SUN LEARNING SERVICES
COLLABORATIVE LEARNING ENVIRONMENTS

Instructional Design Model
White Paper
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Abstract

This document outlines an instructional design model and descriptive guidelines for the design of Collaborative Learning Environments (CLEs) in a virtual setting.

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Executive Summary

Many instructional designers primarily focus on the instructional messaging in content intended for learning, and not on the total learner experience – which begins the moment the learner starts to access instructional content and lasts until the learner exits the learning session.

A successful total learner experience should promote the cohesive integration of information resources into the overall structure of an instructional content delivery system. An eLearning content delivery system in the context of this paper is defined as *a system that contains every component designed to facilitate a learning intervention, including the interface access point, which could be a web-based learning management system, corporate intranet website, or a simple web page, to the content itself in whatever structure it is disseminated*.

Successful design of a total learner experience enables the learner to:

• Easily find, access, and consume the appropriate learning content.

• Be engaged, motivated, and enthusiastic throughout the learning experience.

• Transfer understanding into action after the learning is completed.

The critical aspect in implementing a successful total learner experience involves crafting a non-corrupt, pure, instructional message that meets the identified goals and objectives of the learning intervention.

The total learner experience framework enables the three primary types of learning modalities for adults (based on Coombs, 1985; Selman and Dampier, 1991):

• Formal learning

  — The structured, formal education system with compulsory attendance as a requirement. Sets the foundation for competency credentialing into adulthood.

• Continual learning

  — Organized educational activity offered through corporate training programs, continuing education courses, or community-based organizations, etc. Usually voluntary and based on specific performance outcomes.

• Informal learning

  — Educational activities that occur outside the construct of formal or continual learning environments. Informal learning activities are not usually related to institutional curricula. The community of learners can determine the objectives, models of acquisition, assessment, and mastery. Community participants voluntarily choose to engage without the guidance or observation of an authorized agent.

Malcolm Knowles (1970) argued that everyone consistently engages in informal learning throughout their lifetimes. In a 1976 national study (Penland, 1976), results

showed that people spend an average of 10 hours per week or 500 hours a year engaged in informal learning activities. From this study came the recognition of individualistic bias (Brookfield, 1981). Individualistic bias is the assumption that one learns most of what they learn individually rather than in collective context. However, further research conducted by Brookfield showed that the collective aspects of informal learning, i.e., social engagement with others, is integral to actual knowledge acquisition. The individualistic bias can be overcome when people engage in informal learning in a social context.

A Collaborative Learning Environment (CLE) as defined here combines social utilities with instructional messaging and content to enable the learner to engage in continual and informal learning. A well-designed CLE recognizes the challenges of non-planned learning (an informal learning activity that results in acquisition of new skills or knowledge without formal recognition until after the fact), ill timed learning (informal learning that occurs in a very short time period), and distinguishes between learning processes and learning outcomes.

Less capable learners engaging in informal learning may require more processing time to achieve a successful learning outcome. The CLE may facilitate a decrease in that processing time with properly designed social learning activities that foster meaningful comparisons between more capable learners and less capable learners.

The CLE instructional design model outlined here serves as a framework for effective instructional messaging in the context of learner-to-learner engagement, and helps to ensure the effectiveness of the total learner experience.

1. CLE Structure

CLE Content Management Structure

A CLE may be organized by terms, content, or by a combination of both:

TERM 1

| COHORT 1 |
| COHORT 2 |
| COHORT 3 |

MASTER CLE SHELL
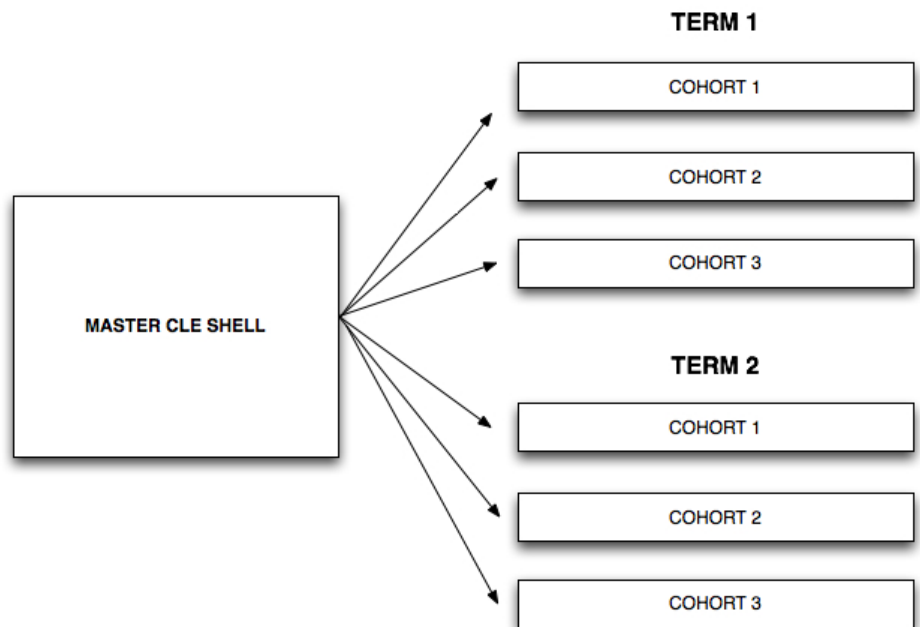
TERM 2

| COHORT 1 |
| COHORT 2 |
| COHORT 3 |

Figure 1. CLE Structure

Instructional content is stored in a course management system, which contains a "content shell" referred to as the master CLE. When a new CLE is developed, the instructional designer publishes course content into the master CLE.

The course management system can organize CLEs in terms. Terms can be organized by time periods, as well as by the level of development that has been reached in the design of the CLE itself. For example, a pilot or prototype can be organized into a "Pilot" term. Month, term number, or any other numerical indicator can organize date-based terms. For example, Term 1 runs from Jan-Apr; Term 2 runs from May-July, etc.

After a CLE is developed and approved, it is ready to duplicate into terms (see Figure 1). When publishable, the CLE is locked to prevent any additional changes and then it can be duplicated. The CLE duplication process creates a new CLE shell for each term and copies the content from the master CLE shell into each term-specific CLE. The enrollment process for each particular term can begin.

2. CLE Instructional Design Model

The CLE instructional design model contains three primary systemic goals for increasing organizational performance outcomes:

1.   Create an ecosystem of mutual trust and engagement

2.   Build understanding and flexibility

3.   Develop shared experiences

Figure 2. CLE Model

The CLE instructional design model is structured to support four desired participant behaviors (explained in detail following):

• Attention

• Motivation

• Participation

• Retention

Attention

With so many choices as to how learners spend their time in the digital age, attracting the attention of the learner is critical to obtaining their engagement in the CLE. Through the interface design of the CLE, a positive attraction to the environment must be achieved.

Integrating Visual Imagery

Integrating text and visuals are common in eLearning. The visuals may easily overwhelm the learner if they are irrelevant, segregated from the learning objectives, or do not assist reasoning. *The main goal of the visual should be to convey evidence of a relevant learning message.* If the visual strays from the learning objective, relevance is diminished, and mental clutter and confusion may occur. Instructional content laden with non-relevant visuals meant to heighten emotion, or decorate the user interface may corrupt the ability for the learner to process data, and can result in diminishing the value of the entire instructional message.

In the context of gaining attention, visuals matter. Visual imagery tends to be comprehended almost instantaneously, as opposed to text-only display. Text-only display prompts systematic processing and takes time to fully comprehend, whereas images often ignite a more visceral emotional response.

To further the cognitive manipulation required to successfully gain the learner's attention, the visual imagery must be perceived as "high-resolution" imagery. The use of higher quality visual imagery builds an expectation of authority. Considerable effort has gone into improving the imagery in videogames because visual fidelity implies authority. Likewise, simplistic or unrefined graphics are often an indication that the experience will be of lower quality (consider poorly designed product packaging – it does not attract the consumer in the same way a more vivid product package will). In fact, lower quality imagery may diminish the overall impact of the CLE.

Along with high-resolution imagery, credibility and evidence should be primary motivating factors behind the integration of visuals into the instructional message. The learner quickly judges a visual based on quality, the explanatory ability of the visual, and its association with the content.

To properly show evidence, the instructional designer should strive to reveal full detail in the visuals. Before deciding to manipulate the visual "to fit" or to reduce perceived complexity, the relationship between the visual, the data surrounding the visual (or included as a part of the visual), and the learner should be considered.

Sometimes the best way to communicate information is with an interactive visual. With interactivity applied to the visual the chance the learner will interact with the visual is increased. Using visuals (even visuals that contain text) for navigation or interaction is problematic if they are not recognized as "clickable." Interactive visuals work best when the learner can easily identify what is actually clickable.

Decorative visuals, such as company or department logos, backgrounds, or over-sized course banners, are usually more hurtful than not, especially when they consume a

large percentage of the interface. They may contribute design flair or a sense of professionalism, but will more than likely diminish the attention the learner will apply to the instructional content.

It is also possible for decorative visuals to backfire, resulting in a negative learning connotation. Using cartoonish visuals or clip art may frustrate the learner when they crowd the instructional message. The instructional designer should only focus on the elements of design that will matter most to the learner, and refrain from losing precious interface real estate to non-relevant decorative visuals.

Navigation

Many conventional courses are built around a logical hierarchy of modules and topics that may also include a menu with navigation options. When constructing a course around a content navigation structure, the instructional designer may think in terms of: where the learner will *want* to go, where should they be *allowed* to go, and how should the navigation elements be labeled? More than likely, the thrust may be to push the learner off the navigation structure into the content, which places the focus on structure instead of content.

More than likely, learners are not interested in the structure of the content. They will be more interested in the content that will enable them to achieve their desired learning goals. The design of the content should be the first priority, with the content navigation structure, hierarchy, etc., at a lower priority, with important considerations.

When viewing a navigation structure, learners will metastream their choices, and scan for trigger words. Metastreaming is the quick scanning of the CLE performed during the first few seconds of initial learner involvement. In just those few seconds, the learner will determine whether or not to fully commit to the environment. Trigger words are identifiable keywords that the learner will scan for during metastreaming when deciding whether or not to "commit" to staying, understanding their options, or making a quick navigation decision that may not offer appropriate results. Trigger words become important elements in the navigational structure, and should be placed in the appropriate user interface areas so learners will easily identify them. When designing the CLE's navigation structure, ask the following questions:

- Why is the learner here?

- What areas will be most important to the learner?

- How will learners get to the important areas?

- What are the associated trigger words for these areas?

When learners cannot intuitively find something they perceive to need to know, they will become frustrated. This will cause them to quickly lose confidence in their ability to navigate the CLE; however, if the learner can intuitively achieve their learning goals within the content structure, they will gain a sense of confidence. *The critical times of achieving learner confidence are right before and right after the learner decides to perform a navigational decision.* Are they able to easily decipher where the navigation

option will lead them? Did the option lead them to the right content? Confidence and intuitive navigation go hand in hand.

Learners should be "lured" to the content they need by:

- Communicating relevant content through appropriate navigation labeling. Navigation labels should not be constrained to the parameters of the visual design (shortening a label name to make it "fit" a design element). They should be named appropriately so that they are informative and contextual.

- Identifying the trigger words that the learners will associate with the content, and ensuring that their assumptions of what those trigger words will expose is correct.

- Ensuring that the content "evolves" with the navigation. If the learner sees the trigger words associated with the content, they will feel like the linking is getting them closer to the desired information.

Screen Layouts and Templates

When designing the screen layout, templates too often dictate the placement of data. Improper use of white space can affect the learner's cognition, and negatively impact learning. Without the ability to modify the placement of the data elements – basically manipulating the white space – visual noise and clutter may result. Rigid templates can diminish the instructional value and cause learner fatigue and frustration.

To improve the instructional value while formatting content layout (template or free-form), these guidelines should be considered for the display of data elements:

- Whenever possible, reduce visual "noise" and "clutter".

- Prevent large disparities of color ranges between similar elements.

- Carefully consider font weights and differences. Use sturdy, readable fonts.

- Use color to enhance spatial dimension.

- Be careful about shading and color usage (never place shading behind text).

- Remove all unnecessary data.

- Design for harmony between the data and the user interface.

- Focus on the relationship between the visual and the text on the screen, and make sure there is a relationship.

- Avoid thick rules and boxes surrounding pictures or text.

- Avoid clip art.

- Layer and separate elements to prevent clutter.

Enhance the resolution when possible, for example, do not scale screen shots and allow them to become distorted.

Displaying Complex Data

Presenting large amounts of data via a computer increases the risk of data clutter and confusion, sometimes referred to as "data fog." There is a general assumption that learners will not "read" what they consider to be too much text on a computer display. How much is too much text? And should we continue to assume learners will not "read" text on a computer display?

Cognitive load theory is based on information processing that describes the amount of information a learner can keep in memory. The theory states that small segments of "chunked" information enable the learner to focus attention and facilitate knowledge transfer. However, consider gamers and how they process information during game play. Large amounts of data are displayed, stored, and later recalled. Serious gamers learn quickly by doing: recalling key combinations, player moves, shortcuts, goals, and challenges during repetitive play, when the game requires action. Compelling content with high-resolution, relevant visuals may be able to counteract the possible contamination brought on by memory overload that often occurs with dry, macro-chunked content devoid of a bold visual narrative, negating some of the proposed cognitive load theory mentioned above.

High-resolution displays combined with good instructional design, compelling visual evidence, and readable text can lead the learner to action, and gain their attention. Instead, bad design, data clutter, and lack of action may be what causes cognitive overload, and will lead to learner frustration which leads to their lack of attention to the CLE.

Motivation

Most human actions are motivated by goals. Adult learners gain a high level of satisfaction when they are able to achieve short-term learning goals, thereby increasing motivation. However, if the goals are too easily attained, the learner will be just as dissatisfied as if the goals were not achieved at all, resulting in a state of indifference or diminished motivation. In the construct of the CLE, a learning activity must be designed to clearly disseminate goals, instill a sense of control and autonomy in the social context of the environment, and allow for the learner to derive meaning and satisfaction from their role in the activity to enable a state of intrinsic motivation (which is necessary for better learning to occur). Intrinsic motivation is defined as involvement in a situation that precludes any external reward mechanisms. In other words, if the learner achieves a state of intrinsic motivation in a learning experience, they are motivated solely by the desire to engage in that particular activity for no other reason than they are deeply interested in that activity.

Although not every learning intervention requires collaboration between learners and/or instructors, there are specific situations where collaboration can lead to better learning. For example, a less capable learner may actually learn more by reading and/or interacting with the instructional message on their own, whereas, a more capable learner may find it more beneficial to interact with other learners in a collaborative environment. The learning objective may also dictate whether or not

collaboration between learners leads to more effective learning for the individual and the community of learners.

Sustaining learner interest in the instructional message is key to fostering a motivational learning environment. By offering a higher level of learner adaptability to how the instructional messaging is consumed, the CLE can be optimized to take into account individual learning styles.

Throughout the educational experience, learners will sequence between recognition of self and recognition of the social environment (similar to Maslow's hierarchy); however, learners may not perform the sequencing in an expected fashion. Designing a relevant and meaningful activity that will lead to an increase in learner engagement is key to increasing the learner's motivation. The instructional designer must compensate for the disruptive behavioral patterns conducive to eLearning in their activity design.

First, the instructional designer must build trust and confidence to successfully influence the learner to action. The instructional message should show causality at all times – speculation and selective use of data is no substitute for evidence. Causality is best exposed through simplicity. The instructional message should foster the ability to deduce intent without relying on assumption or jargon, mismatched meaning, and marketing-speak. Learning improves when the instructional message is verifiable and easily able to be placed in context to the learner's sense of reality. To increase motivation, the instructional message should contain whatever is necessary to show evidence, and to assist in reasoning – learners will aggressively seek relevance and credibility in the content and the instructional messaging.

Make the Learning Fun

To many learners, training is seen as "drudgery" and something that must be endured just to "get through." In a CLE, the instructional designer should consider designing the learning activities to evoke a sense of fun. A large percentage of training is voluntary, so intrinsic motivation is a design requirement to motivate the learner to engage. Even in mandatory training, where extrinsic motivation is often the coercion factor behind the learner's engagement (extrinsic motivation occurs when there are external mechanisms driving the engagement, such as a manager requiring the learner to pass a compliance course), the level of learning can still be affected by the learner's intrinsic motivation. The instructional designer's primary goal in designing a motivating learning environment should be focused on making the learning enjoyable. To make learning enjoyable, it should be fun and infused with a sense of "learner control." A fun learning environment should consider a "happy learner." Consider the four key aspects of workplace happiness:

• The learner feels like their work is satisfying.

• The learner believes they are good at something.

• The learner spends time with people they like.

• The learner believes they have a chance to be a part of something bigger than themselves.

Contrast workplace happiness with learning happiness: *the learner must be able to optimally pursue the goals and objectives of the educational activity while happy.* Instructional components required to keep learners happy include:

• Good design

• Evidence

• Credibility

• Encouragement

• Ability to relate the information to their real world situation

Many game designers include the key aspects of happiness in their game play design. The best games are designed to enable the learner to be good at things they may not think they're good at in "real life." The instructional designer must make the distinction in their instructional messaging between what elements will induce intrinsic motivation, which will lead to higher levels of motivation and engagement.

Key elements that lead to higher levels of engagement in a learning activity include (based on Malone & Lepper 1981):

• Scoring and timing mechanisms (as in games)

• Whether audio or visuals are included

• Randomization

• Speed in response requirements

Malone & Lepper conducted recent studies that demonstrated a higher level of motivation and better learning results occurred when the same instructional activity was designed as a game instead of a standard drill format. However, there may be gender-specific differences in the appeal of certain types of gaming formats as it applies to motivation.

The CLE must be designed with motivational embellishments that lead to higher levels of sustained learner interest, which will lead to a state of intrinsic motivation.

Participation

The participatory element must be designed to instill in the learner a desire to acquire and impart knowledge, and engage in acts of sharing within the construct of the CLE. Participatory elements should include three interrelated components:

- Inquiry

    — Allow the learner to engage in discovery, exploration, and research in a social setting.

- Analysis

    — Allow the learner to gain insight into the topic while working in a social setting.

- Discussion

    — Enable learners to engage in critical conversation about the topic, share the results of their analysis, and raise new perspectives that may not be readily apparent to an individual outside of the construct of the social setting.

The key to the success of a participatory element lies in the element's relevance to the interest and experience of the learner. The participatory element should be experiential by enabling the learner to relate to prior experience, build on present skills, knowledge, and attitudes, and reflect on how to apply the learning to their individual future needs.

There are four levels of learner participation available in the CLE:

- Level 1: participant works as a consuming learner.

- Level 2: participant contributes to the social dialogue in a learning context.

- Level 3: participant contributes content.

- Level 4: participant leads dialogue, contributes content, and/or mentors/coaches other learners.

The instructional designer cannot assume that participating learners will have sufficient knowledge or skills to prevent non-relevant discussion from entering the dialogue. In designing the participatory element, the instructional designer must:

1. Set the foundation for the engagement criteria.

2. Provide specific rules of engagement.

3. Moderate the discussion to enable proper inquiry, analysis, and discussion.

Retention

The instructional messaging should show comparison, contrasts, and/or differences in a meaningful, structured context. Learners with prior knowledge may ask the fundamental question, "compared to what?" when evaluating the instructional message. To encourage the ability of the learner to build on prior experience, and retain key aspects of the instructional messaging, the content should pass the "Six Rules of Design Simplicity":

Table 1. Six Rules of Design Simplicity.

Show meaningful context	Is the information relatable to the learner's real-world or on-the-job experience?
Present evidence and credibility	Does the content and instructional message demonstrate subject matter expertise and relevance to the learner? Will they trust the message?
Remove invasive user interface clutter	Is the navigation intuitive? Does the company and course branding close in on the content? Display only the elements necessary for learning. Do not consume the screen real estate with non-essential decoration such as large course title banners or company logos.
Remove irrelevant visuals	Do the visual media support the instruction? Ensure the visuals appropriately support the contextual literacy of the instructional message. This allows the learner to form the proper association between the visual and the content to increase retention.
Strip out jargon and corporate-speak	Do acronyms, marketing language, and industry buzzwords run rampant throughout the content? If so, delete or minimize them. Refrain from buzzwords, especially industry specific ones. "Return-on-investment," "constraints," "accountability," "resources," "targeting" are examples of jargon.
Remove barriers to content	Can the learner easily access the content without unnecessary log-ins, restrictive or confusing LMS design, intrusive pop-ups, and uninstalled plug-ins?
	The first rule of a good user interface is to not make your user have to think about the user interface. Don't try to re-invent what many of the experts have already figured out: how to build good navigation. Conventions exist, so use them. Do not think you should change or break conventions, especially for a design aesthetic.

A common barrier to retention is often caused by data corruption: *a flaw in the design process that cognitively diminishes the transfer of information intended to promote learning.* Consider these common elements of data corruption:

Table 2. Common causes of data corruption in instructional messaging.

Ambiguous instruction	Imprecise language such as, "Click the items that are usually included in the box." Note that with sketchy words like "only," "usually," "never," and "nothing," learners may misinterpret the intent of the learning objective.
False or unnecessary information	Make sure the content displays the information relevant to the learning objective. Be careful of including too much information, or including information that you cannot verify. Learners are more than willing to question the credibility of the content.
Forced action / Limited choice	Do not require the learner to view content in a prescribed order when possible. Refrain from limiting the learner's choice when it comes to the ability to explore content, unless exploration diminishes the instruction.

Designing CLEs

Instead of relying on the traditional construct of the ADDIE model when designing instructional messaging in the construct of a CLE, the instructional designer should recognize and allow for user-generated content, collective learning, and varying levels of non-guided exploration.

In the construct of the CLE, the instructional designer must integrate continual and informal adult learning activities; however, there must be compensation for uncontrollable learner behaviors such as:

- Groupthink

    — Groupthink can occur when groups of people agree on faulty decisions just to reach quick consensus. To prevent groupthink, the instructional designer should formulate policies that drive the desired behaviors in the social activities, moderate the social activities, and formulate various designs based on different tasks within the activities.

- Positive Interdependence

    — Positive interdependence occurs when students come together so one cannot succeed unless all group members succeed. (Johnson, Johnson, & Holubec, 1998, p. 4:7). In group-based social activities, the group may become focused on the

common goal, and the members may work together to make sure everyone in the group learns the material. The instructional designer should focus on incubating group activity, but also design mechanisms to enable individuals to accomplish the same tasks on their own.

- Distraction

  — Learners will be constrained in the CLE by their level of control, the specific design of the content, interest in the content, and external distractions.

When constructing an instructional message for the CLE, consider a design method referred to as *Stitch Design*. Stitch Design involves weaving connections and opportunities across different learning styles to synthesize the goals and objectives of the CLE. Key components of Stitch Design include:

- *An understanding that learners will metastream.* The instructional designer is no longer the only architect and/or control agent of the CLE. The learner is more than a partner in the experience – they are an active agent and will "metastream" the experience before committing to full participation.

- *Realization that dropping pre-determined solutions to the learning audience is ineffective.* The design should guide the audience toward the realization that they need to apply "design thinking" to improve their own performance. Social networking enables smaller, more intimate connections – which can create a higher level of engagement. The spontaneous output of collaboration will change the group's learning dynamic.

- *Becoming technology agnostic.* Technology does not matter when it comes to forming relationships (pivotal to successful learning engagement). Technology is merely the enabler. People will find ways to communicate, share, and build relationships regardless of the available technology. The technology of the CLE platform should be invisible to the learner, and it should be highly intuitive.

- *The realization that innovation is irrelevant to the learner.* The learner does not care how "innovative" the design is – they just want to be happy and satisfied. Good design will lead to happy learners – not an over-reliance on technological innovation. Focus only on the learner's problems. The reason for the learning intervention should be fed only by the passion to solve that problem. Don't distract the learner with too much innovation.

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