Translating Theory to Practice: Applying Systems Thinking to the Design of Professional Development

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Introduction

Systems theory spans many disciplines and several decades. The field of biology has informed systems theory, according to von Bertalanffy (1972) and Boulding (1956), as an organizing principle of living beings. Extensions of this theoretical framework have led to the application of systems theory as systems thinking in a diverse array of organizational fields, including but not limited to health care, economics, and engineering. Within each field, different terminologies have emerged to describe distinctive environments with different contextual situations.

Across numerous organizational disciplines, systems thinking is based on two coherent focal elements: (1) a single, compelling, overarching goal or purpose for the system and (2) connectivity among parts of the system, including departments, processes, and people, to bring forth that single goal or purpose (Checkland, 2000). The organizational discipline we focused on in this session was engineering.

Areas ranging from public health to homeland security, to workforce development are enriched by applying an engineering perspective of complex social systems. Thomas Gilbert's (1996) *Human Competence: Engineering Worthy Performance* provided a valuable perspective for examining how organizations as systems can refine themselves for the purpose of performing according to their respective visions. Gilbert usefully distinguished between the world views of scientists and engineers. Scientists, he noted, examine the world to determine how it is. In contrast, engineers are intent on remaking the world through active design (Gilbert, 1996).

The study of engineering has provided a foundation for exploring how complex social systems facilitate the productive functioning and development of organizational capacity. Researchers in engineering have compiled, defined, and clarified the systems principles for this field (Adams, Hester, Bradley, Meyers, & Keating, 2014; Keating, Peterson, & Rabadi, 2003; Whitney, Bradley, Baugh, & Chesterman, 2015). Adams et al. (2014) proposed a construct for systems theory that specified principles applied through axioms. Their intent was to support systems theory by making it more understandable, meaningful, and pragmatic. It was their view that the construct of axioms and systems principles would "provide improved explanatory power and predictive ability," offering context to "enable thinking, decision, action, and interpretation with respect to systems" (Adams et al., 2014, p. 120).

Systems thinking as understood in the field of engineering also has relevance for instructional designers. Consistent with the engineering philosophy of complex organizational systems, instructional designers craft interventions designed to facilitate an organization's functioning at a high level of effectiveness. Understanding

organizational systems provides a logical starting point for such work. Clarity is of importance at every phase of instructional design, with the purpose of building system capacity to increase the probability of achieving the desired outcomes.

As part of our work as consultants, we often design and deliver instruction for professional development, and we view complex social systems as a fundamental reality. Such complex organizational systems typically exist to focus on large-in-scope goals that transcend what any single organization can do alone (Jones, 2014). Strategic thinking and planning also play vital roles in designing complex organizational systems to achieve shared success. Such work within complex systems requires education on systems thinking as a vehicle for making productive change.

Systems Principles and the Instructional Design of Professional Development

How can professional development become more deeply relevant and meaningful? Systems thinking provides a foundation for building the workplace as an entity that enriches and educates. Designing professional development from a foundation grounded in organizational systems principles enhances the designer's understanding of how the system works and the degree to which professional development activities and approaches can be effective.

An examination of the nature of organizations as systems strengthens the designer's understanding of the context framing professional development. Recognizing the characteristics of a system informs the understanding of the sphere within which professional development takes place. An in-depth examination of the organizational system through the lens of specific principles results in a clearer understanding of how the system works (Adams et al., 2014). Such study further clarifies the degree to which an instructional design can be effective.

During this session, three systems thinking principles were introduced, defined, and discussed in the broad context of designing and participating in professional development. Examples from the private sector, public sector, and higher education were explored. Participants engaged in activities to guide practice in the application of systems principles.

This session presented these principles from the perspective of designing professional development. The learning outcomes for this session were:

- Identify accurate, authentic, and realistic organizational performance by applying the Law of Consequent Production.
- Examine the systems principle of Complementarity as it pertains to learners, the organization, and continuing professional development.
- Propose the systems principle of Holism as a lens through which to view the field of instructional design.

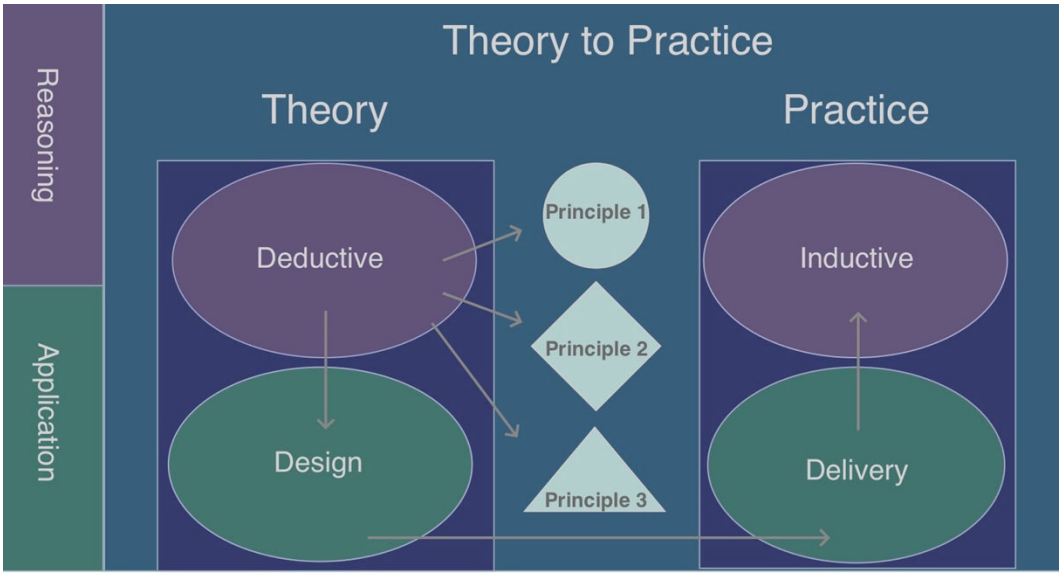

Figure 1. Theory to Practice

Theory to Practice

As noted earlier, systems theory provides a solid foundation from which we can trust the work we do as instructional designers. As shown in Figure 1, to translate systems theory into practice, we first follow a deductive process. Beginning with systems theory, we discern which systems principles are most relevant for instructional designers when designing professional development. After singling out salient and relevant aspects of the theory, in this case three systems principles, we move to the design stage by asking questions. As we reason, discuss, and refine, a design begins to take shape for delivery to participants. During delivery, participants are encouraged to provide their perspectives regarding the application of systems principles. In particular, participants may identify the level of effectiveness in applying a particular systems principle. Through an inductive process, the resulting interpretations stimulate the recognition of a newly discovered theoretical perspective. The inductive process supports the delivery as well as the application. In this way, theory informs practice and practice informs theory.

Systems Principles and Instructional Design Practices

The three focal systems principles provide a rich foundation for performing instructional design from a systems perspective. As shown in Table 1, these principles correlate to three key practices inherent in instructional design.

Table 1. Systems Principles and Instructional Design Practices

Systems Principle	Law of Consequent Production	Complementarity	Holism
Instructional Design Practice	Needs Assessment	Learner Analysis	Contextual Analysis

The Law of Consequent Production

The first principle discussed was the Law of Consequent Production, which states that a system can only produce what it produces (Keating et al., 2003). This principle is associated with a needs assessment conducted in concert with the instructional design of professional development programs. Needs assessment facilitates identifying a gap between 'what is' and what 'should be' in an organization (Altschuld & Kumar, 2010). The Law of Consequent Production examines what a system is producing as the best indicator of how a system is designed. The introduction of this principle may provide additional theoretical foundation to the application of needs assessment by identifying accurate, authentic, and realistic organizational performance.

The Law of Consequent Production helps designers discern between the purported intention and the actual production of a system or project. Many times, we are tempted to say, "Here is what we would like the system to produce." Consider, for example, a K-12 district in which the school board, the administration, the faculty, the parents, and the students, regard their schools as excellent. Now suppose a concerning reality emerged: the graduation rate at the high school is only 60%.

According to the Law of Consequent Production, what the system produces is the best indicator of how the system performs. This law anchors the fundamental practice of needs assessment. In performing the needs assessment, we confront the gap between what is claimed and what exists in reality.

During this session, participants worked in groups and selected an example of a system from those provided to support learning about the Law of Consequent Production. Participants from the groups indicated the purported design of their system and what that system actually produced.

When conducting a needs assessment, instructional designers often confront a contrast between what they would like to be seeing happening from the system, and the actual result. It seems fair to suggest that the gap may exist due to a breakdown in communication. Perhaps some of the stakeholders were not part of the dialogue at the front end of the needs assessment as to what was being configured for the system.

With this systems principle, we are reminded that if what the system produces is *not what is intended*, we may benefit from reverse engineering. For example, as instructional designers conducting the needs assessment, we might state, "Let's find out how we produced that undesirable result. Let's work backwards to identify the processes involved." As we do that, we can recalibrate how we arrived at that result. Then we can adjust or redesign for the desired result. The Law of Consequent Production introduces a reality check as we perform a needs assessment. This

systems principle acknowledges the truth of the 'what is' reality, enhancing the thinking of an effective needs assessment.

Complementarity

The second systems principle was Complementarity, defined as: Each person's perspective is both valid and incomplete (Adams et al., 2014). This extremely powerful systems principle invites us to gather a vast array of perspectives in the interest of accuracy and clarity.

Participants in this session engaged in an activity to identify the variety of perceptions possible about several images of organizational life provided by the presenter. The discussion emphasized what makes each perspective valid and how the range of perspectives contributes to the accuracy of the picture. Specific questions included: What if we considered every perspective as valid – even and especially those we disagree with? What if we considered those difficult valid perspectives as constraints within which we must design the organization, department, instruction, etc.? What insight might this principle provide?

This systems principle informs the performance of learner analysis by instructional designers (Brown & Green, 2016). Learner analysis as informed by the systems principle of complementarity benefits instructional design in a systems-enhancing way, anchoring a level of accuracy that depends on gaining as many views as possible, arriving at a clarity of system reality from multiple views, at once valid and incomplete.

In the current societal environment, we are challenged by many viewpoints. As we examine the many views, their simultaneous validity and insufficiency, civility is critical. The more we hear, the more we learn, and the closer we arrive at an elevated understanding. The instructional designer needs to recognize a compendium of viewpoints to discern priorities and the key message for that system. This means slow, deliberate listening and synthesis.

The listening and synthesis of insights allows the simultaneous validity and insufficiency of each perspective, leading to improved clarity about the system reality. When we perform learner analysis, we're discovering factors that enrich our understanding of what the system needs to do. This means we are working deductively, reasoning how the system is defined from the many viewpoints, all valid and incomplete. The infinity of views fortifies the sharpening of a clear and accurate understanding of the system. Performing this learner analysis as it is informed by the systems principle of complementarily means an enhanced approach to instructional design based on a systems reality.

Holism

The third and final systems principle examined was that of holism. Holism is defined as perceiving, understanding, and appreciating a system from its collective essence (Whitney et al., 2015).

During the session, the presenter displayed a simple diagram of a university system on the board, represented by dots (departments) and lines (relationships). The presenter proposed the joining of two unlikely areas of the organization and requested that participants identify what might be possible if those connections were created, interrupted, or elaborated on.

Holism informs contextual analysis (Adams & Keating, 2011) required of instructional designers to ensure an accuracy of purpose and fit for the initiative or product. Recognizing the parts of a system as inherently and practically connected, it is important to understand that effective performance often includes different people and departments contributing particular activities and resources to complete the work. At the system level, processes themselves are interconnected, as well. Thus, the holistic perspective informs an overarching emphasis on how each contribution is relevant and important and serves the system purpose or goal.

Emphasis is placed on the connections between parts of the system, noting that these connections are simply relationships that are created or invented rather than pre-existing. They can be made stronger, weaker, elaborated on, or erased. They can connect to the vision of the organization, the heart and mind of the individual, to the expansiveness of the universe as a system, or anywhere in between. Thinking holistically means thinking in more than two dimensions. Such thinking adds depth, richness, innovation, and inspiration. This practice allows for and encourages an understanding of the social nature of humanity as well as opportunities for technological advances.

As instructional designers performing contextual analysis, we need to know where and how the learner is situated. Is there managerial support for that person in his or her job? What other supports are present within the job environment? This means also that we need to be alert to the non-linear and inclusive pieces that allow for an emergence of aspects we might not understand or anticipate regarding the context of the system-level performance and results.

The principle of holism emphasizes connections among parts of the system while maintaining clarity about the purpose and direction of the complex organizational system. Holism reflects a palpable and fundamental reality of the big picture of a system, revealing the depth, richness, innovation, and inspiration potentially available. Holism also provides a contextual lens through which to view the field of instructional design.

Conclusion

Meaningful change management initiatives benefit from being situated in the framework of systems thinking (Gharajedaghi, 2011). The strong and multiple connections enhance the capacity of the complex organizational system to produce results through systems thinking. Examining systems principles enriches the understanding of instructional design practices that facilitate the effective design of professional development initiatives.

Three specific systems principles were examined as they inform three parallel instructional design practices. The systems principles of the law of consequent production, complementarity, and holism were presented as parallel to the instructional design practices of needs assessment, learner analysis, and contextual analysis.

The law of consequent production informs what we know as needs assessment in our instructional design work. Complementarily informs learner analysis and positions us to discover yet more perspectives. Holism is what informs contextual analysis. As we connect these three systems principles, we discover that they work together resiliently and informingly so that what we do in instructional design provides a deeper foundation and connection among them.

As we view holism in relationship to complementarity and the Law of Consequent Production, we recognize an integrated whole that is fortified by an array of diverse views that could address gaps in a system's productivity and enhance the larger picture of the organization. Together, the three systems principles support the two primary features of an organizational system: (1) A single unified goal for the entire complex system, and (2) The inter-relationships among parts of that system.

Complex organizational systems evolve, change, and strengthen. The three systems principles described and explored in this session inform each of the respective instructional design practices to produce value for the professionals within these systems. In other words, strengthening analytical practices with systems thinking serves to enrich the instructional design of professional development.

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