Distributed Learning: A Flexible Learning and Development Model

Stephen Victor
Strategy and Design Lead
Obsidian Learning
Houston, TX, United States
StephenV@obsidianlearning.com

Shannon Hart
Senior Learning Strategist
Obsidian Learning
Houston, TX United States
ShannonH@obsidianlearning.com

Abstract: This paper presents Obsidian's Distributed Learning model. Grounded in social constructivist theories of learning, the model emphasizes the use of blended learning solutions (instructor-led, online, mobile, ongoing performance support) to foster collaborative learning. There are three primary components in the model: technology, experience, and people. Obsidian's distributed learning solutions draw from each of these components depending on organizational constraints, instructional requirements, and learner needs. This paper discusses several learning solutions that can be used in distributed learning environments, presents a case study of such an environment developed by Obsidian Learning, and suggests approaches to refining the model through future research and development.

Introduction

This paper discusses the use of "distributed learning" as a method of engaging learners in a blended environment. In this paper we define distributed learning as a general term; review the literature on learning theories, in particular social theories of learning; describe the Obsidian Learning model of distributed learning; and present a case study of Obsidian's Distributed Learning model in practice.

The term *distributed learning* is used in many industries with a variety of meanings. While it is generally understood to represent an instructional model that includes blended, multimedia components, there is not a universally accepted definition. In the terminology of cognitive psychology, "distributed learning" specifically refers to periods of study following instruction. Research has shown that distributing (or spacing) study periods increasingly further apart improves test performance (Son & Simon, 2012). The use of "distributed learning" in the educational arena is not as precise. In most cases, the term is used to refer to learners who are "distributed," that is, separated by geography. Typically, such "distributed" learners work collaboratively to learn and to solve problems (see, for example, Koszalka & Wu, 2010; Lee & Cho, 2011; Terry & Doolittle, 2006).

While we will define *distributed learning* more precisely in a later section, it is sufficient for now to note that the expression is generally used as an umbrella term including one or more of the following:

- **Blended learning**: Learning that combines instructor-led training (ILT) with web-based training (WBT) and other learning activities outside the classroom, with such learning activities as pre-work, independent projects, mentorships, and internships. Includes both synchronous and asynchronous learning.
- **Mobile learning**: Learning that occurs on a portable device, such as a tablet or smartphone.
- **Informal learning**: Learning that occurs outside a formal learning environment (classroom, online class, etc.). This type of learning is facilitated by social interaction.

Theoretical Background

Distributed learning is best understood within the context of sociocultural theories of learning. In this section we will briefly review the development of learning theory from behaviorism to social constructivism. We will also examine some of the social and emotional issues related to learning in an online environment.

Social Construction of Knowledge

The move from the notion that knowledge is external to the learner to the notion that knowledge is internally constructed began with the work of Vygotsky (1978), who suggested that learning occurs through social interaction with others. Learning takes place as learners are moved, through social interaction with more advanced peers and adults, to higher levels of development. Proponents of a constructivist theory of knowledge suggest that learners do not absorb a body of knowledge external to themselves; rather, they construct their own knowledge from a variety of stimuli and experiences in ways that are personally meaningful. Instruction in this model of learning, then, is learner-centered. Creating learner-centered experiences requires the instructional designer to create opportunities for social discourse that support personal learning and collective knowledge building; students must be encouraged to be active participants in identifying knowledge problems and collectively refining ideas (Hmelo-Silver & Barrows, 2008).

Social Learning Models

The concept of *social learning* is not new. Bandura's (1977) social learning theory, while thoroughly grounded in behaviorism, suggested that learning occurs by means of the interaction of personal and environmental factors. Reinforcement of learned behavior occurs through observation of others and through the learner's direct experience. However, with the rise of sociocultural theories of learning, coupled with increasing use of the Internet and mobile technologies, concepts of social learning have broadened to include technological terms and concepts. For example, Wenger (2009) has also proposed a social theory of learning. The focus of this theory is "learning as social participation" (p. 210), in which learners actively participate in the practices of social communities and construct personal identities in relation to these communities.

Another social learning theory (and one that directly includes technology in its model) is connectivism (Bell, 2011; Downes, 2008; Siemens, 2005). This theory extends learning to include knowledge gained by means of informal networks among people and from digital information available online. Learning is a process of connecting nodes or information sources and may reside in machines as well as human beings. The knowledge we gain from this kind of learning can be described as connected or distributed (Downes, 2008), and learning is greater when instructional activities promote connecting nodes instead of simply learning facts and procedures (Mundie & Hooper, 2014). For example, in an ethnographic study of a Danish social networking site used by young people between 13 and 17 years of age, Ryberg and Larsen (2008) noted the emergence of a concept of "networked identity," which is multidimensional and relational. Among the possible implications of this concept, the authors suggested learning environments could be based on the metaphor of *networks* and be built on students' and instructors' interests rather than solely on subject matter and courses.

Social Presence

Social presence refers to the degree to which learners feel "present" in a learning environment. In face-to-face interactions, social presence is high because learners are able to see, hear, and communicate (verbally and using non-verbal cues) with other learners. In an online environment, social presence can be lower because direct communication factors are absent or diminished. Social presence may be a critical factor in online learning and can improve learner performance (Hostetter, 2013).

Reporting the results of a study examining collaboration in an online peer review group, Zhao, Sullivan, and Mellenius (2014) identified three dimensions that contribute to collaboration: participation, interaction, and social presence. They found that participation is required for interaction and collaboration to occur, but it does not automatically ensure they will occur. Next, interaction is a prerequisite for collaboration, but again it does not ensure it will take place. Finally, they found that social presence emerges from interaction, and an optimal level of social presence improves the quality of participation and interaction and thus promotes collaboration.

Whiteside (2015) has proposed a Social Presence Model. As shown in the following table, the model

contains five elements that work together to affect learners' motivation to take an active role in their own and their peers' learning. These elements can be used as a model for designing learning experiences that maximize social presence.

Affective Association	The emotional connections among participants. These connections include personal emotion, humor, and self-disclosure.
Community Cohesion	Individual sharing of resources and information with the group. Viewing the group as a cohesive whole. At the interpersonal level, this element also includes being an approachable group member (using greetings and sharing with other members).
Instructor Involvement	Instructors provide community-building activities and encourage learners to engage constructively with other learners.
Interaction Density	This element describes the level of interaction among participants. Interaction density includes acknowledgement of others' input, agreement, disagreement, compliments, and questions.
Knowledge and Experience	The group's collective knowledge and experience are important for building social presence and can enhance discussion and collaboration.

Table 1: Social Presence Model (adapted from Whiteside, 2015)

Obsidian's Distributed Learning Model

Given the social constructivist theories of learning described in the previous section, what are the characteristics of distributed learning? Obsidian Learning has grounded its model in three guiding principles (Victor, 2016):

1. Learning must be fully learner-centered, supporting the learner not only in periods of formal training but also in times of need in the workplace. Learners do not passively absorb information from the "sage on the stage." Alternatively, social, collaborative experiences enable both personal and group construction of knowledge. Access to online tools promotes integration of personal experience with networked knowledge.
2. Learning should be blended. Learning experiences must be focused, easily manageable, and targeted to the unique needs of the adult learner. It is expensive, time-consuming, and ineffective to keep learners in a classroom for days. Instead, learning should be ongoing, occur when needed, and make use of inexpensive (if not free) technologies.
3. Learning should be a social experience. It should provide opportunities for collaboration and interaction – both within formal learning experiences and continuing in the workplace, in the form of collaborative problem-solving, ongoing performance support, and communities of practice. Instructional design for distributed learning must take into account social presence, using learning strategies that encourage and build camaraderie and engagement. Just as connectivism suggests that learning also includes knowledge gained from online sources, Ohler (2008) stated that we each have our own "personal learning network (PLN)" (Ohler, 2008, p. 8) in which we find information to meet our own learning goals.

Based on these principles, Obsidian Learning uses the term "distributed learning" to describe learning that is:

- blended, using various combinations of ILT, WBT, and mobile learning;
- collaborative, including individual, partnered, and larger group experiences;

- spread out over time, including formal training, informal learning, refresher;
- just-in-time (JIT) learning that occurs at the point of need, along with performance support; and
- focused on competency development rather than on general knowledge growth.

Components of the Model

As illustrated in Figure 1, there are three major components of Obsidian's Distributed Learning model:

1. **Technology**: Through technology – in the classroom, on the LMS/LRS, on social media platforms like Twitter or Facebook – learners are empowered to collaborate with each other and to seek resources for their own personal learning networks (PLNs).
2. **Experience**: A variety of learning experiences using a variety of media – instructor-led training (both classroom and virtual), web-based training, performance support (for just-in-time learning), communities of practice – leads to increased learner engagement and builds the technology-mediated collaboration skills that are so vital in our global economy.
3. **People**: Collaborative learning is a key component of Obsidian's Distributed Learning model. Learning experiences should encourage collaborative learning and problem-solving, the development of ongoing communities of practice, and forming connections, e.g., PLNs connecting with other PLNs.

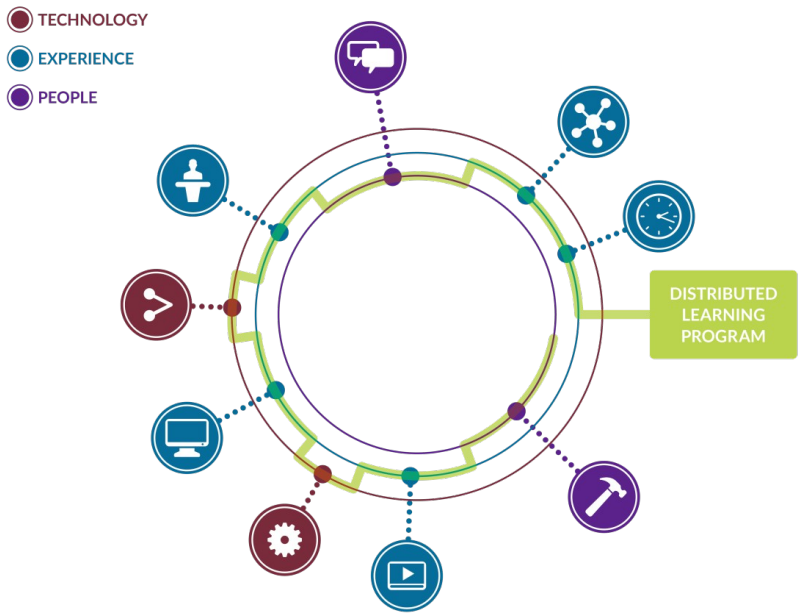

Figure 1: Obsidian Distributed Learning Model (Victor, 2016)

For successful implementation of distributed learning, the learning designer should augment the traditional elements of instructional systems design to include these three components, as illustrated in the following sections.

Technology

What tools can be used to enhance social learning in Obsidian's Distributed Learning model? Examples include:

- **Learning Portal**: A designed page (or set of pages) housed on a learning management system (LMS), SharePoint, or some other website that serves as the hub of the program.
- **Social Networking Technologies**: Such tools as blogs, wikis, and online networks of friends and professional colleagues can be powerful enablers of social, collaborative learning. The user-centered and interactive nature of social networking technologies enables collaboration and sharing of information (Chen, Wu, & Yang, 2008), and can thus be used to support the development of online learning communities (Yan, 2008). Technologies like wikis and blogs can capture the co-creation of knowledge by a group of learners (Mondahl & Razmerita, 2014), while Facebook's closed group feature can be used as a platform for online discussion and collaboration (Norman, Nordin, Din, Ally, & Dogan, 2015).
- **Mobile Learning**: Learning that is delivered using mobile communication technologies, such as tablets, smartphones, and similar devices (Cochrane & Bateman, 2010; Goh & Kinshuk, 2006; Motiwalla, 2007). Mobile learning can include performance support systems, brief tutorials, checklists, videos, teleconferencing (chat), and microlearning.

Experience

What learning experiences will best meet the needs of the learner, and when should they occur? In some instances, short instructor-led training (ILT) might be all that is needed. Alternatively, virtual ILT with technology-driven collaboration might better meet the needs of dispersed learners. In Obsidian's Distributed Learning model, ILT is usually brief and very focused on problem-solving and application. In other cases, web-based training (WBT), or eLearning (electronic learning), is a more appropriate method. Typical delivery of eLearning is via the Internet using such technologies as self-paced courses, teleconferencing, and video conferencing. Obsidian has used the interventions listed below in distributed learning environments:

- **Microlearning (learning nuggets)**: Brief learning activities (lasting a few seconds up to several minutes) that can be used to enhance (or even replace) larger course modules; examples include brief videos followed by quizzes and micropodcasts delivered on platforms like YouTube, Twitter, and SoundCloud (Semingson, Crosslin, & Dellinge, 2015). At Obsidian, we often use the term "learning nuggets" to describe microlearning. As described by Bailey, Zalfan, Davis, Fill, and Conole (2006), learning nuggets are tasks that learners perform in a particular context in order to attain specific outcomes. Thus, as targeted and contextualized pieces, microlearning (or learning nuggets) can be used with mobile technologies to provide just-in-time performance support.
- **Learning Video**: With the rise in popularity of free video sharing sites such as YouTube and Vimeo and the availability of quality video capturing technology on smartphones, videos as a learning format are becoming increasingly popular. Videos are not only used to capture the intricate details of many subjects (as on www.khanacademy.com, for example) but are often used to explain and simplify complex concepts, systems, or processes. Ideal learning videos are typically brief (from three to five minutes long), and are thus well-suited for mobile learning.
- **Guided Project Work**: In a guided project, the course facilitator or another expert provides input and advice while learners work collaboratively to solve a problem or complete a project. With input from peers, direction from an expert, and collaborative work, learners gain a greater understanding of course concepts and how to apply them in the workplace.
- **Simulations**: A simulation is an instructional strategy that replicates as faithfully as possible an actual situation, process, or procedure. Simulations can be done in person (in the form of role playing) or using technology (both in person and online). Simulations should be learner-centered, meaningful, and transferable to the workplace (Beckem & Watkins, 2012). Indeed, research has suggested that simulations promote self-efficacy (the learner's sense of ability) and transfer of learning to the workplace (Gegenfurtner, Quesada Pallarès, & Knogler, 2014). The addition of gaming elements to simulations can provide an added element of learner "competition," further increasing engagement (Borro-Escribano, Del Blanco, Torrente, Alpuente, & Fernández-Manjón, 2014).

- **Coaching and Mentoring**: Observation of problem-solving strategies used by experts (referred to as cognitive apprenticeship) is helpful as novices learn new skills, and this method can be an important tool for web-based collaboration (Kuo, Hwang, Chen, & Chen, 2012). In Obsidian's Distributed Learning model, learners engage in real-world practice and skill-building by working with coaches or mentors in the workplace.

People

To maximize opportunities for collaborative learning, distributed learning experiences should include activities to enhance social presence in all types of learning interactions: student-to-student, student-to-teacher, teacher-to-student, student-to-content, student-to-world. The following strategies are proven means of creating higher levels of social presence:

- Create a discussion space for open interaction to foster group cohesion and interaction.
- Encourage both facilitators and learners to give feedback that contains compliments and expresses gratitude in order to create a supportive learning community. Support open expression of acknowledgement of others' input, agreement, disagreement, compliments, and questions.
- Use personal emotion, humor, and self-disclosure to strengthen emotional connections in the group.
- Provide tools for individual sharing of resources and information with the group. Remember that the group's collective knowledge and experience are important for building social presence and can enhance discussion and collaboration.

Consider also ways to assess mastery not only of content but also of the social, collaborative elements of learning in the 21st century. For example, Starkey (2011) has proposed a "digital learning matrix" that captures the activities required for learning with digital technologies. In this model, learning is measured not just in terms of individual achievement but also by examining the ways in which learners connect with others to collaborate and share the creation of knowledge. Examples of such collaborative learning include communities of practice and personal learning networks:

- **Community of Practice (CoP)**: A type of collaborative learning community wherein an informal grouping of people share expertise and interest in a common activity (Wenger & Snyder, 2000). Online tools like wikis can be used for collaborative knowledge collection in a CoP (Gunawardena, Hermans, Sanchez, Richmond, Bohley, & Tuttle, 2009).
- **Personal Learning Networks**: Just as connectivism suggests that learning includes knowledge gained from online sources, Ohler (2008) states that we each have our own "personal learning network (PLN)" in which we find information to meet our own learning goals. Again, social networking tools can support self-directed learning (Van Harmelen, 2008) – an important activity in the development of PLNs.

Obsidian Distributed Learning Case Study

How can you use Obsidian's Distributed Learning model to enhance learning in your organization? What is the cost of distributed learning solutions, and are they worth the investment? In this section, we present a case study of a distributed learning solution developed by Obsidian Learning

Background

We were approached by a global Fortune 500 construction company seeking to revamp some key leadership training. The audience of senior project managers is accountable for the success of very large-scale construction efforts. Time spent away from their projects is at a premium, and as a result many site managers have received little formal training. The existing curriculum consisted of a two-week-long instructor-led course during which a rotating slate of guest speakers gave PowerPoint-based lectures. The course was rated relatively poorly by participants.

Considerations Discovered in Analysis

1. Audience – Very mobile, high energy upper level project managers with little tolerance for sitting still at a computer. Used to working long days, very positive about learning opportunities, open-minded. Wide range of previous experience (some new to company, some long tenure), as well as a wide range of comfort and experience with technology.
2. Highly competent SME – Dedicated, credible, talented, very committed VP willing to help facilitate.
3. Existing content – Strong case study, too much lecture, overall much too long.
4. Commitment to active learning – Company culture supports an interactive learning approach.
5. Limited time and budget – Course scheduled for 4 months from project start date.
6. Online resources – Abundant, though underutilized, online resources. Can be hard to find, and it is sometimes unclear when to use what. Personnel in the field tend to feel disconnected from corporate resources.

Our Solution

Obsidian proposed an updated curriculum that would be delivered over a 6-month span. Our recommendations included an introductory conference call to help establish a cohesive learning community, and an element of self-paced learning to introduce the most important learning themes and to create a sense of urgency as participants realized how much they have to learn. One of the goals of the program is to create a cohort of site managers that can rely on each other and company experts when facing new challenges and to share lessons learned, so we maintained the face-to-face component and provided additional networking opportunities. To save both time and money, we leveraged existing content as appropriate, and bolstered skills transfer by increasing interactivity and hands-on learning while shortening the overall ILT experience to 4.5 days. Behavior change is reinforced over time through post-course microlearning text messages and regular conference calls.

Technology

What technology tools were available to empower this audience of learners to collaborate? The client had a well-developed set of resources available on their intranet, so trainees were provided with opportunities to practice using the tools at their disposal. To create an interactive learning community, we used the most basic technology – group email lists and a pre-class conference call. As this particular audience relied heavily on their smartphones, we designed remote learning on that platform.

Experience

What learning experiences would best meet the needs of the learner, and when should they occur? To meet our client's specific needs, we developed a solution consisting of pre-ILT independent work, an ILT course, and post-ILT reinforcement activities.

Pre-ILT. Before coming to the classroom for training, learners completed two independent activities:

- Microlearning video: An emailable 5-minute communication piece to preview the top learning themes of the curriculum
- Quiz: Quick 6-question mobile quiz based on real-life site manager dilemmas to create awareness of knowledge gaps

ILT. In the classroom, learners completed the following learning activities:

- Case studies
- Activities – team-based interactions, hands-on activities
- Discussion – group learning elements
- High-profile expert input – highly credible experts provided regular feedback on deliverables produced in class
- Social engagements – each evening included a networking/social opportunity

Post-ILT. Obsidian prolonged the learning experience with targeted engagements:

- Individual mentoring on personal development plans established with a senior mentor and based on a skills inventory designed to highlight gaps
- Three conference calls spaced over a 4-month period
- Mobile phone distribution list – text message quizzes

People

How can learning bridge social and geographical gaps, enabling collaborative learning? How can we give all learners, no matter where they are located, a sense of social presence in the learning community?

- Established a learning community (invitation to training followed by conference call)
- Shared class roster and provided networking opportunities
- Continued conference calls post-class (three over a 4-month period)
- Distributed group text message quizzes

Conclusion

This paper has presented a model for design and development of distributed learning experiences, as well as an example of the model in application. To date, over 50 participants have completed the program. Level 1 evaluation results have been positive. The case study is an excellent example of how blended and distributed learning should inform all of our design choices. To provide the solution, we incorporated the most adapted technology and learning experiences for the audience and organization that made use of social learning to foster collaborative development of knowledge and skill development. While we have discussed preliminary findings from use of the model, empirical research is needed to test the effectiveness of our approach. For example, are there interactions among the three elements of the model, and if so what effects do they have on learning outcomes, learner motivation, and other variables? There is much yet to be explored as the model is tested and refined.

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