type
4. Problem context is varied to promote transfer and scaffolded to approach real-world problems
5. Cooperative learning creates strong conditions for learning

Performance-based Learning & Assessment (Hibbard et al., 1996)

Top Five Features

1. Performance is the heart of the learning and its demonstration across all levels of education
2. Emphasizes learning by doing projects using a cyclical learning process & assessment lists
3. Emphasizes balanced content, intrapersonal and interpersonal competency development
4. Uses guided self-assessment, self-evaluation, and self-regulation of learning
5. Supports learner independence, personalization of learning and individual challenge

Performance Management & Improvement (Bussin, 2013; International Society for Performance Improvement, 2013; SHRM, 2019)

Top Five Features

1. A multi-directional approach aligning strategy, organization, and individual goals and actions
2. Applies leadership, team management, and self-management
3. Performance appraisal focuses on improvement
4. Performance evaluation focuses on accomplishment & supplies ratings for decisions
5. Goals, metrics, dashboards, direct activity and measure success

Six-Sigma Process Improvement (Harry et al., 2011)

Top Five Features

1. Standardized 5-step approach following DMAIC
2. Defines quality as measurable outcomes on products produced
3. Defines the process to be improved
4. Emphasizes improving the process, education, training, and coaching vs. simply blaming individuals
5. Must be adapted to situations and purposes

Learning Approach (Reference)	
Situated Learning (Lave & Wenger, 1991)	
Top Five Features	<ol style="list-style-type: none"> 1. Learning and advancing a performance domain in a community of practice 2. Status in community based on expertise & supporting others 3. Expertise gained through scaffolded accomplishment of performances 4. Contributions developed as expertise and domain boundaries challenged 5. A structured form of cooperative learning by doing
Process Education (Apple, Ellis, & Hintze, 2016)	
Top Five Features	<ol style="list-style-type: none"> 1. Public nature of performance 2. Expectations are shared 3. Includes identity of performer 4. Fluency of the performer 5. Incorporates cultural values

Method

The research approach is based on the Education Design Research methods described by McKenney & Reeves (2018) and informed by the Education Research and Design guidelines (Institute of Education Sciences & U.S. Department of Education and National Science Foundation, 2013). Using this approach, research is conducted prior to the design phase in order to identify evidence-based elements and criteria supportive of the research goal. Then the design is created incorporating as many of these elements as possible. After building the design, it is tested, iteratively improved, and ultimately implemented in educational settings, proven, and finally scaled up for widespread impact.

Leasure et al. (2018) produced the original systems model incorporating Elger's (2007) Theory of Performance and contextualized it for competency-based education. While based on their original model, LxP is designed with two goals and four criterion in mind. Goal one is that LxP will be a conceptual system that further advances and embeds the performance model of Elger (2007). Goal two is to incorporate the key features of the learning approaches presented in the literature review. Additionally, the design will incorporate the following four criteria:

1. The design presents a general system to guide, plan, assess, explain, evaluate, and coach performance to meet the expectations of stakeholders and goals and needs of the performer or performing team;
2. The system covers formal and informal learning within individual and team performance for educational, professional, and life coaching contexts;

3. May be specialized to a particular usage by choosing which elements to emphasize, where to insert or remove instruction, and other adaptations;
4. Utilizes to the extent possible existing concepts and methodologies of Process Education.

The framework that is described in the next section will meet these goals and incorporate these four criteria. After describing the performance framework, an analysis of how these goals and criteria are met is presented.

The Performance Framework

A process starts at an initial state, uses a series of stages with inputs and outputs that collectively produces a final state. In the most general terms, the performance improvement process begins with the initial performance capability of the performer (individual or team), guides the performer to learn, grow, and practice performances, and ends with improved capability of the performer. The process consists of seven stages as depicted in Figure 1.

The process loops through these stages until time expires or the performance capability meets or exceeds expected capability. The process typically ends after Stage 7, with the desired performance reached or the time exhausted. The process of moving through the stages, however, may end at any time if the performer stops or an authority figure ends it. The process repeats after Stage 7, beginning again at Stage 1. The process may also end at any point a deadline is reached or the performer has met an approved standard.

Two looping pathways, a high-stakes pathway and low-stakes pathways exist within the LxP design. The high

stakes pathway, which contains all seven stages, includes a judging of the performance, that is, it uses an evaluation cycle. The low-stakes pathway, which omits Stage 5, is followed when an individual performance is not being judged, that is, it uses a coaching cycle. The distinction is important because an evaluation cycle may involve performance stress and without coaching, it does not explicitly call out improvements. Uncoached, this stress interferes with performance and could result in a downward spiral, e.g., students dropping out of college or an employee being fired. The evaluation most likely highlights a score supporting a decision and deficits from the ideal performance. The coach, using the SII methodology, must explicitly translate these to strengths and improvements. An assessment cycle is performed under lower stress. An evaluator may also function as coach and include suggestions for improvement, as with an annual performance evaluation.

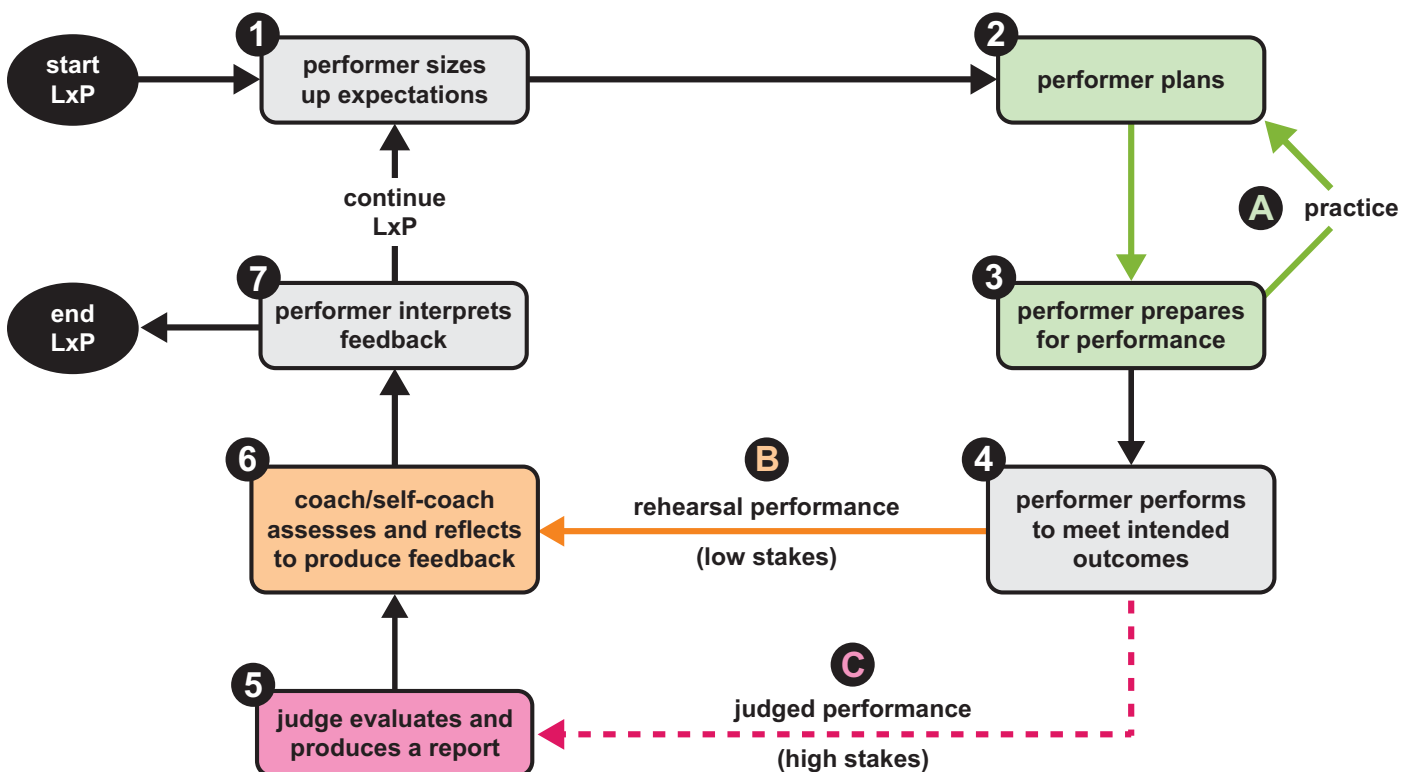
To have a deeper understanding of the process stages, an examination of the inputs and outputs is required including how they are transformed and how each part relates to the others. Object flow diagrams depict objects and process stages in a framework that shows the input objects used by each stage to produce or modify the output objects. Objects appear in the figure as white boxes. The process stages are actions and appear in a gray box. The arrows represent the object flow into and out of a stage. The start and end points in the overall system appear as gray ovals. In what follows, object flow diagrams are utilized for each LxP stage.

Stage 1: The Performer Sizes Up the Expectations

Prior to Stage 1, an organization on behalf of its stakeholders identifies the performances needed from a performer. An analyst, engineer, or a program/course designer designs the stakeholder's expectations creating the performance scorecard, a tool that delineates the standards, incentives, criteria, description and demonstration of the expected performance. The performer builds an understanding of the expected performance by analyzing the performance scorecard. During Stage 1, the performer must make sense of the performance that is expected. Both the stakeholders and the performer have expectations. The scorecard captures the formal stakeholder expectations, and there may be others that are implicit or not known at this time. The performer has expectations, and like the stakeholders, these may be formal expectations or implicit, not known, or unrecorded. As the performer internalizes the scorecard, the external scores are translated by the performer's understanding of the performance as well as the performer's goals into the intended performance outcomes, shown as an output in Figure 2.

A representation ranges from "I know you want me to do something" to a precise understanding and alignment with the scorecard. Realistically it is a mix of imperfect external and internal expectations. It is mental and sometimes written in the performer's words. Stages 1, 4, and 5 of The Learning Process Methodology (Leise

Figure 1 Process Stages within Performance Improvement



et al., 2007) ask a learner, the performer in a learning experience, to record their motives, objectives and own criteria in order to meet the external performance expectations. Likewise, the Reading Methodology asks the reader to meet the external performance expectations when filling out the Reading Log (Hurd et al., 2018).

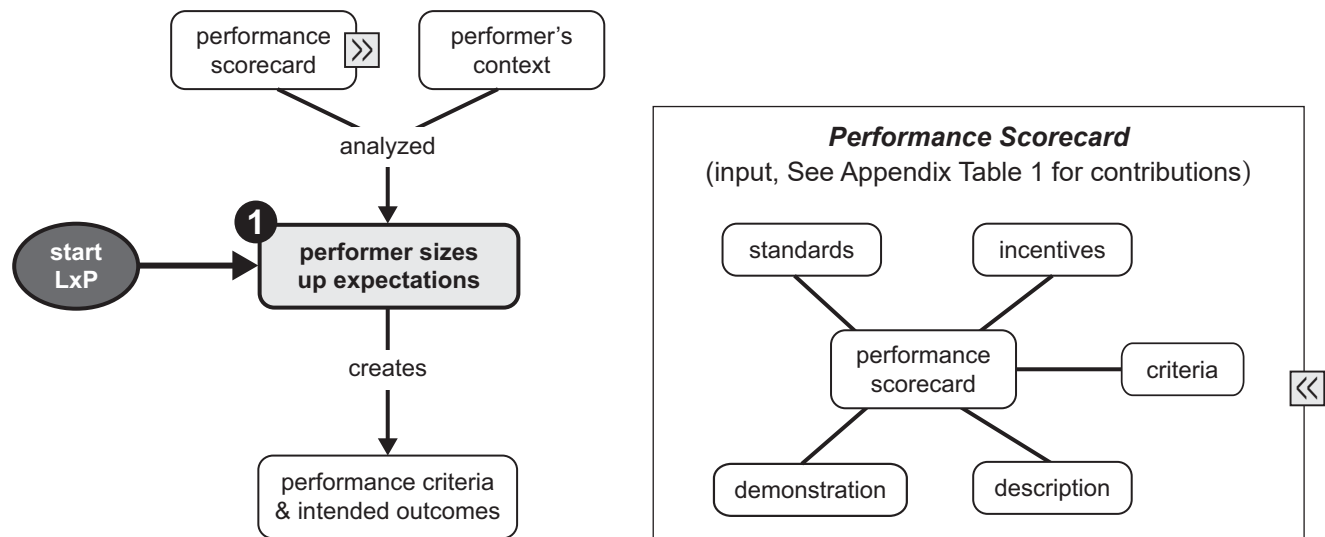
If the performer has access to stakeholder representatives, the performer may ask for additional clarification and improve this representation. For example, asking the professor to clarify an assignment. Similarly, an organization may want a performer to create a software app for the smartphone markets. The performer is comfortable with basic app development methods but also wants to learn advanced techniques. As a result, the performer would include the intent of the scorecard (as understood by the performer) as well as the personal expectations in the intended performance outcomes.

Stage 2: The Performer Plans for Learning, Growth, and Execution

After clarifying the performance expectations and intended outcomes in Stage 1, the performer creates improvement plans by analyzing the performance context and the performer's context as well as any feedback and improvement plans from the last performance. This stage, as well as its inputs the performance context and performer's context, are all delineated in Figure 3.

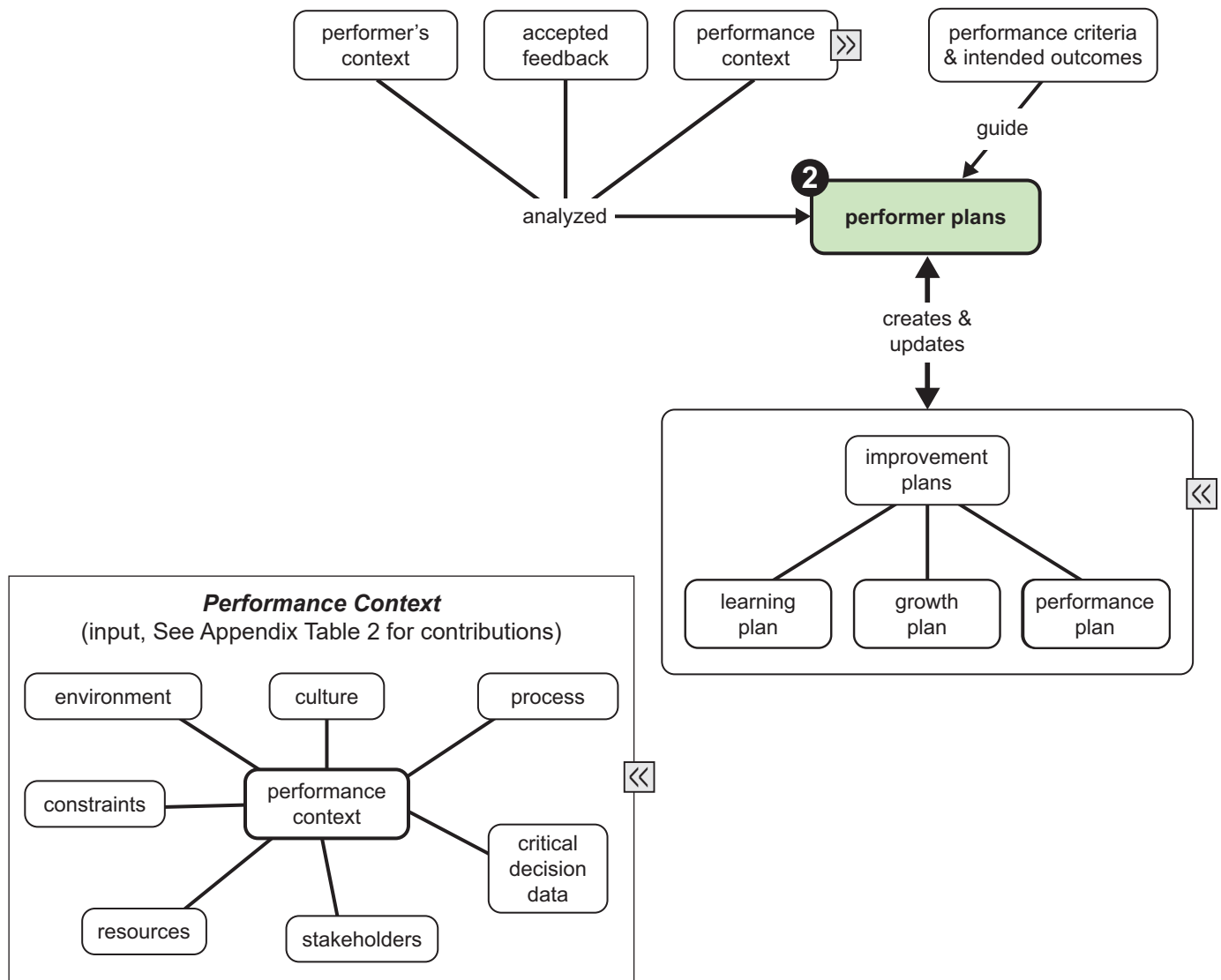
In planning, the performer determines what needs to be learned and what learning skills need to be practiced as they develop their learning and growth plans. They will also produce a performance plan that is a script or plan for their performance. This planned approach is designed to meet the performance criteria and achieve the intended outcomes for the current performance context and includes the selection or design of a script or set of rules and principles.

Figure 2 Stage 1—The Performer Sizes Up Expectations

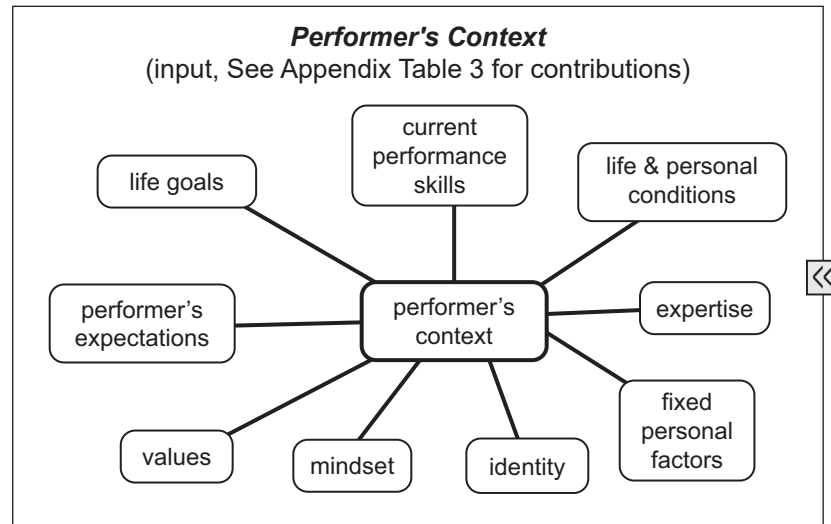


Description	A concrete exemplar or model of the holistic performance that is desired to be produced to help visualization
Demonstration	A visual performance of what is desired, such as carving, sewing, dancing, or facilitating learning in a classroom
Criteria	The broad explicit statements of the expectations of quality
Standards	The conventional norms along with minimal levels of quality that must appear or acceptability; Bussin (2013) lists four common features of performance standards: the quality of the result, the quantity of production, time and other resources used in producing the results, and adherence to the process
Incentive	Any extrinsic reward, either monetary or non-monetary, given to the performer for achieving a specified quality level

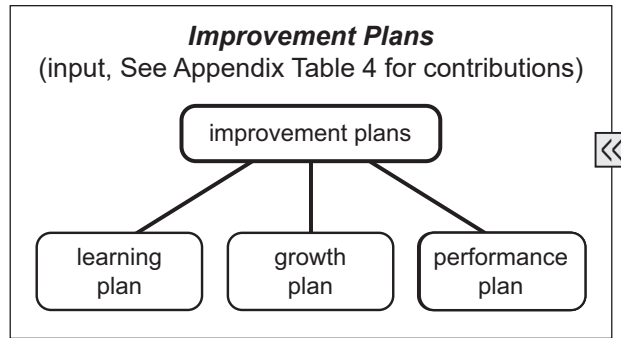
Figure 3 Stage 2—The Performer Plans for Learning, Growth, and Execution



Critical decision data	Technology and data required to support performance
Process	A way of doing the expected performance with supporting tools and other machines
Stakeholders	Everyone who has a say in the specific performance including participants and stakeholders of the performers
Culture	The shared ways of being, frames, narratives, policies, & value in the embedding organization
Constraints	The specifications and tolerance that bound the performance as a system including time and resource constraints or operational or product constraints
Resources	The materials, services, time, people, money, etc. available to support a performance with the learning resources needed, such as a syllabus, book, or operations manual
Environment	All aspects of the operating environment in which the performance is staged



Life goals	The conditions that the performer wants to achieve for their life. The life goals may impact the performer's expectations, identity, and mindset, prioritize planning stages, and even be updated as a result of experiencing LxP for a specific performance
Current performance skills	An estimate of the current level of the skills anticipated to be needed; these levels will change throughout the LxP as skills are grown or the performer sharpens their understanding of the skill requirements; an extensive set of such skills is described by Leise et al. (2019)
Life & personal conditions	The current external and internal conditions of the performer that may affect the performance and yet can be accommodated in the improvement plans
Current expertise	An estimate by the performer of the level of the expertise anticipated to be needed for the performance; these estimates will change as expertise is developed during the LxP and as the performer sharpens their understanding of the expertise required; see Figure 4 (Stage 3), for the attributes of <i>expertise</i>
Fixed personal factors	Unalterable conditions of the performer during the scope of the LxP performance that have to be accepted and addressed such as a broken arm or more permanent limitation
Identity	The way of seeing oneself through personal narratives and the way of being guided by deeply held patterns of action and thought; identity may be changed through various methods such as those in life coaching
Mindset	A way of thinking and feeling about oneself and the world that guides thought and action; a part of one's identity
Values	A set of monitors that regulate thoughts, feelings, actions, and self-perception; values may be implicit or explicit and are resistant to change
Performer's expectations	The goals that a performer has for an upcoming performance; their goals need not align with the performance scorecard and need to be made explicit to understand their impact on a particular performance



Learning plan	A particular performance may require the performer to build knowledge related to the performance. The learning plan may be developed using the Learning Process Methodology (LPM) of Process Education or another approach (Apple, Ellis, & Hintze, 2016, p. 111–114)
Growth Plan	Process educators distinguish learning from growth (Apple, Ellis, & Hintze, 2016, p. 11). <i>Learning</i> refers to using learning skills to build knowledge. <i>Growth</i> refers to the development of one's learning skills. The LPM can be used to plan development of the learning skills. Leise et. al (2019) describe an extensive collection of learning skills in their article, Classifying Learning Skills for Educational Enrichment. Physical and psychological strengths are developed through practice and coaching, essentially a recursive iteration of the learning by performing system
Performance Plan	The performer, in Stage 2, builds a plan that includes a script to guide the performance and a plan for how team members will apply resources over time and in their roles to achieve the intended outcomes; the Methodology for Developing Methodologies is used to create the script for the performance

Stage 3: The Performer Prepares to Perform

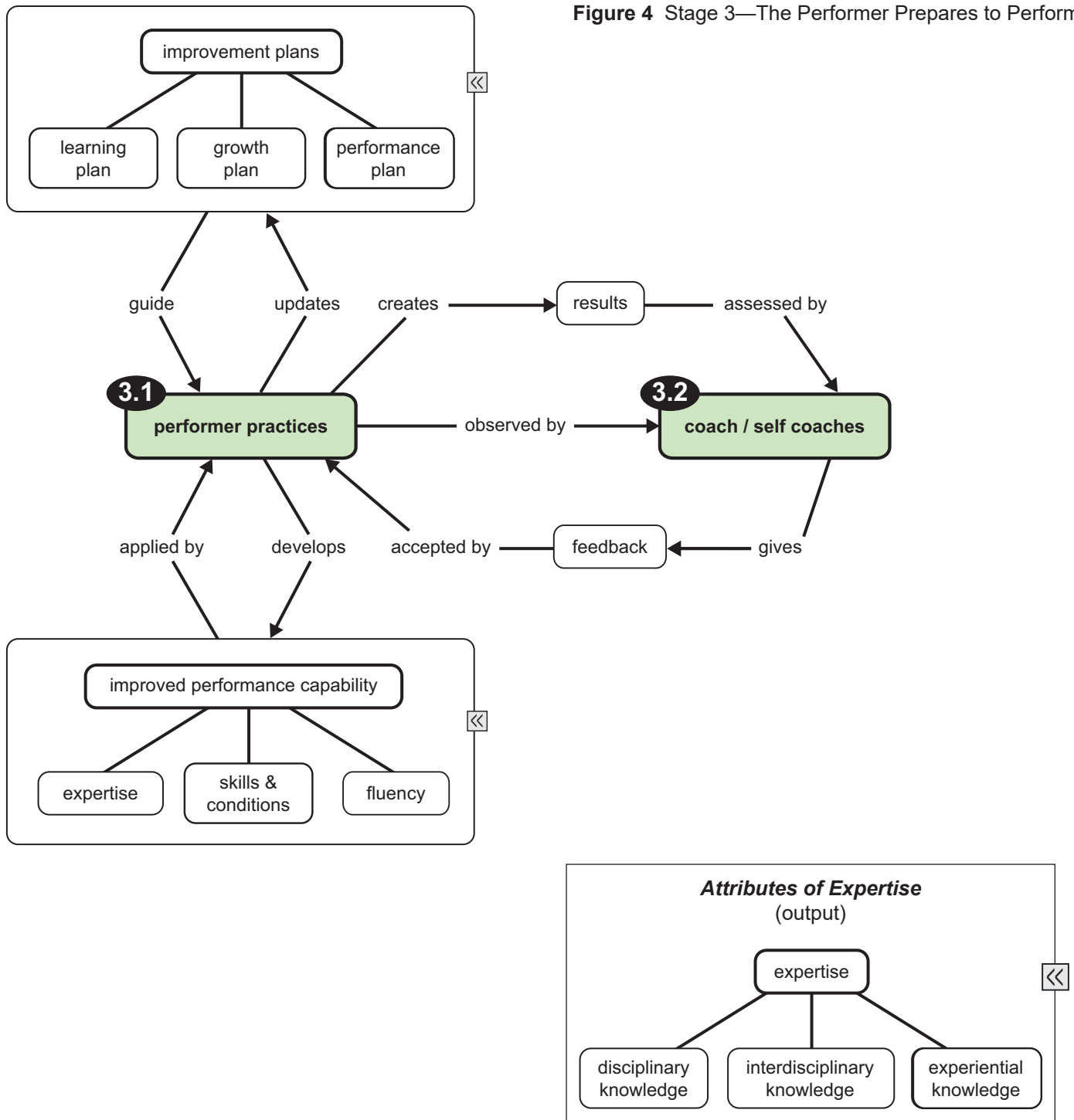
During Stage 3, the performer prepares for the full performance. As depicted in Figure 4, the performer refers to the development plans to determine the specific learning, practice, and rehearsal activities that are required to become prepared to perform. These activities may be conducted by using the following:

- **Purposeful Learning:** the performer develops the required knowledge using the Learning Process Methodology (Leise et al., 2007) to achieve the learning plan; skills and strengths may also be developed through coaching of their use in learning
- **Performance Development:** when the need for growth is larger, the performer and coach use the Performance Development Methodology (Utschig, 2019) with the growth plan to develop the required skills and strengths
- **Practicing:** individual activities in the planned performance are practiced to integrate knowledge and skills; practicing physical movements develops physical strengths; psychological strengths are

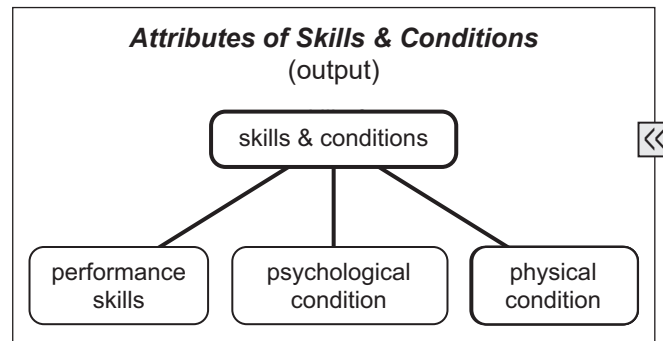
developed through deliberate practice; assessment and coaching are applied to as needed during practice; practice also develops implicit skills and knowledge to increase performance fluidity

- **Rehearsing:** the performer integrates all activities in their performance plan and receives coaching; rehearsal reveals any activity-to-activity performance gaps or a performer's additional development needs; implicit development of knowledge and skills continues; in addition, self-regulation and real-time adaptation are developed for the performance area using the realistic performance conditions of rehearsal
- **Life Coaching:** Mindsets and identity may be strengthened through life coaching techniques (Rock & Page, 2009)

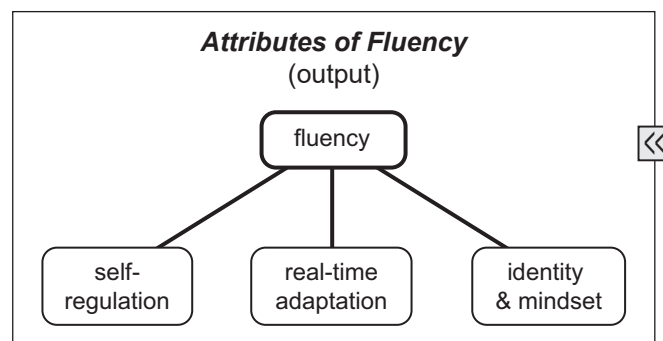
Figure 4 Stage 3—The Performer Prepares to Perform



Disciplinary knowledge	Knowledge from the primary discipline related to the performance that is sufficient to execute the performance
Inter- disciplinary knowledge	Knowledge from other disciplines that is sufficient to execute the performance; this is separately noted in the model to emphasize that inter-disciplinary knowledge is often overlooked in a situation, at least until it's need is discovered during coaching
Experiential knowledge	Knowledge represented within cases and implicit knowledge derived from experience with other performances and that is sufficient to execute the performance



Performance Skills	Competence in selected skills from the classification of learning skills that is sufficient for the performance
Psychological Condition	The current state of all cognitive or emotional factors that could impact the performance
Physical Condition	The current state of all physical factors that could impact the performance



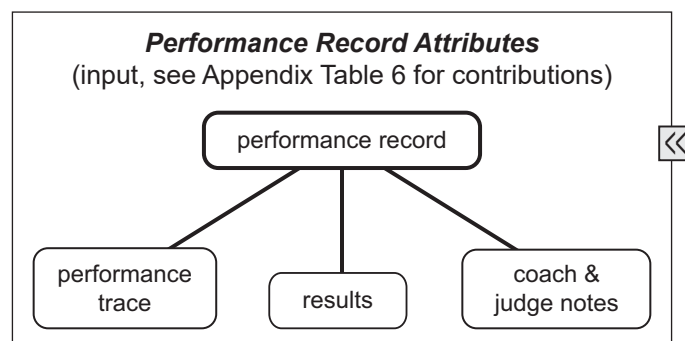
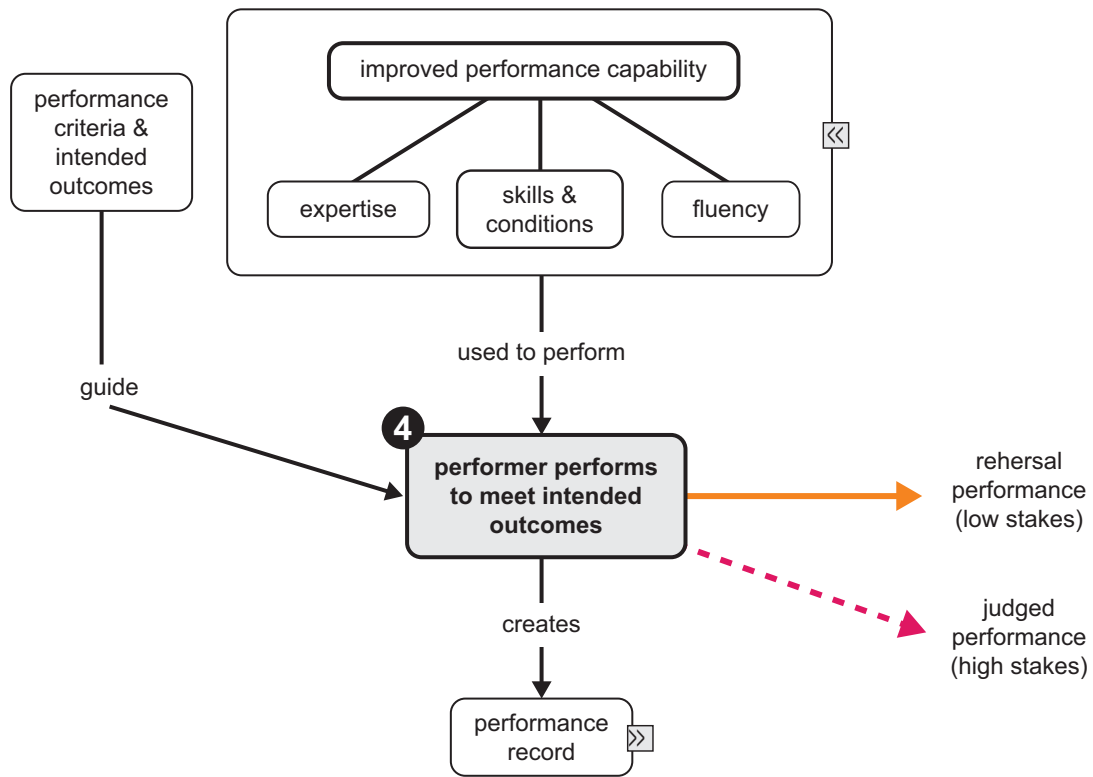
Self-regulation	The executive function of monitoring the performance and performer during the performance to promote optimal conditions
Real-time adaptation	The monitoring of progress to the intended outcomes and adaptation of the individual and team execution plans and performance tasks needed to produce the intended outcomes
Identity & mindset	The beliefs and understandings of the way of being for oneself, others, and the environment together with mindsets aligned to learning, growth, and performance as well as any required for the performance area, such as a patient-care mindset

Stage 4: The Performer Performs to Meet the Intended Outcomes

As depicted in Figure 5, the performer (who could be an individual or a team of participants) follows their performance plan to their best current ability for the given situation (rehearsal or final performance) to meet the performance criteria and intended outcomes.

The criteria and outcomes guide the performance as the performer continually checks and modifies their thoughts, actions, and interactions while regulating their feelings. A performance record (depicted in the same figure) is produced and can be analyzed by the coach for a practice and rehearsal or by the judge for a high-stakes performance.

Figure 5 Stage 4—The Performer Performs to Meet the Intended Outcomes



Performance Trace	A trace of the performance by various means, including memory of the performer or observers
Results	The products and artifacts that were desired by the stakeholders or the quality of the experience received

Stage 5 Judge Evaluates and Produces a Report

If the performance is to be judged, then the evaluation/high stakes path through Stage 5 is taken as depicted in Figure 6. A judge determines the quality level of the performance by measuring the performance using the performance scorecard. The judge compares the quality level to a set of standards in the scorecard to determine whether the standard has been met and determine whether any incentive is to be awarded. The judge then produces an evaluation report.

Stages 6 Coach/Self-coach Assesses and Reflects to Produce Feedback

Both high-stakes and low-stakes performances proceed through Stage 6 as depicted in Figure 7. During Stage 6, a coach uses the performance record and thoughts recorded during the performance (if available) to measure the performance. The coach then analyzes the results together with the performance context, performer context, evaluation report (if available), and scorecard to understand the contribution of the most significant strengths and the most impactful opportunities to improve future performances. A feedback report (verbal or other medium) is produced. As an example, the coach can use the SII Methodology to deliver the performance strengths, areas to improve as well as any insights gained (Wasserman & Beyerlein, 2007). The coach may be the performer, a separate coach, or both, depending on the circumstances. If the low-stakes coaching path is taken (labeled practice and rehearsal in Stage 4) then no evaluation report will exist, but otherwise the analysis will be the same.

Stages 7 Performer Interprets Feedback

In Stage 7, depicted in Figure 8, the performer receives and interprets the feedback from the coach. The performer then updates the performance expectations, including any improvements the performer wants to make. From there, the cycle begins anew with Stage 1.

When the inputs, outputs and the objects of each of the seven stages are incorporated, the final LxP system model is produced, as depicted in Figure 9. This figure is the elaboration of the bare-bones description in Figure 2. The incorporation of the inputs and outputs of each stage is critical to the use of the framework for designing learning and performance experiences as well as for analysis and assessment of a performance.

Figure 6 Stage 5—The Judge Evaluates the Performance and Produces a Report

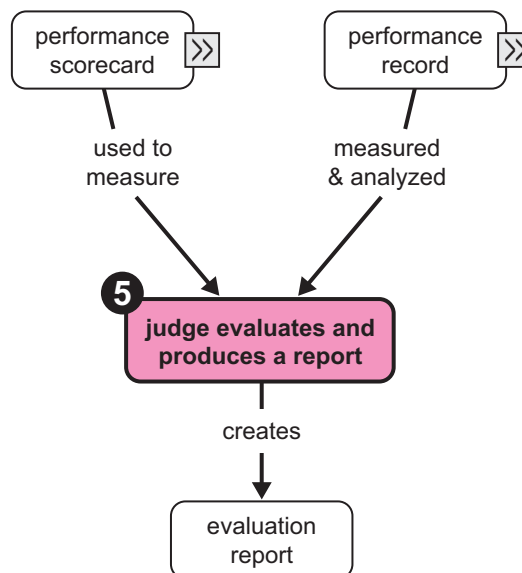


Figure 7 Stage 6—The Coach or Self-Coach Reflects and Assesses to Produce Feedback

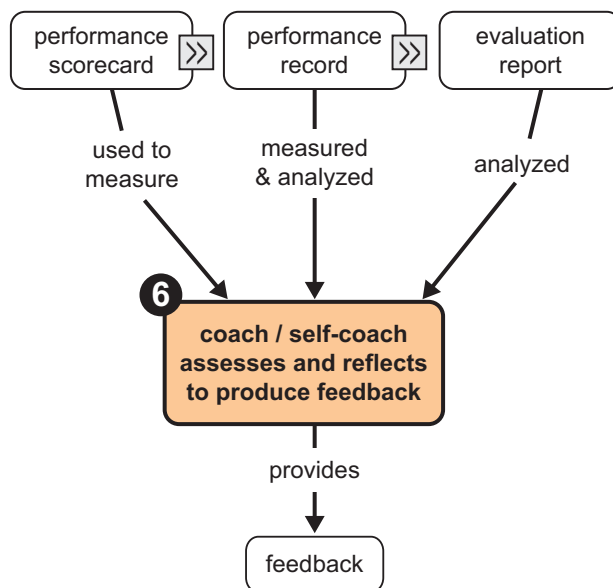


Figure 8 Stage 7—The Performer Interprets the Feedback

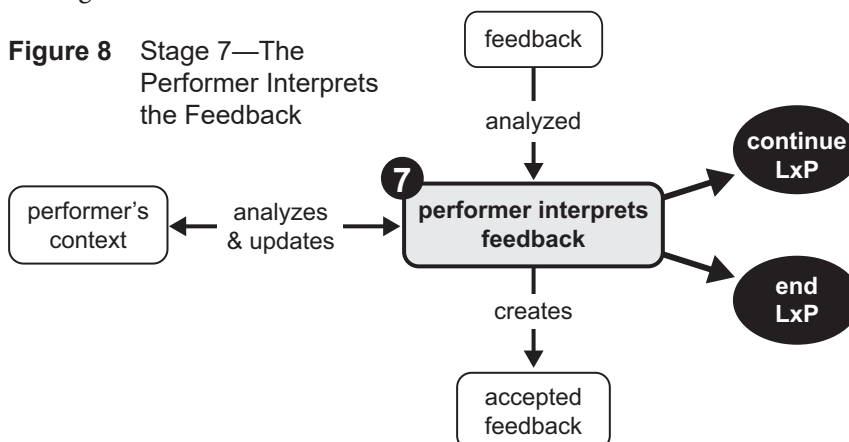
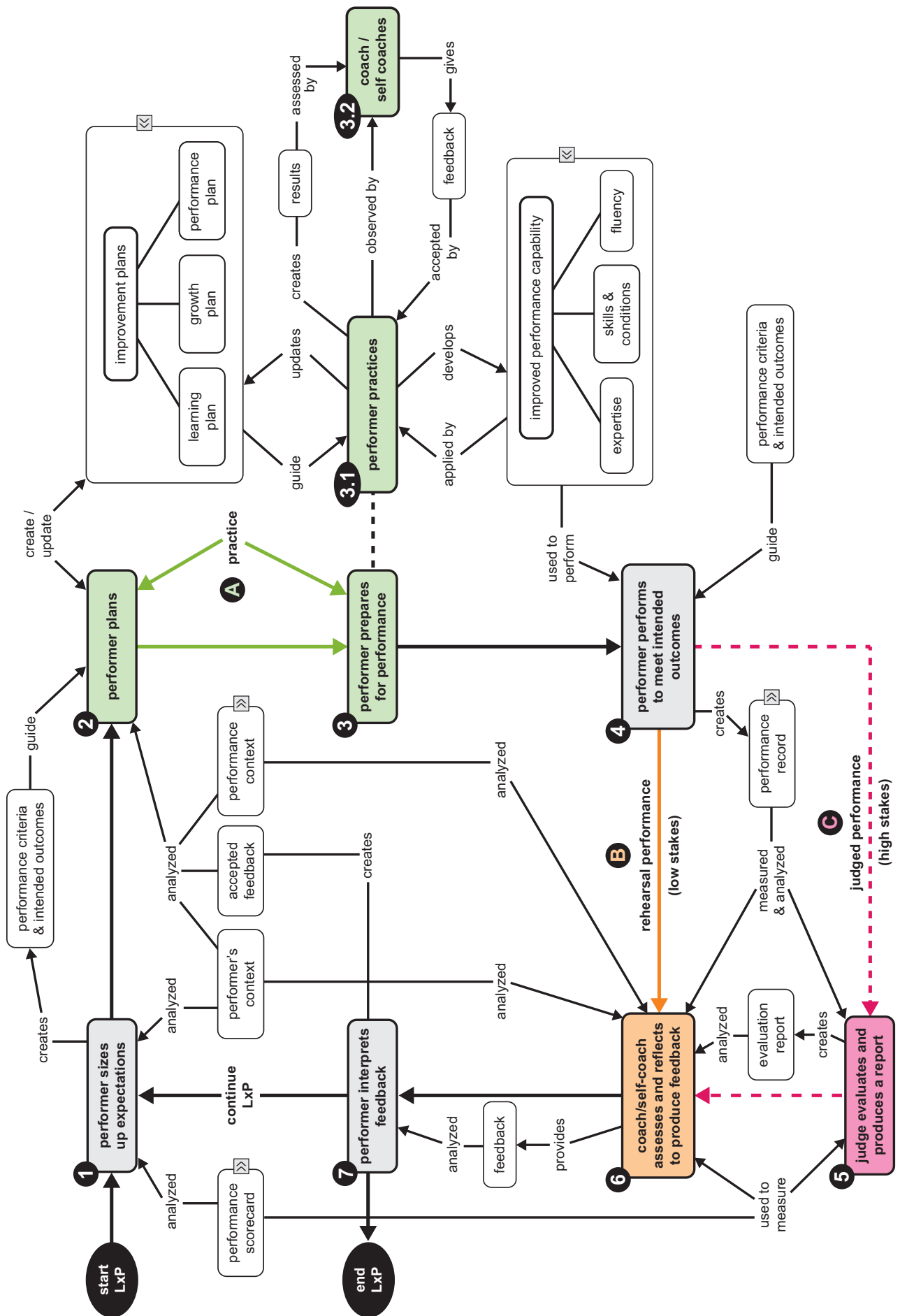


Figure 9 LxP System Overview



Analysis

The LxP systems model illustrated in Figure 9, meets the two goals and four criteria delineated in the Methods section. The first goal was to design a conceptual system that advances and embeds Elger's (2007) Theory of Performance. Elger's model contains six components. These components are all found in Stage 2 of LxP. Five of the six, identity, skills, knowledge, personal factors, and fixed

factors are expanded in the Performer's Context section, while the sixth component, context, is refined within the Performance Context section.

The second goal was to incorporate the five key features from each of the Learning Approaches discussed in the Literature Review into the LxP model. Table 2 delineates how each Learning Approach contributes to each pathway and stage in the LxP model.

Table 2 Contributions to the Pathways and Stages of the LxP System Process

Stage of LxP Model	Practice Pathway
Learning By Doing	Perform process segments or to simplified goals using no- or low-cost resources & light to medium coaching
Active Learning	Active learning in a classroom done on short exercises, individually or cooperatively & light to medium coaching
Situated Learning	Learning by Doing is applied to scaffolded, authentic performances to allow entry-level learning leading to higher valued performances; & is generally not low-stakes, practice only
Mastery Learning / CBE	Practice pathways are provided & coached based on scaffolded or segmented process or other learning goals
Self-Regulated Learning	No distinction is made between practice & high-stakes performing
Problem-Based Learning (PBL)	Cooperative learning provides low stakes learning via peer to peer coaching. Practice may be done individually
Process Improvement and Performance Management	Process & goals focused with individual low-stakes training
Performance-Based Learning and Assessment	Most of the learning time is spent in these pathways (<u>cycle of learning</u>)
Process Education	Step 11 of LPM; Generalizing Methodology
Stage of LxP Model	Low-Stakes Rehearsal Performance Pathway
Learning By Doing	Perform full process with full goals using low-cost to standard resources & coaching
Active Learning	Outlines, drafts, or key assignment parts are created or performed and are coached with written feedback
Situated Learning	Learning by Doing is applied to scaffolded, authentic performances to allow entry-level learning leading to higher valued performances; & is generally not low-stakes, practice only
Mastery Learning / CBE	Performance is evaluated for meeting standard or judged for needing improvement; time varies to allow for correction
Self-Regulated Learning	No distinction is made between practice & high-stakes performing
Problem-Based Learning	Cooperative learning provides low stakes learning via peer to peer coaching. Practice may be done individually
Process Improvement and Performance Management	Process & goals focused with individual low-stakes training
Performance-Based Learning and Assessment	Most of the learning time is spent in these pathways (<u>cycle of learning</u>)
Process Education	Performance Tasks

Stage of LxP Model	High-Stakes Judged Performance Pathway
Learning By Doing	Perform full process using standard resources & coaching
Active Learning	Final projects or performances are judged or graded
Situated Learning	Performance is judged formally or subjectively
Mastery Learning / CBE	A time limit may be given after which the standard must be met
Self-Regulated Learning	Evaluation occurs after performance results are submitted
Problem-Based Learning	Work submitted for grading is judged.
Process Improvement and Performance Management	Supervised performance
Performance-Based Learning and Assessment	Judgment applied after exit from cycle of learning
Process Education	Problem solving Methodology
Stage of LxP Model	Stage 1: The Performer Sizes Up the Expectations
Learning By Doing	Observes demonstration & reviews model products
Active Learning	Reviews written or oral instructions & reviews models
Situated Learning	Observes demonstration & reviews model products
Mastery Learning / CBE	Reviews written or oral instructions & reviews models
Self-Regulated Learning	Phase 1 definition of a task interprets external task cues into internal standards of performance
Problem-Based Learning	Assigned problems are interpreted to determine the true meaning of the assignment.
Process Improvement and Performance Management	During goal setting, work assignment, & training
Performance-Based Learning and Assessment	1. Stating task, audience, purpose - learning complexity is scaffolded by level
Process Education	Performance Criteria
Stage of LxP Model	Stage 2: The Performer Plans for Learning, Growth, and Execution
Learning By Doing	Planning (e.g., break down of process to doable steps) & may be an explicit part of the doing & coached
Active Learning	Plan often done by instructor
Situated Learning	Planning done by instructor at start and transitions to performer as expertise gained
Mastery Learning / CBE	Learning often planned by instructor; may be planned by an experienced learner
Self-Regulated Learning	Phase 2 creates internal goals and plans
Problem-Based Learning	The individual or group identifies learning and effort that is needed and plans individual assignments
Process Improvement and Performance Management	Accept the defined process or develop a new process; practice on segments or scaffolded performance
Performance-Based Learning and Assessment	Procedure is given in the description of the performance task of step 1; level of detail varies
Process Education	Step 8 - LPM - Planning

Stage of LxP Model	Stage 3: The Performer Prepares to Perform
Learning By Doing	Preparing includes practice doing process segments with coaching
Active Learning	Practice occurs individually or in group with internal coaching
Situated Learning	Follows plan and progresses by scaffolded performances
Mastery Learning / CBE	Learning according to plan is done with feedback from coach on segments
Self-Regulated Learning	Phase 3: studying tactics follow the plan to produce product
Problem-Based Learning	Practice may occur by solving simpler version of the problem or subproblems. Integration is attempted
Process Improvement and Performance Management	Practice occurs during training phase
Performance-Based Learning and Assessment	2. access & acquires information; 3. process resources; 4. produce draft; 6. self-assess
Process Education	Step 11 - LPM - Application; Preparation Methodology
Stage of LxP Model	Stage 4: The Performer Performs to Meet the Intended Outcomes
Learning By Doing	Performs with entire process and adapting to needs
Active Learning	Individually or cooperatively perform to the plan
Situated Learning	Performs with entire process and adapting to needs
Mastery Learning / CBE	Full performance
Self-Regulated Learning	Phase 4: adaptations are made when monitoring determines that there are gaps between standards and product quality
Problem-Based Learning	Individual work is integrated, polished, and submitted
Process Improvement and Performance Management	Full performance
Performance-Based Learning and Assessment	4. produce product: 5. disseminate product (present)
Process Education	Theory of Performance
Stage of LxP Model	Stage 5: The Judge Evaluates Performance & Produces a Report
Learning By Doing	Performance delivered to coach acting as judge or external judge
Active Learning	Regular academic evaluation
Situated Learning	Performance delivered to more advanced practitioner acting as judge or external judge
Mastery Learning / CBE	Evaluated by judge
Self-Regulated Learning	When products are submitted, they are judged and feedback is received
Problem-Based Learning	The judge evaluates the problem solution
Process Improvement and Performance Management	Evaluated by judge
Performance-Based Learning and Assessment	Grading is the evaluation and is done outside the cycle of learning
Process Education	Evaluation Methodology

Stage of LxP Model	Stage 6: Coach/Self-Coach Reflects & Assesses to Produce Feedback
Learning By Doing	Feedback is provided; may not come as coaching but additional evaluation
Active Learning	Most coaching occurs while performing
Situated Learning	Feedback is provided; may not come as coaching but additional evaluation
Mastery Learning / CBE	Coach provides improvement feedback (may be the same as judge or performer)
Self-Regulated Learning	No explicit provision for external coaching, but self-coaching done through meta-cognitive monitoring
Problem-Based Learning	An instructor may be available for questions.
Process Improvement and Performance Management	May be coached if not performing to process or process, context, or resources adapted to more consistently achieve outcomes
Performance-Based Learning and Assessment	6. self-assess; 7. self-evaluate
Process Education	Turn Evaluation into Assessment Assessment Methodology
Stage of LxP Model	Stage 7: the Performer Interprets the Feedback
Learning By Doing	Internalizes feedback and starts again
Active Learning	Reflection and metacognition may continue the active learning assignment
Situated Learning	Internalizes feedback and starts again or progresses to more advanced performance
Mastery Learning / CBE	Performer accepts feedback.
Self-Regulated Learning	Feedback from evaluation folds into process and may trigger another cycle.
Problem-Based Learning	PBL focuses on the problem solving and not iterative improvement, though not prevented, either
Process Improvement and Performance Management	Performer may return to training or make small adjustments
Performance-Based Learning and Assessment	8. Self-regulate - develop plans for learning
Process Education	Self-Assessment vs. Reflection

The first criterion was that LxP should be a general system to guide, plan, assess, explain, evaluate, and coach a performance that would meet the expectations of stakeholders as well as the goals and needs of the performer or performing team. The seven-step model guides performers by identifying key steps in any performance. The utility of the LxP model has been demonstrated by the assessments done by the participants who tested LxP for their own development in the Summer 2019 Self-Growth Institute. These learners used the model to plan, assess, explain, and self-coach (Utschig, 2019). Stage 5 of the model includes the performance scorecard to capture stakeholder needs and determine how well the expectations have been met. Finally, during Stage 6 Coach/Self-Coach, the performer uses their explicit expectations documented in the performer's

context to determine how well their own expectations have been met.

The second criterion is that LxP will cover formal and informal learning within individual and team performance for educational, professional, and life coaching contexts. Performances occur outside of formal learning contexts for anyone engaged in their work or hobby, and what LxP enables is a systematic approach to performance that improves the outcomes, as it incorporates the steps of the 6-sigma process improvement approach (but not its statistical methods) and more generally to performance management. Its approach structures the performing of "legitimate contributions" of the situated learning approach. For formal learning settings, LxP structures active learning, learning by doing, and problem-based learning with

a mastery/competency-based learning approach that incorporates phases of practice, rehearsal, and performing. It contributes real-world considerations, particularly performance scorecard and context, to self-regulated learning and performance-based learning and assessment.

The third criterion requires LxP to be able to be specialized to a particular usage by choosing which elements to emphasize, where to insert or remove instruction, and other adaptations. With formal learning systems, the scorecard and performance context are determined by a school board, accreditor, regulator, and/or college faculty. The learning occurs in classes with textbooks and lectures, but the learning activities are active performances that help drive results. The coach and judge are the classroom teacher. Example rewards are grades, credits, and graduation. Nonetheless, the formal learning system constrains many aspects of the LxP system because the formal learning system makes it hard to include efforts to master performances, create personalized performances, involve the learner much more actively, and support learning through a balance of coaching and judgment. A greater portion of learning comes from the coach and performer efforts and not from teaching.

The fourth and final criterion is that LxP uses, to the extent possible, incorporates existing concepts and methodologies of Process Education. LxP incorporates elements of Process Education described in *25 Years of Process Education* by Apple, Ellis, and Hintze (2016). The guiding principles for the emphasis on learners developing ownership and skills for learning and performing comes from the Process Education core principles (Figure 2, p. 40). Other Process Education ideas include a simplified performance model (p. 29-34), coaching and judging in the form of assessment and evaluation (p. 53-66), performance criteria and measures (p. 71-78), the learning process methodology, problem solving, and creating methodologies (p. 111-124). Finally, Process Education methodologies that had an impact on the design of LxP include elevating knowledge, generalizing knowledge, personal development, and performance preparation methodologies (Apple, Ellis, and Leasure, 2018).

In summary, both formal and informal learning occur as short and long-term learning activities. LxP is adaptable through omission of one or more elements and/or generalization depending on the nature of the learning/performing experience. It is important to note that the full framework provides a comprehensive approach to improvement analysis and may suggest where a specific implementation needs to be strengthened. LxP may be adapted to formal learning situations following the experience and course design approaches of process education (Apple, Ellis, and

Hintze, 2016, p. 137–141). A methodology for learning by performing that is suitable for personalized, informal, and formal learning was presented (Utschig, 2019).

Discussion

LxP model integrates the strengths of many approaches that together make the system more complete. While being flexible, it differs from formal learning approaches through its structure of low-stakes loops and high-stakes loops that set it apart from most current educational practices. It also encourages a high degree of learner ownership and most resembles self-regulated learning and problem-based learning in this regard. The planning that could be completely done by an instructional designer is shared with the performer to improve development of problem solving and planning skills.

The low-stakes paths are implemented with self-coaching, peer-coaching, and faculty coaches. Coaching in all forms supports higher motivation and learning because it reduces or eliminates negative responses (Apple, Ellis, and Hintze, 2016; Boyatzis et al., 2015; Buckingham & Goodall, 2019). Self-regulated learning recognizes the importance of learners regulating their emotions during performance.

Learners coaching others develop essential teamwork and analysis skills. The learning-by-doing nature of LxP encourages the development of implicit and explicit teamwork skills, among many others. Group-based learning is encouraged in active learning, mastery learning, and problem-based learning. Process education includes a well-practiced approach to cooperative learning that identifies the skills explicitly (Van Der Karr & Burke, 2007) and are recommended for inclusion in curriculum using LxP.

The approach of scaffolding authentic performance from situated learning is recommended when it fits with LxP so that performances may be incrementally stacked over time. Both the performance difficulty and the context can be scaffolded. Learners planning a larger performance may themselves scaffold learning by simplifying performances down to ones they can handle at their current level, as recommended, e.g., by Pólya (1945). LxP generalizes several systems based on learning to perform and therefore serves as a model to guide implementations of learning by performing that address the needs and realities of a wide range of contexts, especially workplace and personal performance development.

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Appendix

Table 1 Contributions to the Performance Scorecard

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
<i>Performance Scorecard</i>			
description	instructional cues	1 task, purpose	problem challenge; descriptions for performance development
criteria		prescribed expectations	performance criteria
standards		performance standards	measures
incentives		grades	
demonstration	may be in resources	benchmark (examples of work at different levels)	demonstration activity type

Table 2 Contributions to the Performance Context

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
<i>Performance Context</i>	task conditions		design problems to solve
environment		assessed separately by facilitator	quality learning environment
constraints	time		time-pressure learning
resources	resources		resources
culture	social context		culture of success
stakeholders		audience	program assessment
process		task procedure, assessment list	methodologies
critical decision data			performance measures
accepted feedback		self- assessment; self-evaluation	assessment methodology
performance criteria		purpose	performance criteria
intended outcomes		performance task assessment list	learning outcomes

Table 3 Contributions to the Performer's Context

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
<i>Performer's Context</i>	cognitive conditions		performance (Elger, 2007)
life goals			life vision
values			life vision
performer's expectations	standards, task definition, goals		self-grower
mindset	motivational factors & orientations		profile of a quality collegiate learner

Table 3 Contributions to the Performer's Context (continued)

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
identity	beliefs, dispositions, & styles		theory of performance
current performance skills	knowledge of study tactics & strategies		classification of learning skills
current expertise	knowledge of task, domain knowledge		Working Expertise (2002 paper)
life & personal conditions	motivational factors & orientations		quality of life
fixed personal factors			performance

Table 4 Contributions to the Improvement Plans

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
improvement plans		8 self- regulation produces plans	self- assessment
learning plan	goals & plan	integrated plan	learning-process methodology - plan
growth plan	tactics & strategies	learning competencies	annual growth plan
performance plan	implicit in 4 phase approach + control & monitoring	integrated plan	methodology for creating methodologies, problem-solving methodology

Table 5 Contributions to the Improved Performance Capability

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
improved performance capability			performance measurement
expertise			
disciplinary knowledge	domain knowledge	discipline competencies	performance: knowledge
interdisciplinary knowledge		implicit in model	TofE - interdisciplinary knowledge
experiential knowledge	knowledge of task	implicit in model	generalizing methodology
skills & conditions			
psychological condition	motivational factors		self-growth
physical condition			
performance skills	knowledge of study tactics & strategies	inter- & intra- personal competencies	classification of learning skills
fluency			
self-regulation	control		profile of a quality collegiate learner

Table 5 Contributions to the Improved Performance Capability (continued)

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
real-time adaptation	cognitive evaluations, monitoring		self-assessment
identify & mindset	beliefs, dispositions, & styles		profile of a quality collegiate learner

Table 6 Contributions to the Performance Record

<i>LxP component</i>	<i>Self-Regulated Learning</i>	<i>Performance-Based Learning ...</i>	<i>Process Education</i>
<i>performance record</i>			
performance trace			notes from learning process methodology, reading logs, other methodologies
results	performance products	5 disseminate product	reflection tools
coaches & judges notes		unstructured feedback	
evaluation report	external evaluations	7 self- evaluation	evaluation
assessment		6 self- assessment	assessment
feedback	external evaluations	6 self- assessment	assessment feedback