

The Phoenix Rising: Emergent models of instructional design

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The blurring of distinctions between online and distance education in many parts of the developed world has led to reflections on the strategies and processes by which we create effective online learning environments for the distance education learner. In this article we argue that the foundational models of instructional design that typically inform the design, development, and delivery of online environments do not always support the epistemology and pedagogy that embodies the online environment. Through an analysis of current approaches to instructional design we present a case for adopting principles of emergence theory as a means to best harness the power and potential of design and development for online distance education. Using a prototype three-phase design model that embodies emergent principles we advocate that to achieve the full potential of interaction and community networks through online communications requires a repositioning of roles and processes associated with “instructional design.”

Introduction

With the growth of online education, it is becoming clearer within the instructional design community that modifications can enhance traditional design approaches in meeting the demands and opportunities of online learning environments. Current approaches to instructional design are only moderately successful in taking advantage of the new online medium due, in part, to historically linear implementation procedures. Instructional design models do not often appear to take a multidisciplinary approach to design, thereby omitting the most effective and innovative options for successful and creative online distance education environments. More user-responsive methods are needed to target design for the online environment that promotes effective learning. It is the premise of this article that using principles of design that incorporate new ideas that are evolving from emergence theory can create environments that maximize the potential of e-learning.

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Ideas about distance education and online learning are merging: “Online learning, as a subset of all distance education, has always been concerned with providing access to educational experience that is at least more flexible in time and space than campus-based education” (Anderson & Elloumi, 2004, p. 31). Online learning is also beginning to change ideas about transactional distance between instructor–learner, learner–learner, learner–content, and learner–interface, reflecting Michael Moore’s (1997) theory of transactional distance. Recent studies have corroborated Moore’s early assertions about transactional distance (1997) that “structure needs to be appropriate for the learner and that high structure and high dialogue can lessen [the perception of] transactional distance” (Stein, Wanstreet, Calvin, Overtoom, & Wheaton, 2005, p. 114).

Like many other disciplines, instructional design is experiencing a convergence of ideas related to distance education and Internet-based networks. The challenge is to use what we know about distance education to enhance the online learning experience, and at the same time ensure that the models used to inform the creation of online learning experiences are relevant to the pedagogy that embodies the learning environment. To achieve this, we initially present an overview of the key theoretical premises of instructional design and the gaps between those theoretical prescriptions and online environments. Second, we present a case that the use of an emergent approach to instructional design for online distance education will provide the framework for contemporary online teaching and learning. Through this argument, we then present the Three-Phase Design (3PD) model as a potential structure for an emergent instructional design approach. The 3PD model was initially proposed by Sims and Jones (2003) and predates similar design strategies presented by Kays (2003a, 2003d), and Kays and Francis (2004).

Historical Basis for Instructional Systems Design (ISD) Models

Instructional design models have their roots firmly planted in the models that were based on ADDIE (Analyse, Design, Develop, Implement, Evaluate) from the 1950s. The earliest premise for instructional design was a focus on product (filmstrip, for example), but in the 1950s, the profession began to think about the design of instruction as a process (Finn, 1960, as cited in Reiser & Dempsey, 2002). Over the past half century, the rapid changes in our understanding of learning have positioned ISD to accommodate new ideas, with the ADDIE model providing the foundation from which more recent instructional design models have been built that integrate constructivism, systems thinking, forms of interaction, information processing, and learning-centred approaches.

Early instructional design models tended to have their premises based on behavioural principles. Gagné (1974) documented conditions of learning, which initiated a shift in focus toward information processing models of learning, or ideas related to cognition. Beginning in the late 1980s, a shift began toward models that incorporated information processing concepts including cognitivism and constructivism. While the concept of a systems approach for developing instruction was introduced by Silvern

(1964), it was in the early 1990s when the field truly began to reconsider instructional design as a system; something more encompassing and holistic than a process. Considering instructional design as a system opened the door to alternative approaches to instruction, learning, and delivery. As a part of systems thinking, discussions about the integration of constructivism, media-enhanced instruction, performance enhancements, and the Internet began to take precedence over discussions about process. Part of the challenge has been to represent a holistic three-dimensional system in a two-dimensional representation constrained by print and Web limitations. The idea of a modern interpretive dance would be a better representation, as all the elements needing to be considered are interwoven and impact other parts of the system, yet are bounded by an outside framework or set of parameters.

Reigeluth (1999), Rossett (2003), Rowland as represented in Smith and Ragan (2005), and others suggest that there are particular characteristics that represent the design of instruction that establish the parameters of the system, which include characteristics related to process, systems, outcomes, and delivery. Consideration of these elements helps ensure that thoughtful, theory-based decisions are reflected in an instructional intervention. Characteristics are summarized in Table 1.

While instructional design tends to be more accepted in business, industry, government, and the military, one is beginning to see a greater acceptance of instructional design processes in colleges and schools as well, and this may be due to a greater involvement in online learning (Reiser & Dempsey, 2002). Perhaps it is the greater involvement of instructional design in colleges and schools that portends the holistic, systematic, and iterative approach to design that incorporates the characteristics described in Table 1. Since the mid-1990s, the rapid increase in the use of the Internet to deliver online distance education has focused the field’s investigation of how best to do that and how the models can best inform the process.

Consider two recent ISD models in light of the characteristics shown in Table 1. The Morrison, Ross, and Kemp (2004) model emphasizes four key areas that entail

Table 1. Characteristics of instructional systems design (ISD)

Process for design	Systems	Outcomes	Delivery
Goal directed. Translates requirements to specifications. Understanding problems and solutions may be both simultaneous and sequential. Involves technical skills, creativity, and rational and intuitive thought processes.	Team thinking adds value. Systematic structures provide parameters for solving learning challenges. Technology enables progress, including diffusion and dissemination of instruction and information, and diverse global audiences.	Cognition is the goal. Instruction is not the only performance solution. Data guides decisions. Causes/needs help drive solutions.	Considerations about transactional distance are important. Dialogue focuses on how much interaction takes place. Structure enables learning that meets learners’ needs. Autonomy as learners influence their own learning or the outcomes of instructional design.

many of the characteristics in the previous discussion, ranging from learners, objectives, methods, and evaluation. These authors make the point that—once the problem is identified—“the order in which you address the individual elements is not pre-determined” (p. 8), implying both flexibility and fluidity in the model, with the development team implementing elements as appropriate during the instructional design process. The model’s two outer rings address revision and project management, which are ongoing and continuous. While based on the characteristics previously described, the model’s holistic systematic approach is apparent and yet presupposes that content and activities are predetermined for the learner.

Tennyson’s methodology (1999) labelled the re-envisionment of an ISD model as a methodology, perhaps implying the dynamic nature of methodology as compared to a static affiliation with the term, model. Likewise, rather than describing phases or stages, Tennyson’s concept addresses domains, almost as “way stations” to pause and reflect on some aspects of design and development. The characteristics related to process, system, results, and interaction are considered as the development team moves between domains. The overlapping domains also signify the holistic fluidity and systematic approach, maintaining the bounds while providing flexibility to the outcomes. Yet the model results in a product produced for consumption by the learners.

How do these characteristics relate to a discussion about ISD models and distance (online) education?

... instructional design models tend only to be modifications and elaborations of a basic problem-solving model tailored to the needs of the instructional design specialty.... A model, as exemplified by instructional design models, is no more than a way to begin thinking and learning about important principles in a relationship that assist their initial comprehension. (Smith & Ragan, 2005, p. 11)

The model interpretation depends on the team, the process, and the boundaries required for the learning intervention. A model helps inform a team as they make decisions regarding the design and development of an instructional intervention, providing guideposts based on theory and best practices. As we begin to reconsider models in terms of recent thinking about learning and emergence theory, we will see how this plays out.

For the last decade experts have pondered how systematic instructional design approaches blend with dynamic delivery systems as presented by the Internet and technology. Technology serves to enhance increased understanding of mental processing, cognitive sciences, artificial intelligences, learner choice, and mandates fresh thinking about models that guide the design of instruction. These new opportunities indicate that adaptations to the instructional design processes will become more common in the future in order to address the gaps that currently exist in ISD models, and designing for the online learning environment. The present models most likely remain rooted in the classic instructional design models. One model is not appropriate for all settings, and “as designers respond to an ever-widening array of needs and conditions, an expanded set of design and development processes will be required”

(Reiser & Dempsey, 2002, p. 338). This expanded set of design and development processes will come about through consideration of design methodologies, complex problem-solving, and reflection on emergence theory.

Design for Online Distance Education

Instructional design for online learning is a special case of design, which can be thought of as a strategy of problem-solving that generates workable solutions for multifaceted problems. Generally, the act of design may be considered as the formulation and communication of ideas, but, of course, communicating ideas and solutions for complex problems has in itself a complexity that goes beyond what a mere intuitive approach or simple, linear models can generate. In solving problems with varying levels of complexity at an increasing rate of change, different design professions have evolved more systematic methods of inquiry to achieve functional solutions and better reflect the nature of how designers think and work.

Generally, designing has been thought of as a planned process that follows organized logical steps to assist in bringing a functional design from conception to completion. Alexander (1964) noted in one of the first texts on design process that the “complexity of the problem will defeat us unless we find a simple way of writing it down, which lets us break it into smaller problems” (p. 3). However, instructional designers face new challenges in the online environment that go beyond employing a prescriptive approach to developing instruction. Designing for the online environment involves complex problem-solving, meeting the user’s needs, incorporating value systems and problem contexts, and therefore, needs a process that makes instructional design more effective, efficient, and better reflects the complexity of the overall process. There is a continual need for a balance between the organic nature of the human participants and their environment, which requires that the design undergoes constant alteration and modification. This process is iterative and collaborative which, reason suggests, can successfully be applied to the online environment by understanding the ill-defined nature of the problem and incorporating emerging theories of organized complexity.

In the late 1960s, design problems began to be distinguished as *well-defined*, *ill-defined*, or *wicked*. In a well-defined design problem, the problem is clear and the solution is clearly specified. Well-defined problems have generally known solutions that are apparent (Newell, Shaw, & Simon, 1963). In ill-defined problems, it is not clear what the problem is or what the solution may be. Therefore, finding a solution requires problem definition and redefinition (Newell et al., 1963). Wicked problems are similar to ill-defined problems and typically compounded by no agreement about what the problem really is (Churchman, 1967; Rittel & Webber, 1973). Careful review of problem types suggests that the problems inherent in designing an effective online learning environment are of the ill-defined sort, given the variety of individual learning styles that must be accommodated and the numerous variations that the Web makes possible. Within online environments, the complexity of interactions may even make the instructional design challenge a wicked problem, thus raising the

question as to whether the process and systems thinking associated with many instructional design models are consistent with the ill-defined or wicked problems that confront the online environment.

The last 25 years have given rise to both fundamental and philosophical approaches to design methodology. Focus has been more on ill-defined and wicked problems, which require more adaptive and flexible approaches to design. Design methodology has also become more interdisciplinary including engineering, architecture, industrial design, computer artifacts, systems design, and Object Oriented Programming—that is, art, science, and technology.

More recently, design methodologists have been working on creating models that address the shortcomings of earlier generations of design models. Cross (1999) stated, we

lack a successful simplifying paradigm of design thinking. Those simplifying paradigms which have been attempted in the past—such as viewing design simply as problem-solving, or information-processing, or decision-making, or pattern-recognition—have failed to capture the full complexity of design thinking. (p. 9)

Earlier attempts to understand instructional design problems were labelled first-generation models based on the concept of systems analysis. The models managed design problems in a straightforward systems way by following specific steps. The second generation of instructional design models utilized the systems approach but incorporated rational problem-solving methods. The latest generation of models in instructional design share several common themes, as they deal with the non-rational side of the design process with the expectation of bridging the gap between process and practice. Many of the newer models also have been influenced by Schön's (1983) early interest in how professionals use knowledge they gain through continual inquiry and analysis to deal with uncertainty and value conflicts to solve problems. He proposed a constructivist paradigm dealing with the messy, problematic situations where the designer *frames* the context of the problem and applies a more intuitive *reflection-in-action* approach. The reflective practice approach allows for spontaneous responses, unexpected outcomes, and the restructuring of strategies by stressing the uniqueness of every design problem. Existing instructional design models and complex problem-solving methods provide a foundation but not a relevance to complex and dynamic models for online learning environments. We therefore present a framework for alternative instructional design thinking through an analysis of emergence theory.

Emergence Theory and Instructional Design

Emergence theory dates from a seminal paper by Weaver (1948), wherein he suggested that life sciences dealing with real human problems were addressing neither the simple problems of classical physics nor the “disorganized complexity” of quantum mechanics. Rather they were studying problems with a moderate to large number of variables that exhibited complex interactions that Weaver called “organization.”

From that time until the present, studies of widely dissimilar organized phenomena such as slime moulds, ant colonies, and human cities have exhibited similar results. These results, along with studies from molecular biology and computer science were drawn together by Johnson (2001) into the picture of a new scientific perspective called “emergence.” The key to understanding this new perspective, according to Johnson, lies in understanding that simple interactions of the elements in a system—without any central top-down control—can lead to the emergence of highly complex, intelligent behaviour.

Every type of emergent system shares basic characteristics. In an emergent system there is no controlling agent or “pacemaker.” Systems operate from the bottom-up rather than the top-down and organize themselves by creating feedback loops that encourage other agents to join the group. Agents interact dynamically following local rules rather than any high-level instructions. For a system to be considered emergent, the interaction must create a macro behaviour, while a high-level pattern arises out of complex interaction between the agents. Emergent behaviour has the qualities of adapting, growing smarter over time, and responding to changing needs of the environment (Johnson, 2001).

In terms of technology and the online environment we already see various types of emergent systems in use, such as self-organizing software applications, video games, blogs, and virtual communities. Each system allows the system to govern itself and learn from itself in a dynamic way. The study of emergent behaviour has moved from the lab into the mainstream of our everyday lives.

Interactions of the system agents hearken back to the earlier discussion about the holistic three-dimensional dynamic systems that newer instructional design models are attempting to represent (Kays 2003a, 2003d; Kays & Francis, 2004). With this principle, we argue that it is not merely a case of implementing an instructional design model, but rather using behaviours and activities within the broader instructional design system as a means to allow complex and intelligent behaviours and higher level learning to occur.

Therefore, the application of emergence theory to the design of online distance education derives from viewing the e-learning environment and the learning process itself as a problem in organized complexity. The elements in it—students, instructor, resource materials, environment—interact spontaneously, even randomly, and are shaped by social processes of a natural alignment of the concepts for learning and dynamic group behaviour. The idea is a radical extension of the idea of learner-centred design that supports spontaneous and creative learning. The following differences between models based on emergence theory are important to our argument.

As described previously, traditional ID often assumes a top-down design process with experts in content and design principles creating the environment and content. Models range from the conventional ADDIE model to more complex designs such as Tennyson (1999), but all assume that experts decide objectives, assessment criteria, outcomes, and learning activities. This has been enshrined in a set of best practices developed and approved by accrediting associations. Emergence theory suggests a radical alternative—that design should proceed from the ground-up rather

than from the top-down. A repertoire of random learning behaviours is made available in a process of natural selection that will weed out the less useful. Experts may still be called upon for the establishment and articulation of intended course outcomes, but the driving force resides in the behaviour of the students and the interactions between instructor-learner, learner-learner, learner-content, and learner-interface. According to Johnson (2001) learning in an emergent environment goes beyond being aware of information. Learning is about storing information and knowing where to find it, recognizing and responding to changes in patterns and “altering a system’s behaviour in response to those patterns in ways that make the system more successful at whatever goal it’s pursuing” (p. 104).

The learning delivery platform needs to be capable of having learners make simple choices from among a repertoire of options. Traditional online learning platforms, while not impossible to adapt, still favour the more conventional situation in which the course designers make most of the decisions. Therefore, to take full advantage of the emergent process it is essential to use learning management systems that enable flexibility, adaptability, and growth. Perhaps the introduction of responsive systems, using intelligent agents and avatars to allow the selection and manipulation of elements is the early implementation of these ideas.

The role of the teacher moves from providing content to providing feedback and building rapport (Kays, 2003b, 2003c; Reiser & Dempsey, 2002; Sims, 2003) to influence which activities are more successful in moving toward the intended course outcomes. The instructor’s behaviour could serve a natural selection function to amplify or extinguish student behaviours that do not “work.” In self-organizing systems, feedback creates structure, growth, and fosters higher level learning. In the most pure application of emergence, the teacher or “pacemaker” would not exist in the traditional sense. Faculty in the emergent role will need a far different attitude from the conventional role and will become part of the collective rather than the controlling agent.

Faculty-student interactions, student-student interactions, student-content interactions, and student-interface interactions are critical to generating variation in behaviour and in providing corrective and supportive feedback so that the natural selection process of weeding out the less effective ideas can take place. Computer support for complex interaction occurs through the use of 3D chat rooms, blogs, and such interactive environments as MOOs (multi-object orientation) and MUDs (multi-user dimensions). Assessment becomes significantly different as the focus shifts from individual feedback in relation to rubrics to expansion of individual variation and then the gradual reaching of consensus about which ideas to propagate. Principles of emergence are more suited to the generation of experienced, sophisticated learners with more technological sophistication and the ability to create a more dynamic learning environment, thereby using principles of learner-centred environments to their full potential.

The discussion about emergence theory and instructional design posited ideas that in order to fully realize the potential of online distance education and the affordances of community, we need to re-think current design models. By utilizing

the principles of emergence theory, there is the opportunity to bring about an instructional design ethos that is emergent oriented rather than systems or process oriented. The options provided through the 3PD model provide a framework for consideration.

Emergence Theory and the Three-Phase Design (3PD) Model

The 3PD model focuses on the creation of functional course delivery components, with evaluation and improvement activities integrated with scaffolding (support) for the teacher and learners to provide a dynamic, emergent teaching and learning environment in which resources or strategies can be developed or modified during the actual delivery stage. While the initial concept for the 3PD model (Sims & Jones, 2003) advocated an iterative development approach where prototypes are built to *test the water* before completion of the entire course, subsequent reflection has led to an amended approach that describes the life cycle of the course in a more emergent framework. The first iteration or phase allows for the emergence of learning environments which provide functional delivery with the necessary componentry for effective online teaching and learning, including any necessary scaling to the teaching and learning context. Within the second and subsequent iterations, development can be enhanced with each cycle of change, supporting generative learning environments and the adaptability of the model to incorporate evolution of locally developed solutions so the learning environment can grow organically with scope to develop schemas and frameworks.

The 3PD model is also based on a multi-role strategy, integrating three of the key skills of course development—design, subject matter, and production—in an organic rather than disparate manner. Rather than development driving the process, it is the course that determines the make-up of the teams (a cross section of skills from educational design and production) in a much more targeted and effective manner, which encourages cross-field dialogue and provides a quality check on expertise (Merrill & Wilson, 2005).

The 3PD model reinforces both the team-based approach to design and production of resources and the iterative and emergent processes for development and dynamic learning. One of the essential aspects of the model is the specification of *baselines* that correspond to these iterations—the first relating to functional and essential course components, the second to multimedia enhancement or interactivity, and the third to ongoing maintenance. These baselines could consist of “core constructs” (choreography for the dance) with modifiable components (interpretive dance elements or diverse array) that allow for a broad set of variables, scope for re-useable learning objects, and templates. These iterations are identified within the model as three scheduled phases of development that integrate a methodological approach to unit development, scaffolding of participants and quality control and assurance, providing scope for improvement in communicating and documenting processes of issue resolution and of quality benchmarking, and overall management of course development. Importantly these phases also cater to the complexity of

interactions between roles of designer, teacher, and learner and allow for emergent and active rather than static design strategies and assume an ongoing relationship between course and design teams rather than dissolution when a “product” is complete.

The model is therefore one which enables emergent instructional design within the modus operandi of the organizational context, staggering the creation of online materials over a number of delivery cycles and collaborating with the academic and learners and other team members, where feasible, during actual course delivery. The emergent framework offered by the 3PD model is manifested through three discrete phases: first, environments are established to provide fully functional online teaching and learning components; second, subject to feedback from the teacher, learners, and others, modifications are made to those components; and third, the environments are monitored and maintained for quality. To maintain communication, the teams should remain cohesive for the long term, such that the initial shared understanding is developed and builds into a long-term confidence and rapport where trust between players is the key to ongoing effectiveness of the resources, an organic and ecological concept (Nardi & O’Day, 1999). Table 2 presents the relationship between the emergent design and the 3PD model, after which more detail of the phases of the 3PD model are elaborated upon.

Phase 1: Preparing functional components

The aim is to design and create a functional online teaching and learning environment that will meet learning outcomes as well as departmental teaching and learning strategies. Production is not focused on completion of a final package at the first attempt and the process may be compared to enabling a *dress rehearsal* for both teacher and learner. This phase also involves specifying the core items for the course, such as specific teaching resources (e.g., unit guides, study guides, readings), their mode of access (e.g., print, online), and essential educational strategies (e.g., experiential, situated, learner-centred).

Three discrete sub-teams exist within the instructional development cycles—the *development support* team, the *faculty* team, and the *user* team. Each of these has a critical role that can only be performed effectively when the complete team has a shared understanding of its purpose and goals. Within the development team a major player is the *educational designer (instructional designer)*, responsible for educational advice, curriculum design, and strategic decisions for the instructional design. This role can also encompass project management and team leadership. The educational design role also typically coordinates other members of the development support team, specifically focusing on courseware development processes and maintaining interaction and rapport with the academic. Other players in the development team may include the *interactive architect*, responsible for ensuring that the online interactions and communications are consistent with the design; the *information analyst*, responsible for ensuring all required learning resources and objects are available; and *online developers, network specialists, and technical specialists*

Table 2. Linkage points between the 3PD model and emergence theory

How emergent models differ from current models	3PD model phases	3PD model elements
Trickle up. Design proceeds from the bottom-up rather than from top-down, allowing for global behaviour.	1: Functionality	Iterative development process. Course/content determines make-up of learners.
Simple elements. Learning platform enables options for learners to choose to learn elements.	1: Functionality	Specification of a baseline.
A decentralized system. Teacher leads through facilitation, feedback mechanisms, and acting as part of the collective.	2: Enhancement	Teachers and learners have the opportunity to work in a scaffolded environment. The <i>team-based</i> approach to delivery is used. Generation of dynamic learning environment.
Random encounters. Variety of interactions are critical to shaping learning experiences without predefined orders.	2: Enhancement 3: Maintenance	Effective communication paths are developed and built. Shared understanding of project goals and learning outcomes are established. Necessary content is available and learning outcomes are addressed.
Patterns in the signs. Assessment begins to change to individual assessment based on consensus and patterns rather than a rubric.	2: Enhancement 3: Maintenance	Long-term care and commitment maintains the quality of the original functional system. The functional system will always be subject to change. Imprints from innovative projects can filter across projects.

who have responsibilities to both advise and be advised on required and/or appropriate learning environments.

The second major group is the *faculty* or subject matter expert team, whose academic staff from the teaching unit are responsible for ensuring that all necessary content is available and all learning outcomes, learning activities, and assessment tasks are defined. It is the relationship with and shared understanding between the development and faculty teams that are critical to the ultimate achievement of project goals.

The third set of essential participants includes the *user* team or “try-out” learners, who have a major role in learning as well as in assessing the quality of the design process and communicating their evaluation data back to the development team. Where possible, this group would trial an initial prototype of a “learning episode”

created by the academic and development teams and provide feedback that can then be incorporated into the design and delivery.

An important aspect of the *influence* concept is that members of the development team are understood to have potential levels of influence at any stage of the development and delivery process. For example, the interactive architect, who has the main responsibility (influence) for creating the design specifications, may also be active in the quality review of the project as it nears completion. A second important concept underpinning the 3PD model is that, like dancers on the stage, the team members all have roles and particular *scenes* or *acts* within that process that require their leadership. They can also play smaller roles, but by no means less significant, throughout the development, delivery, and maintenance cycles.

Phase 2: Evaluate, elaborate, and enhance

The second phase is conceptualized to occur during the learning unit, with feedback from teachers and learners used to modify and enhance the environment. This may include the introduction of content items and enhancement of teacher–learner, learner–content, learner–interface, or learner–learner interaction conditions (Sims, Dobbs, & Hand, 2002). Teachers also have the opportunity to work in a scaffolded environment to maximize the effectiveness of online environments, where the efforts of teacher, learner, and developer can be evaluated, and the delivery environment enhanced on the basis of that evaluation. This process is iterative and collaborative, and can successfully be applied to the online environment by understanding the ill-defined nature of the problem and incorporating emerging theories of organized complexity, and which has the qualities of adapting, growing smarter over time, and responding to changing needs of the environment (Johnson, 2001). The process therefore allows for clearer scheduling of resources and planning, production, and workflow processes. This phase emphasizes the *team-based* approach to delivery combining, where appropriate, both academic and technical staff. There is less emphasis on handoff of the project and more emphasis on *duty of care* through the availability of sustainable course materials and teaching resources.

By developing and building effective communication paths between each of these groups, a shared understanding of the project goals and learning outcomes can be established. Without this active rapport, educational quality and the effectiveness of online teaching and learning environments may be compromised.

Phase 3: Maintain

Following completion of the learning unit, additional modifications and enhancements are prescribed and implemented for subsequent delivery. The unit then continues in “maintenance mode,” involving ongoing support and training, until it undergoes a more formal review. Again, the important concept underpinning the 3PD model is that the original functional system developed will always be subject to

change and that any development environment must schedule resources to be available for the lifetime of the learning unit.

The success factors for this emerging approach to instructional design will depend not only on the concept being accepted but also for academic staff, students, and the development team to reconceptualize their roles in the design and delivery of online educational resources. For teachers there is the option to collaborate with an online development expert while delivering the course to implement modifications based on feedback from students and other team members; for learners there is the opportunity to contribute to both the content base and the educational strategies; for the development team, there is the long-term care and commitment to maintain the quality of the learning experience for the learner.

Conclusion

This article described the evolution of instructional design from product to process to systems and on to an emergent focus. The principles related to emergence theory were described along with an instructional design model that considers some of the principles of emergence theory, and then the 3PD model and principles related to emergence theory were juxtaposed in order to consider the relationships. Issues for further analysis and research resulting from the development of e-learning design based on emergence principles include: (a) persuading instructional designers and faculty to relinquish their control over the learning process and to trust that learning will occur, (b) determining when and how to know that learning has occurred in relation to the expected curriculum, and (c) developing and deploying appropriate technology to support the interactions necessary. In particular, a research agenda in which models such as the 3PD model are elaborated to integrate what might be termed “proactive elements” (Sims, 2006) will provide the opportunity to assess how teachers, learners, and designers adjust to shifts in roles, expectations, and technological literacies.

The phrase “instructional design” sometimes conjures spectres of formal classroom environments where the teacher delivers content through a predefined design. The world of online distance education requires practices that are complex, flexible, dynamic, and organic. As the role distinctions of teacher, learner, and designer/developer blur, so do the processes associated with the creation of these environments. Considering the process and systems orientation of the roots of instructional design and blending with concepts from emergence theory, it brings us to new perspectives to consider instructional design as an ongoing, dynamic process, bounded by parameters of the intended learning outcomes.

Notes on Contributors

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