Learning Development Cycle:

Bridging Learning Design and Modern Knowledge Needs

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Abstract

Instructional design (ID) serves only a small part of the entire learning experience. The pace of information development exceeds courses as the primary delivery mechanism of learning, challenging established ID. Alternatives to courses, like learning networks and ecologies, are developing as an informal learning approach. Designers and organizations receive substantial benefits to acknowledging informal learning, and initiating a focused design approach. Effective learning design must recognize different domains of learning. Learning Development Cycle attends to four broad learning domains: transmission, emergence, acquisition, and accretion. Designers focus on different objects during the design process, in order to meet the intended learning goals. Design objects include: instruction, fostering reflection and critical thinking, creating access to resources, and networks and ecologies.

Learning Development Cycle

Bridging Learning Design and Modern Knowledge Needs

Introduction

Changes in technology create a ripple pattern, altering foundational, long-held views. Certain fields are highly susceptible to change, while others are more conservative. In areas of less personal interest, new approaches and techniques are not viewed as a threat. As changes come closer to our core, they take on a greater sense of threat. In no area is this more evident than learning. Our learning institutions have been created in the spirit of research and openness, yet they have acquired their own neurotic tendencies. Most notable is the strong reaction to change in the classic models of distributing learning. Models of courses, programs, and degrees are still central, even though technology and new needs on the part of learners are creating a climate that requires a more dynamic alternative.

Traditional learning design is indicative of the learning field's reluctance to change. In spite of advances in neuroscience, collaborative technology, and globalized business climate, learning is still largely based on design theories created during the early 1900's to 1960's. The environment in which we are immersed has changed. Media and technology has changed. The social environment has been altered. The world has become networked and connected. In this environment of colossal change, the design methodologies used to foster learning remain strangely outdated – created for a time and need which no longer exist. Learning Development Cycle (LDC) is a learning design

model to bridge the gap between design approaches and knowledge needs of academic and corporate learners.

Much of LDC is rooted in more traditional design structures. We are currently still in the beginning stages of societal and technological alterations. The model is intended to simply open doors to new design approaches, while maintaining aspects from previous models that still serve learners. More developed (connectivist-centric models) will be required as we move forward. LDC is a transitory design approach, bridging traditional design and beginning to embrace internet-era design.

Different types of learning exist. Learning happens in a variety of ways – from courses, conversations, life experiences, personal thought, or working on a project. Each different type of learning requires a different design process (as the object of the design differs depending on learning type). LDC presents four broad learning categories: transmission, acquisition, emergence, and accretion. These categories will be discussed in greater detail in this paper.

Learning today has moved beyond courses (courses serve a static knowledge field). As a result, course-based ID is not as useful for designing alternative modes of learning. The more rapidly knowledge and information climates change, the greater the need for responsive dynamic models.

Why do we need a new theory of instructional design?

Reigeluth (1993) defines instructional design as "a discipline that is concerned with understanding and improving one aspect of education: the process of instruction." This definition reflects the predominant view of many designers. The underlying

assumption views learning as a process that can be created if only the instructional component is properly managed. Proper instruction increases prospects for learning. In many cases (particularly courses) this view of design is valid. Designing instruction becomes less valuable, however, when contrasted with the knowledge needs of employees, or mature learners who prefer to explore and experiment to create their own connections and pursue personal objectives.

Learners and learner needs are changing. Oblinger argues (2003) that "new" students, who have been shaped by world events and technology tools, are entering the education system. These students are not passive consumers of educational resources. Oblinger states "colleges and universities may find that understanding – and meeting the expectations of - the "new students" is important to their competitiveness" (p.42). In a similar sense, the activities of corporate training must also be reflective of today's learners. Effective learning design is no longer a formulaic process. It's a rich engagement of learners and their needs.

Frand (2000) provides a list of ten factors which are shaping the information-age mindset, including: the internet is better than TV, doing is more important than knowing, multitasking is a way of life, and learning more closely resembles Nintendo than logic. Frand concludes "we need to think in terms of transforming the educational experience so that it is meaningful to the information-age learner" (p.24).

Beyond simply creating new environments and challenges, technology impacts, even alters, our brains. Richard Restak (2003) discusses a core understanding of neuroscience: plasticity. "Plasticity refers to the brain's capacity for change" (p. 7). Our

brains are constantly changing, evolving, and reacting to transformations within our environment and the tools we use. New tools require more than adaptation on the part of the user; these tools rewire the brains of users.

Neuroscience is providing additional insight into what it means to learn. Early indications of research allude to a fundamental shift in how we view functions of knowing, meaning making, and learning. Instead of seeing learning as an information-processing task, learning can be seen as a pattern-recognition process. Restak uses the illustration of chess to communicate learning "The genius of the grand master doesn't depend on the amount of chess information stored in long-term memory, but also on the organization of these memories and how efficiently they can be retrieved…Geniuses in fields other than chess share a similar talent for storing vast amounts of information in long-term memory and then retrieving that information as circumstances demand" (p. 15). Instead of thinking, experts in a field rely on pattern recognition (based on an almost intuitive understanding of the elements within a particular knowledge field). Downes (2005) supports this view:

> "…human thought amounts to patterns of interactions in neural networks. More precisely, patterns of input phenomena - such as sensory perceptions - cause or create patterns of connections between neurons in the brain. These connections are associative - that is, connections between two neurons form when the two neurons are active at the same time, and weaken when they are inactive or active at different times."

What is the impact of changing learners and growing understanding, from the field of neuroscience, of how we learn? Learning designers need to alter their approaches to creating learning resources. The brains of learners, due to plasticity, are being constantly altered through new tools and technology. Learners have different needs and expectations (due to changed environment and new affordances of technology). Courses and programs are no longer the only design objects for learning designers. Designers must shift their attention to the more ambiguous, tumultuous learning environment in which learners now function. Designers no longer create only instruction sequences. They must create environments, networks, access to resources, and increase the capacity of learners to function and forage for their own knowledge.

Learning design is primarily about creating guideposts, not describing how to walk on a particular path. It is a mistaken assumption that design can create learning. The best that a well designed course, workshop, or work-integrated learning resource can offer is the climate in which a learner can choose to learn.

Instructional design theories take structure as the core element in creating effective learning. Kemp, Morrison, and Ross (1994) state the role of objectives as indicating, "what a learner is expected to do after completing a unit of instruction" (p.96). In keeping with many traditional views of instructional design, they assume that a clearly stated objective increases the potential for learning. This notion has some merit, but falters in that the objectives for learning are determined by the designer, not the learner. In our rapidly developing information climate, designer created objectives may be of limited value to learners. Most learners pursue self-created objectives. In an

era where courses are no longer the primary mode of delivering learning, objectives are no longer the only starting point for learning design.

Instead of courses, designers need to see learning as an activity without beginning or end. Instead of programs, learning needs to be viewed as an activity that occurs within an ecology. In many types of learning, the task of the designer is to create the right environment for continued learning (i.e. design the ecology). Learners themselves will seek and acquire needed elements.

To better reflect the centrality of learners, the term "learning design" will be used in place of instructional design. Instructional design is an important component in the design of courses. Designing courses requires set steps and guidelines for instructors and learners to follow. Learning design, in contrast, is concerned with more than simply creating courses. Instead, the intent is to create the constructs within which learning will occur - networks and ecology. Creating networks and permitting learners to form their own connections is more reflective of how learning functions in real life. Informal and life-experience learning are such a significant aspect of an individual's learning that they cannot be left to chance within organizations. Design processes need to be utilized to capture the value of alternative learning formats.

Various alternative models of learning, notably problem based learning, also provide potential value in learning environment creation. Effective learning can originate from courses or classrooms, as evidence by effective use of alternative learning models. Designers benefit by expanding their view of the object of their design. Instead of seeing instruction as the only object of design, a designer's perspective can be enlarged

by seeing the environment, availability of resources, and learner capacity for reflection, as potential objects of a design process and methodology.

Prior Learning Assessment and Recognition (PLAR) is a growing trend in many education institutions. Red River College defines PLAR as "a process in which individuals have the opportunity to obtain credit for college-level knowledge and skills gained outside the classroom and/or through other educational programs. It is a process which compares an individual's prior learning gained from prior education, work and life experiences and personal study to the learning outcomes in college courses." Higher education will likely continue to identify learning with courses. Yet many people now enter a variety of careers over the course of their lives. PLAR acknowledges the value of experiential learning, and seeks to quantify the learning against established objectives of programs and disciplines. In this case, the objectives follow the learning. Using this format, life experiences can be connected with formal education. While PLAR has yet to gain significant mainstream attention, the principle is critical for tighter integration of higher education and corporate learning.

Bridging prior learning with academic standards requires (to slightly abuse the term) "triangulation of learning evidence" (TLE). TLE requires that learners verify stated learning through a variety of sources and means. For example, to communicate to an academic institution that the learner understands Java programming language may require examples of programs, documentation of workshops/certificates, and a letter from a previous supervisor. The process is still a bit awkward, but it is important to realize that formal education should not be recast to be like corporate education (or

vice versa). Each model of education serves a particular need. Linking need with the right model results in more effective learning. Using a process like TLE, as a subset of PLAR, can serve as a bridging process between informal learning and formal learning.

Learner-centred

Very few people in education have not heard of the rumoured shift from instructor to learner. Institutions discuss "learner-centred", throwing the term around as if it should be implicitly understood. Faculty, administrator, and learner interpretations of the concept vary. What does it mean? Winer, Rushby, and Vazquez-Abad describe learner-centeredness as "…the assumptions that the students are adults, self-motivated, accountable for their own learning, should be respected, as well as exercise control over their learning outcomes…" (p. 876).

Learner-centred design is intended to serve self-motivated, active network creators. Saskatchewan Education (undated) provides a useful overview of learner-focused learning: "Independent learning requires that people take responsibility for their own learning. Individual responsibility stems from the belief that learning can be affected by effort, and this belief is the critical factor which leads to individuals' perseverance in the face of obstacles."

As learning moves from artificial constructs of courses into a format more symbolic of today's work climate, control must shift to the learner. Courses largely seek to communicate what a designer feels a learner should know. Learner-centred design focuses on giving the learner the ability to decide what he/she feels is important and

relevant. A more dynamic design approach is more reflective of the types of challenges individuals will face when learning through experience and other informal methods.

What is learning?

Learning has long been debated in realms of religion, philosophy, and more recently, psychology. The challenge of creating a comprehensive definition lies in the different interpretations of both intent and method of learning. Most often, learning is used in an ambiguous manner, without clear definition of hidden assumptions and viewpoints. Adherents of different styles of learning see the world (and solutions to existing problems) in an isolated manner. Rather than exploring more deeply the diversity of learning, learning methods, and learning intent, new situations are unfortunately approached with the intent of shaping the situation to the world view and design methodology.

Research (particularly in the field of neuroscience) is beginning to indicate that the primary learning component of our brains is pattern recognition, not information processing. Stephen Downes (2005) extends this concept by offering a challenging vision that learning is not a direct causal interaction between teacher and learner. Replacing the causal model of learning (need highlighted, instructional intervention planned, measurement enacted) with "network phenomenon":

> "But with online learning comes not only a much wider, more diverse network, but also the idea that (a) the network may be based on non-physical (or emergent) properties, (b) that the individual may choose to belong to or not belong to a network, and (c) that an individual may assume multiple identities or

memberships in multiple networks. The theory of distributed representation has a profound implication for pedagogy, as it suggests that learning (and teaching, such as it is) is not a process of communication, but rather, a process of immersion."

Acknowledging that learning is a process beyond simply processing information requires a definition that is valuable in both formal and informal learning activities. Learning is not an isolationist activity without intent or aim. Certain learning experiences build skills; others build attitudes, beliefs, or other "soft knowledge". The ultimate intent of the process is to be able to do or achieve something. In this regard, learning can simply be defined as actuated or actionable knowledge. This definition has two components - knowledge: understanding of an implicit or explicit nature, and actuation: doing something appropriate (defined as contextually aware) with knowledge.

The starting point of learning design is to evaluate the existing views of learning types, learning theories, and design approaches. An integrated or holistic view of the diverse learning landscape permits designers and educators to select appropriate models for appropriate means. Most typically, learning theories have not become obsolete in the sense that they do not work. Instead, they are obsolete in the sense that the world around has changed, and new models are required to meet the needs of new situations. Where the learning theory and design approach closely align with a design concern, even "outdated" theories can become valuable. To remain relevant, it is important for designers to account for diminishing half-life of knowledge and increase in

information availability (and amount). Views of knowledge as comprising of "know what" (explicit) and "know how" (tacit) are being usurped with "know where".

Further compounding learning challenges is the importance of "soft knowledge" – i.e. experiences and encounters which are not entirely functions of our cognitive domain. Serendipity is often not acknowledged in more formal instructional design. Yet most sources of innovation are bricolage-like in nature. The sudden recognition of solutions from other domains, or the innovative application of available resources is important. Silo style learning design limits learner access to other competing or complimentary information sources. Exploratory and networked learning, on the other hand, provide opportunities to encounter knowledge from other experts and domains – knowledge which often informs and creates innovative solutions.

John Seely Brown (undated, p. 66) communicates this new dynamic world of learning: "When we look at teaching beyond the mere delivery of information, we see a rich picture of learning, one that embraces the social context, resources, background, and history within which information resides".

Learning Domains

Prior to engaging in learning design, it is important to clarify terminology and highlight assumptions. The word "learning" is often used to encompass a broad field with many ambiguous components. For example, is improving one's capacity to be tolerant of others the same type of learning as understanding a mathematical formula? Or is an increased capacity to manage and organize personal knowledge the same type

of learning as creating a network of contacts and sustained learning resources? Obviously, different aspects of learning require identification and unique approaches.

Learning can be classified by various domains. Figure 1 depicts learning as consisting of accretion, transmission, acquisition, and emergence domains, (these terms do not appear to have a clear origin, though they have been used by Wilson (1997) and Calhoun (undated) without clear attribution to the originating source). Classifying learning in these domains assists designers in evaluating the object of each design task by first determining the nature of learning required.

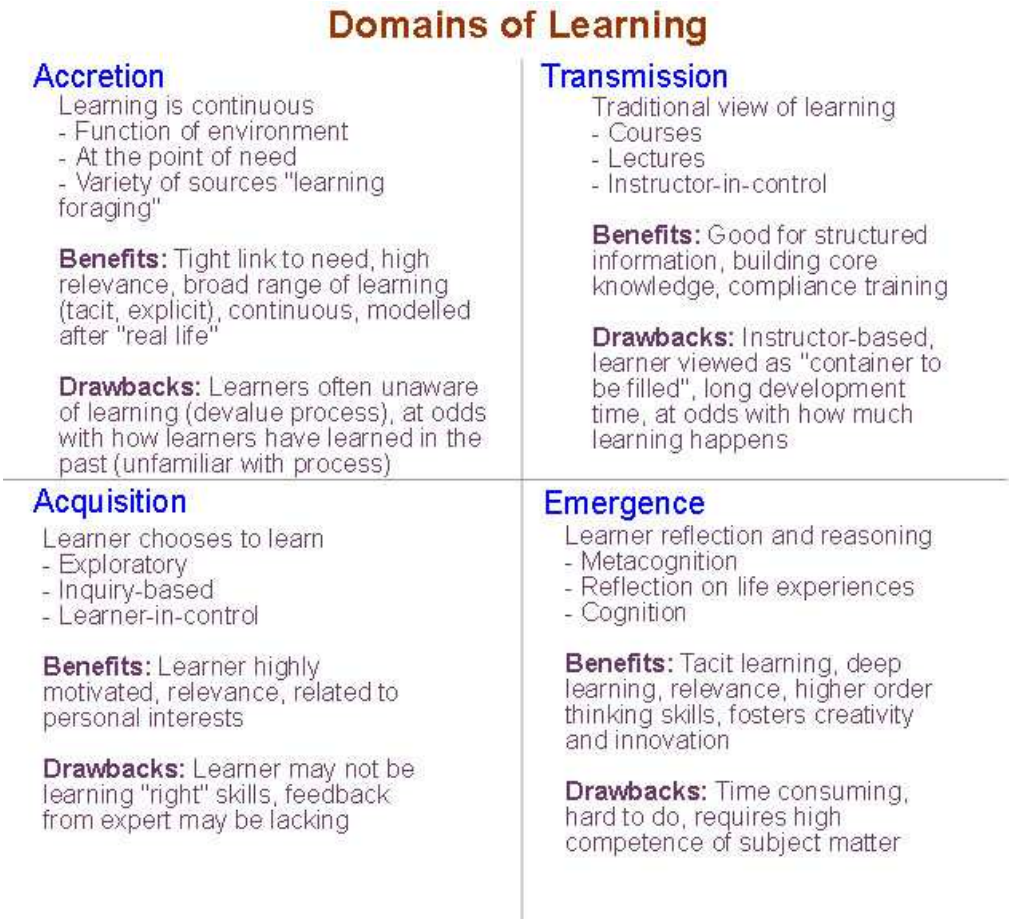

Figure 1: Domains of Learning

Each unique learning domain serves a different purpose, and carries a different combination of benefits and drawbacks. A designer's first task is to evaluate the nature of the learning required. Different knowledge needs require different models or approaches. For example, someone new to field or in need of compliance training will benefit most from courses. Short-term knowledge needs (requirements which are not a part of particular field, but needed for cross-over understanding when dealing with other professionals or a particular project) can often be provided by more information sources like magazines, websites, journals, and newsletters. More developed knowledge need (but with less structure than a course) can be met through apprentice-models like communities of practice.

More advanced and continual learning can best be provided through a networked or ecological view of learning. Capable, self-aware learners are able to identify and meet own knowledge needs. This level of learning often occurs as a result of "living life". The process of living is in itself a learning experience that can result in the creation of a dynamic knowledge network, allowing learners to integrate new information with existing knowledge, enabling more effective decisions in work and personal affairs.

Characteristics of Learning Domains

Each learning domain possesses certain characteristics in relation to the nature of learning, the role of the designer, and the level of control over content and structure. Figure 2 provides a summary of each learning domain and design influence.

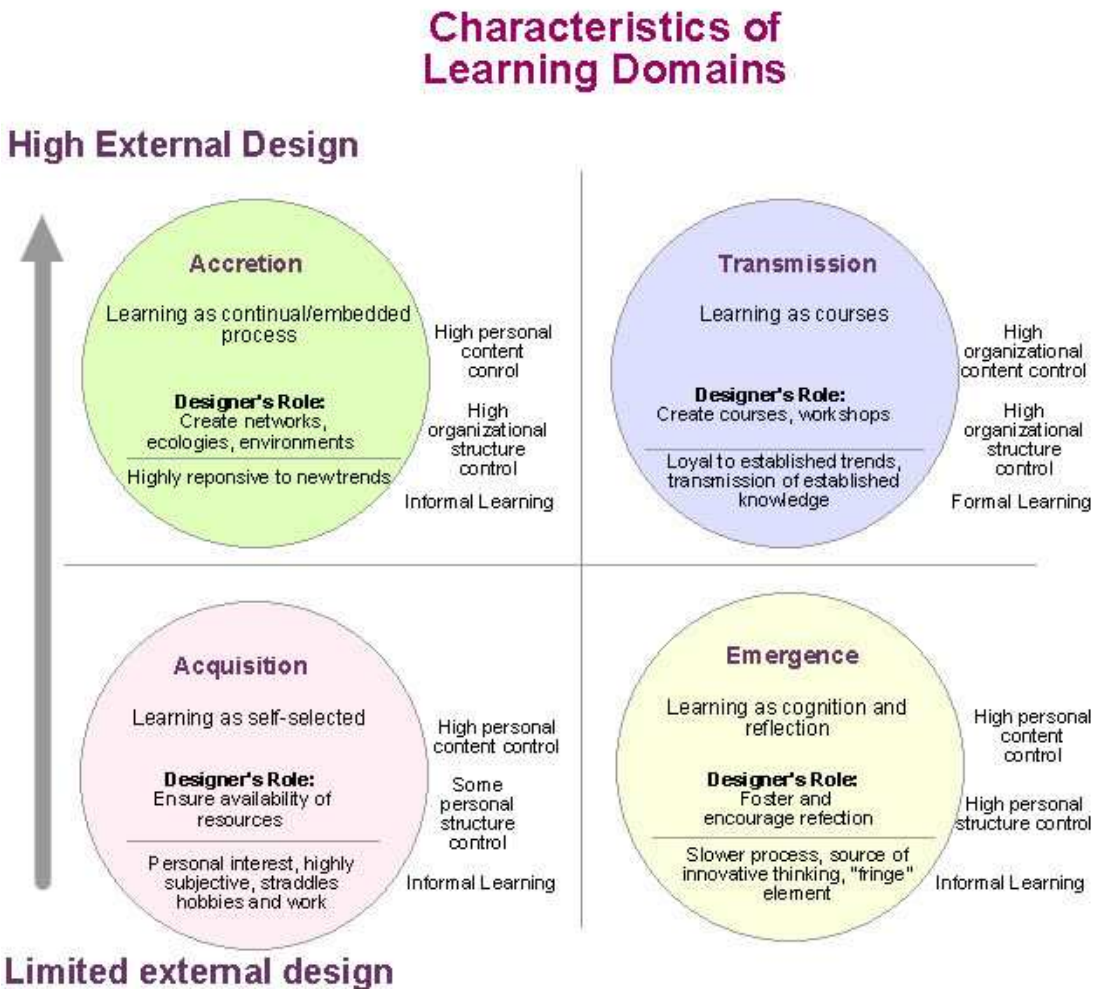

Figure 2: Characteristics of Learning Domains

Most models assume that the creation of an instructional process is the intent of design. This view only addresses the transmission domain of learning. The domains of accretion, emergence and acquisition are often unattended in traditional design. As previously stated, each domain has different object of design. Each different design object is indicative of a different view or theory of learning. Figure 3 expresses the link between learning domain and suited learning theory.

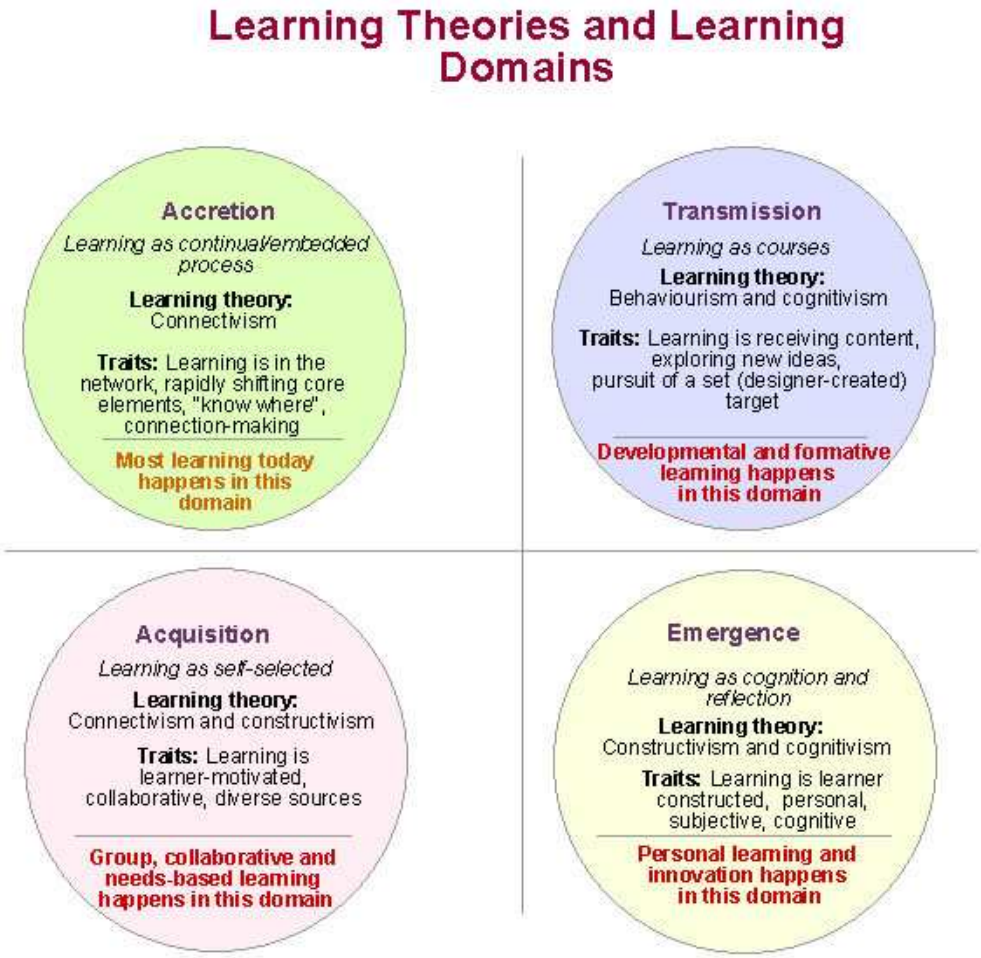

Figure 3: Learning Theories and Domains

The instructional process is the object of design in the transmission domain. Traditional ID models attend to transmission through focus on explicit learning objectives, content analysis, content sequencing, and blueprinting the instructional flow. This model has particular value in creation of courses, programs, and workshops. The instructor (due to activities of the designer) is kept at the centre of the instructional process. Transmission is particularly useful when introducing new bodies of knowledge or meeting compliance-training needs. Much of today's educational system is built on this model of learning. Education is constructed with start and end points (courses,

programs, degrees). Learners are exposed to key ideas within a knowledge field by an instructor who is competent in the domain. Transmission occurs through readings, lectures, and more recently, group work and collaborative activities. Behaviourism and cognitivism are the predominant learning theories utilized in conjunction with the transmission domain of learning.

The capacity for reflective and critical thinking is the object of design in the emergence domain. Emergence is a less common form of learning, but its effects are significant. In a sense, emergence opens doors to new fields of knowledge, leading into the selection of accretion or acquisition domains to continue knowledge development. Reflection and cognition provide learners with the capacity to explore new realms. Serendipitous learning is also an important aspect of the process. The formulation of innovative approaches and new perspectives are functions of emergence learning. Cognitivism and constructivism are the learning theories most reflective of how learning occurs in the emergent domain.

Access to resources is the object of design in the acquisition domain. Acquisition is a large part of learning. Designers also seek to improve the abilities of learners to manage and navigate knowledge resources. It is a largely unstructured process where learners select their own objectives and intent for learning. Often, personal interest is the motivating factor. Of all the learning domains, acquisition is the most "fun". Subject matter being explored is highly relevant to the learner's interest and use. Learners may reach beyond current resources to connect with others in the creation of virtual communities. The internet has made the formation of communities based on interest

(not geography) possible. Connectivism (Siemens, 2004) and constructivism are the learning theories that most adequately inform the nature of acquisition learning.

Networks, environments, and ecologies are the object of design in the accretion domain of learning. Most learning happens in this domain. Learning at this level is a function of creating connections, foraging for needed knowledge, and "plugging in" to learning sources (as compared to possessing learning). Knowing where to find needed information is valued above possessing information, due to how quickly information evolves and changes. The designer's role in this domain of learning is to create the construct and opportunities for learners to pursue and provide for their own learning. The network itself is the critical learning element. Connecting learners to networks and communities ensures that knowledge is relevant and current.

Connectivism

Connectivism as a learning theory provides insight into the dynamics of networks, environments, and ecologies in relation to accretion learning. It consists of the following principles:

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known. "Know where" replaces "know what" and "know how".
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.

- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Learning Ecology

If course-based learning is out of date for today's learner, what is the alternative? The answer can be found in learning ecologies and networks – structures that emulate continual learning. John Seely Brown (2002) defines a learning ecology as "an open, complex, adaptive system comprising elements that are dynamic and interdependent". Learning ecologies possess numerous components (Siemens, 2003):

- Informal, not structured. The system should not define the learning and discussion that happens. The system should be flexible enough to allow participants to create according to their needs.
- Tool-rich - many opportunities for users to dialogue and connect.
- Consistency and time. New communities, projects and ideas start with much hype and promotion, and then slowly fade. To create a knowledge sharing ecology, participants need to see a consistently evolving environment.
- Trust. High, social contact (face to face or online) is needed to foster a sense of trust and comfort. Secure and safe environments are critical for trust to develop.

- Simplicity. Other characteristics need to be balanced with the need for simplicity. Great ideas fail because of complexity. Simple, social approaches work most effectively. The selection of tools and the creation of the community structure should reflect this need for simplicity.
- Decentralized, fostered, connected; as compared to centralized, managed, and isolated.
- High tolerance for experimentation and failure

These ecologies possess numerous characteristics that need to be attended to in the design process. The following components should be present in an ecology:

- A space for gurus and beginners to connect (master/apprentice)
- A space for self-expression (blog, journal)
- A space for debate and dialogue (listserv, discussion forum, open meetings)
- A space to search archived knowledge (portal, website)
- A space to learn in a structured manner (courses, tutorials)
- A space to communicate new information and knowledge indicative of changing elements within the field of practice (news, research)

The formation of networks within ecologies adds a personal aspect to learning endeavours. A network consists of two or more nodes linked in order to share resources. A node is a connection point to a larger network. Learning communities, information sources, and individuals can all be classified as nodes (it is important to note that a node does not need to be a person. For example, an RRS aggregator can be

classified as a node that delivers information to the larger network). A network, in the context of an ecology and communities, is how we organize our learning communities, resulting in a personal learning network.

Technology is an important aspect of our current social landscape. McLuhan stated (1967): "Any understanding of social and cultural change is impossible without a knowledge of the way media works as environments" (p.26). This environmental view of learning and technology provides considerable insight into how designers approach learning. Linking social and cultural change with ecology-designed learning opens new possibilities for creating integrated, relevant learning.

The Learning Development Cycle

Learning Development Cycle (LDC) in Figure 4 is a meta-learning design model. The different domains of learning require a model that addresses different approaches, intent, and desired outcomes. The most critical stage of the design model is the determination of the object of the design process.

LDC consists on the following stages:

1. Scope and object of learning design
2. Creation of learning resources
3. User Experience
4. Meta-evaluation to determine effectiveness and accuracy of design process and assumptions
5. Formative and Summative Evaluation of project and learner experience.

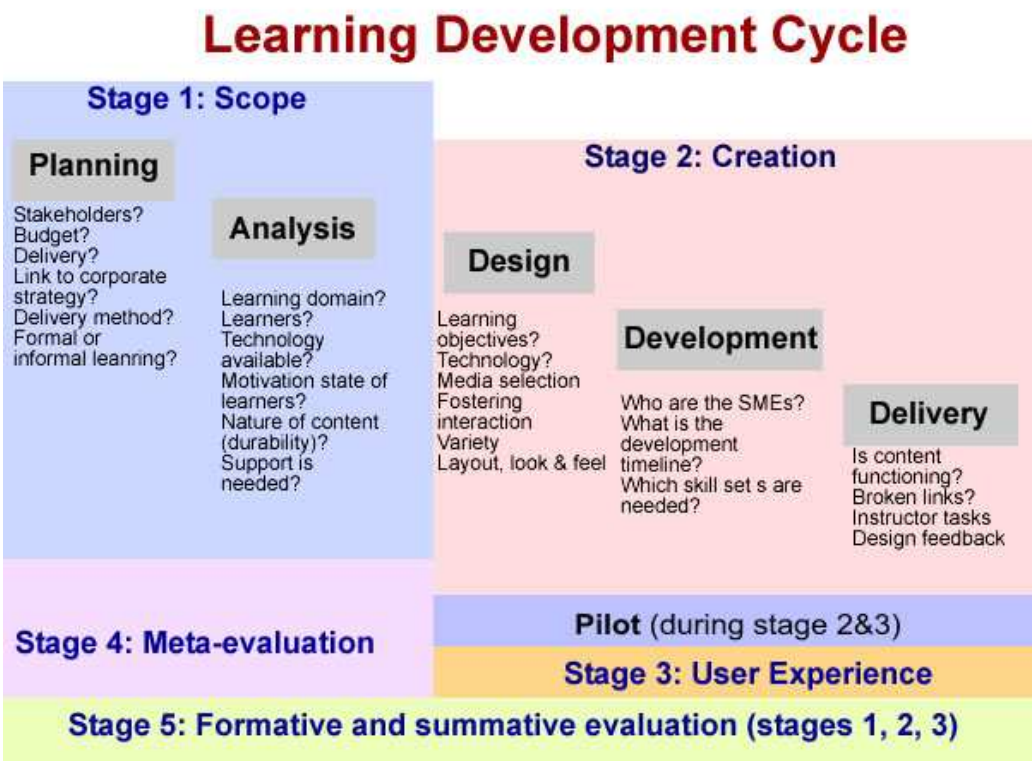

Figure 4: Learning Development Cycle

Stage 1: Scope

Most instructional design theories begin the design process with some type of stated learning objectives. In reality, learning objectives often serve more to guide the designer than to guide the learner. Most learners (especially those at the accretion stage) will have their own objectives. When designing an environment or ecology, objectives no longer relate to content. Learners themselves forage for needed content, connections, and interaction. This model closely mimics how most learning happens. Few situations in life and work are clearly and concisely presented. Most often, problems and situations are ambiguous, requiring exploration and experimentation in finding desired solutions.

Planning and analyzing the scope of learning design begins with the recognition that no one model (i.e. transmission) is able to attend to the entire scope of learning. Eisner (1992) addresses the value of moving from a static model of learning design: "…sustaining a direction in schooling or maintaining a set of priorities in the curriculum is much more like nurturing a friendship than installing a refrigerator in the kitchen. The latter requires virtually no attention after installation: the same cannot be said of friendship" (p. 305).

Stage 2: Creation

During the second stage of LDC, designers design, develop, and deliver learning (regardless of which domain of learning). A key component in traditional instructional design is content type analysis. The main task in this process is to determine the nature of content and the best way in which to present the content. Merrill's Component Display Theory (1983) is based on the assumption "that there are different categories of outcomes and that each of these categories requires a different procedure for assessing achievement and a different procedure for promoting the capability represented by the category" (p. 284-285). Content type analysis has limited value in the design process for the accretion, acquisition, and emergence aspects of learning, as learners will self-select from wider environmental resources. A well-designed resource is simply another node within the larger learning network. Transmission learning receives greater value from detailed content analysis. A pilot phase is also included during the Creation stage, similar to rapid prototyping, where the learning experience is piloted and feedback is actively incorporated into the ongoing design and development.

During the design stage, the main considerations relate to the nature of the content and the planned interaction. Media for presenting content and fostering interaction are also explored and finalized (though the pilot and user-evaluation phase will inform media selection). McLuhan captures the essence of the issue of media and technology selection and use: "In the name of "progress" our official culture is striving to force the new media to do the work of the old". In many cases, learning objectives may be used (either explicitly stated or implicitly utilized during the development process). Certain learning projects will not include explicit objectives. For example, a learning ecology for accretion learning will give learners far greater control in pursuing objectives which are relevant to work tasks or needs.

Blueprinting and sequencing of learning material are less important in emergence, acquisition, and accretion learning. Through the provision of learning ecologies, learners themselves play the critical role in determining needed knowledge. Simply making learning resources available allows learners the capability to navigate the turbulent knowledge waters that define much of work today. Learning is not an "in advance of need" concept. Blueprinting and sequencing is partly unnecessary if adequate ecologies of learning have been designed. Learning occurs not only through content exposure, but also through interaction, reflection, and cognition.

Learner motivation should be in the background of the entire Creation stage of LDC. Keller (1987) proposes the ARCS model consisting of four major categories to increase, create, or reward learner motivation: attention, relevance, confidence, and satisfaction. Learners often do not require external motivation when meeting a

knowledge need of high relevance (work or personally). Most often when learners are foraging for information, motivation is intrinsic. Learning networks, for example require limited design intervention to foster motivation. More traditional design (like courses and workshops) will benefit from specific focus on Keller's ARCS model.

The development stage of LDC focuses on identifying subject matter experts, creating the development timeline, exploring skill sets needed for completing the project, and doing the actual work of creating the learning. Initiating a process of piloting content and interaction is important at this level. Instead of waiting until the completion of a learning resource, the designer receives valuable information during the creation stage. This information can then be incorporated into ongoing design and development. Depending on budget, scope, and timelines, the design team may include a diverse group including graphic designers, programmers, media specialists, subject matter experts, and end users.

During delivery of the learning resource, the activity shifts to implementation. Depending on which learning domain was served during design, the content and interaction process may fall into the care of an instructor, a network of learners, or an individual support system (for emergence or acquisition). Support activities are also important at this stage. Technical, learning, or general support should be available to ensure the design of content and interaction does not interfere with learning. The support network is particularly important to learners who are taking an online course for the first time, joining a network or ecology, or using resources for acquisition or reflection. Early, successful use of learning resources is critical to continued use.

The design, development, and delivery stages are fluid and interdependent. Thiagi (1999) explores the challenges inherent to this process:

> "Design involves all activities undertaken before the actual learner interacts with the instructional package in a real-world training situation. Delivery is what happens subsequently. An important principle (and constraint) is that you can trade off resources allocated to these two phases. For example, if you have a high resource level for delivery (subject matter experts as instructors, plenty of instructional time, small groups of learners, and alternative instructional materials), you can skimp on the design. On the other hand, if you have extremely limited resources for the delivery of instruction (nonspecialist instructors, tight learning schedule, and large groups of learners), you need to allocate extra time and other resources to the design process. The basic idea here is that you pay now or pay later."

Stage 3: User Experience and Piloting

User experience is an important process in making sure that learning resources are used. Various models of user experience and piloting designs are available to assist in this stage. A simple, fairly integrated model can be found in Peter Morville's (2004) "User Experience Honeycomb". Several aspects of user need are reflected in Morville's model: is the design: useful, usable, desirable, findable, accessible, credible, and valuable? User experience and piloting are similar, though piloting may focus only on content, whereas user experience focuses specifically on the learners reaction to

content, presentation, interaction, and general design. Many headaches (for learners, designers, and managers) can be avoided by successfully incorporating reactions and experiences from end users.

Stage 4: Meta-evaluation

Meta-evaluation is the process of evaluating the actual effectiveness of the learning design process. Exploring successes and dialoguing on obstacles helps the entire design process to grow in effectiveness during future projects (and will often inform the revision of existing learning resources). Meta-evaluation is critical to continually improving the model and learning design.

Stage 5: Evaluation

Evaluation is listed as the final stage of the LDC model simply because not all learning activities require the evaluation of learning. Transmission is the only domain that requires a direct evaluation process. This evaluation may be formative (done during the process of exploring a learning resources) or summative (done after the completion of a learning resource). Evaluation can take a variety of forms, including tests, assignments, and group projects, or alternative methods like eportfolios, reflective journaling, and performance assessments. PLAR can be an important consideration at this phase.

Evaluation is not entirely limited to organizational assessment of the learner. Effective evaluation should allow each learner to provide feedback on the quality of the learning resource, instruction (if it was a part of the experience), relevance, and format. If possible, evaluation should be ongoing though out the learning experience. This may

be as simple as encouraging each learner to set up a reflective blog, or contacting learners (email, phone) for direct feedback. Evaluations that only take place at the end of a learning resource (assuming that the resource has an "end") overlook many opportunities for valuable insight for designers.

Learning Development Cycle can be approached in a variety of ways. Most common, and best suited for most organizations, is the linear model presented in Figure 5. As stated previously, determining the object of the design process is a critical element. Once the design object has been determined, designers move into the creation stage. A feedback loop is included in order to provide ongoing feedback into the entire process. Multiple iterations will inform and guide continued scope and learning resource creation.

As with most theories, life usually does not fit into a clear, concise model. Most often, there is overlap between different domains of learning. The design process can then be seen as focusing primarily on one domain, yet still accounting for aspects of another domain. For purposes of espousing a theory, four distinctive domains are used. In actual design situations, a designer will likely select aspects of each domain to create the optimum learning resource.

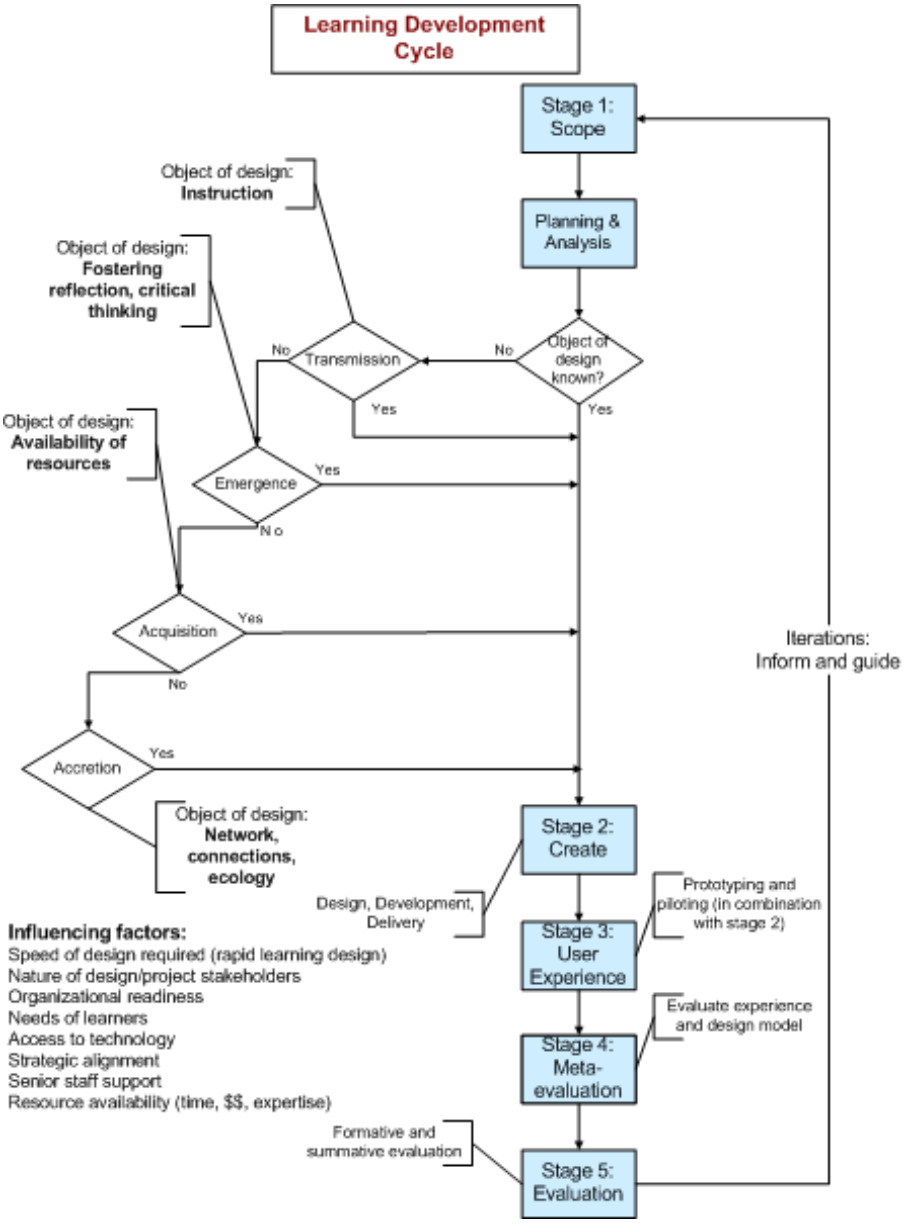

Figure 5: Learning Development Cycle Flow

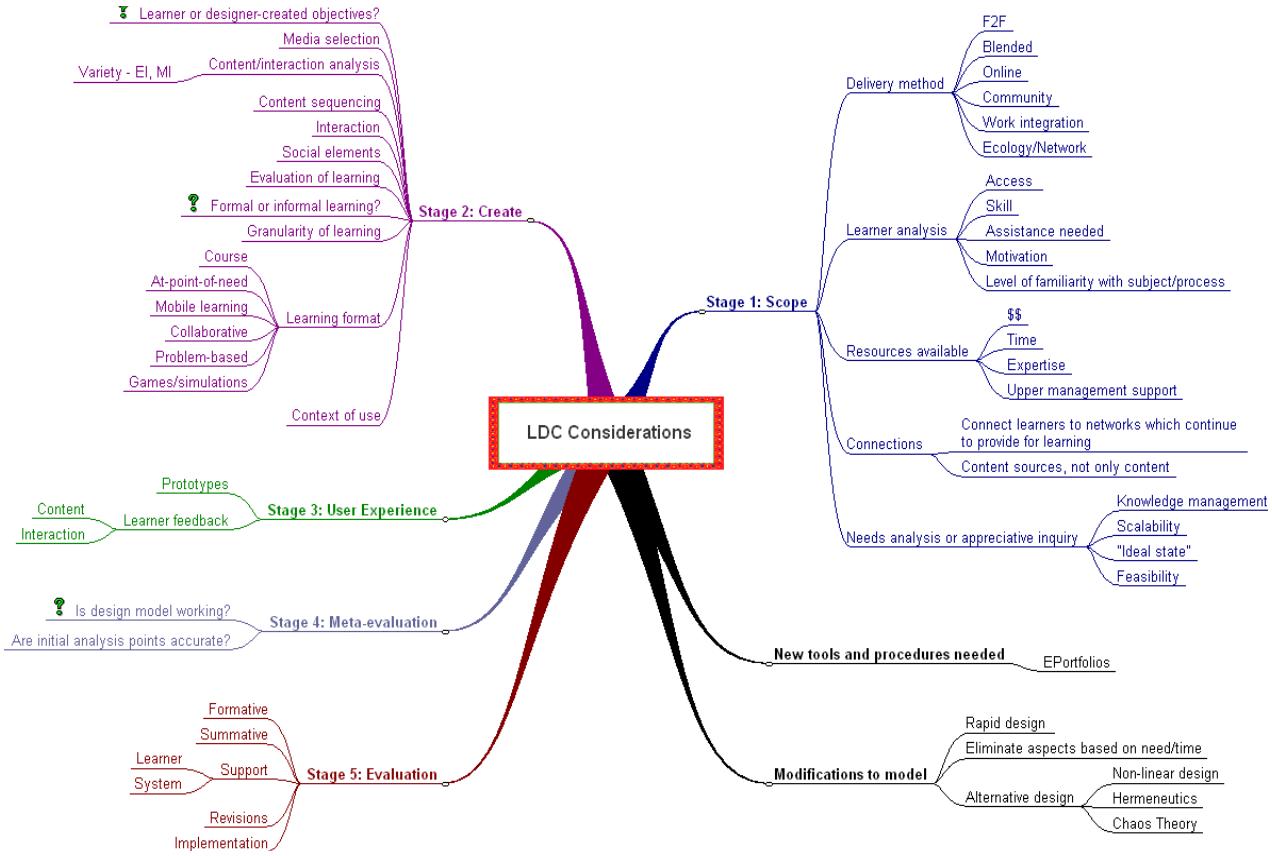

Figure 6: Learning Development Cycle Considerations

New Tools and Processes

A new model of learning design also requires new tools and processes. Many of these tools are already in use in a subculture of internet users. The tools are characterized by: sociability, collaboration, simplicity, and connections. Blogs, wikis, RSS (Really Simple Syndication), instant messaging, Voice over IP, and social networking applications are gaining increased attention in progressive organizations. These software tools are at odds with how many organizations are currently designed (top-down, highly structured, hierarchical, and centralized). As simple social technologies continue to expand in influence, a core reorganization of many institutions can be anticipated.

Saveri, Rheingold, and Vian (2005) explore this new landscape of collaborative tools. They categorize eight clusters of cooperative technology: self-organizing mesh networks, community computing grids, peer production networks, social mobile networks, group-forming networks, social software, social accounting tools, and knowledge collectives. The availability of new technology requires a shift from "designing systems to providing platforms" (p. 2). The power shift moves from organization to individual and from designer to learner.

Applications

LDC has many applications for designing learning today. Most significant is the ability to combine formal and informal learning. Informal learning is experiencing growing recognition as a critical component of most organizations. PLAR provides a bridging solution for individuals entering a new career, and provides colleges with a mechanism to bridge informal learning with formal learning requirements.

Few trends should be of more interest to higher education than the opportunity to integrate corporate education within existing structures and delivery models. It is surprising to note universities and colleges have left the outsourcing trend virtually untouched. Higher education appears to be reluctant to reorganize itself to embrace new climates and environments of learning. Many colleges speak of life-long learning; yet only form relationships with learners for two to four years. The bulk of learning for most people will happen in their work environment. A unique opportunity exists for education providers who are prepared to modify themselves to attend to learner's needs for a lifetime.

LDC also creates a tighter link with the natural process of learning and designed learning. As stated previously, informal learning is too significant a concept to be ignored. Integrating alternative views of learning with design broadens the scope of work for many learning designers. The domain of learning designers extends beyond courses and begins to include environments, and self-functioning skills (i.e. how to handle information, how to forage for information, how to think critically, etc.). Ultimately, the learner benefits, as her needs are attended to in greater detail.

Concerns

Measuring learning (and learning effectiveness)

Most corporations currently track learning in terms of time spent in training, workshops, completion of established software modules, etc. Kirkpatrick's model of measuring training effectiveness has received some criticism, but is still a fairly useful model of determining the impact of learning. Judith B. Strother acknowledges the current limitation of metrics solutions: "Until a more solid research methodology is developed for measuring e-learning results, we can rely on the mainly qualitative feedback from corporations that are using e-learning to deliver their training".

Determining the effectiveness of a course, program, or learning approach can be difficult. Learning is much more than a direct "return on investment" decision. The very nature of learning alters people and organizations, increasing their capacity for competent action. The metrics applied to learning value are unfortunately often linked on a direct "dollars in, dollars out" model. Capacity creation and advanced organizational effectiveness can be overlooked.

Learning is not an isolationist activity. When learning is viewed as a network, each node (in this case, employee) that improves its own value (value defined as ability to act in a contextually appropriate manner to a challenge or opportunity and increased relevance to the environment around) creates a ripple effect that impacts other nodes, improving the value of the entire network (or organization). Seen in this manner, measuring learning impact is less about dollars in, and more about increased relevance and competence. The industrial input/output model is a difficult template to place over a knowledge era organization. Measuring learning effectiveness requires a global view of the corporation. The overall ability of an organization to achieve its defined vision is a by-product of the quality of its learning. An organization in a deficit stage of vision achievement will require increased learning. Models for measuring (and capacity to measure) this view of learning are currently lacking. Metrics of industrial era evaluation are still dominant.

Why would corporations embrace a model that appears to be open in structure? How do organizations measure the effectiveness of learning in this model? LDC still functions from learning objectives (learning design should certainly be clear, but objectives are not always explicitly stated, or even known in advance of learning), but learning is created as guideposts, not directions. The constructs of the ecology permit individual learners broad movements based on personal interests and motivations (but still within the larger organizational parameters created by the designer to serve a specific outcome).

Learner reactions

Learners who have been conditioned to receive information in objective-packaged formats will resist (or be confused) by the sudden expectation of independence and knowledge foraging. The image of being a learner almost creates a preconditioned response of passivity. Most people innately possess the skills advocated by LDC, but they often do not see how pursuing a personal hobby is a learning process. Some transitory stage is required to move learners from passive consumers to active knowledge creators.

Instructor reactions

Instructors and trainers who are used to highly structured, regimented learning will find LDC approaches (particularly when designed for the accretion, acquisition, and emergence domains of learning) frustrating. Training professionals are required to move beyond knowledge provision (the model of transmission) to a more coach or guide-based role. Instructors will encounter disorienting experiences in this environment. The classroom model is a powerful metaphor (and almost, security device) of control-based learning. Letting go and opening up to serendipitous, learner-centred learning is not an easy task. For many educators, it will evoke an identify crisis. After several experiences with alternative learning formats, the liberation of not having to have all the answers, but rather guiding learners towards answers, is an intoxicating (and motivating) revelation.

Conclusion

The needs of continual learning, often tightly linked to work, required a new approach and model. LDC has been designed to create an alternative, less-linear view of learning. Learning is the intent of any development activity – communities, courses, networks, or ecology. Selecting the most appropriate design approach will assure greater a more positive and valuable experience for the learner.

Taking a panoramic view of learning, and accounting for unique facets and domains, equips a designer with numerous approaches and methods. Instead of only transmitting learning, educators begin to create structures and networks that will foster a lifetime of learning and learning skills.

Ultimately, designers continue to play a crucial role in the learning experience. Accounting for varying objects of design (instead of only instruction) creates a tighter integration with the unique nuances of learning today. The monochromatic world of course design is replaced with a vibrant environment where learning occurs in an integrated ecosystem. Learning is a continuous stream, rather than a dammed up reservoir.

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