LEARNER ENGAGEMENT AND INSTRUCTIONAL OUTCOMES

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THE LEARNING GUILD RESEARCH

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INTRO

In December 2019 Charles Dye of **InSync Training**, a company specializing in instructional use of the virtual classroom environment for workplace training, completed his PhD research on the learner engagement construct.

"Engagement" is a popular word in L&D, typically used with vague definition and rationale for its importance. Dye sought to establish better definition of the idea of learner engagement, explore the relationship of learner to learning environment, and identify dimensions and characteristics of engagement. Among the findings particularly relevant to our readership were isolation of three dimensions of learner engagement: affective, cognitive, and situational. Moreover, data consistently supported the idea that learner engagement was not fixed throughout a learning experience, but rather changed—often quite quickly, both as a consequence of the learner and the environment. There's also interesting conversation around the definition of "outcome" and whether that is some summative final examination at course end, or in the broader application of new learning. This report culminates in some findings regarding mandatory v. voluntary learning experiences, and tips for facilitators working in the virtual classroom environment.

Moreover, data consistently supported the idea that learner engagement was not fixed throughout a learning experience, but rather changed—often quite quickly, both as a consequence of the learner and the environment.

Because engagement is a hot topic in L&D often used in conversations involving design and development, I asked Dr. Dye to recap his work and offer suggestions for how it might inform our practice. With Dye's permission I took a stab at making it a bit more accessible to those not used to reading the academic writing style required for projects like dissertations. For those interested in a deeper dive into specifics of his work as well as the full list of his resources, the complete dissertation is available online.

Jane Bozarth
Director of Research,
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THE UBIQUITY OF PROFESSIONAL TRAINING IN INDUSTRY

Workplace training is ubiquitous: organizations often address emergent operational needs with some form of training or development for the standing workforce as part of its approach. In the United States in 2020, government and industry organizations spent $82.5B and countless man-hours and other resources on advancing the skills and knowledge of personnel (*Learning Magazine*, *2020*; Carnevale, Strohl & Gulish, 2015). The goals of the training intervention are meant to align with various organizational objectives relating to, among others, enhanced performance and productivity, regulatory compliance, or new skill development. Advances in alternative instructional treatments such as self-paced learning have enhanced flexibility in delivery and outreach to more of the targeted population (Arkorful & Abaidoo, 2015). Many in the learner population, however, opt not to participate in learning in a proactive manner as part of their vocational "responsibility": training is often mandated by the organization rather than requested or sought after by the learner (Rana, Ardichvili & Polesello, 2016). This challenge is familiar to those in the L&D industry tasked with enhancing the effectiveness and efficiency of professional training, while making the prospect of attending attractive to the learner. This is a tough sell, as traditional methods of mandated workforce training often strike fear and/or loathing into the heart of a worker—eliciting images of classrooms, short bathroom and lunch breaks, stale air, and limited if any interest in the subject matter. The rapid adoption of virtual instruction in the ongoing pandemic has changed the music but not the dance: hours of virtual classroom training with content poorly designed for the environment in which it is delivered (to say nothing of the challenges primary and secondary educators had in similar circumstances).

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The challenge of keeping learners learning can be illustrated by looking at attrition rates for self-paced online courses. Within the L&D field, workers who start an online self-paced instructional program required for their occupation are much more likely to stop before completing it: attrition approaches 80% for non-compulsory training (Kaufmann, 2015; Moody, 2004). Typical attendance rates of non-mandatory training (regardless of treatment or delivery method) in some industry sectors hovers at 10% of those that express interest in the subject matter. To be sure, there are a variety of causes and factors to be considered in addressing this issue, but many practitioners and organizations have focused on driving the learner to "engage" in the learning experience to improve outcomes, reduce attrition, and accomplish the organizational goals of the training program (Wolff, Wagner, Poznanski, Schiller & Santen, 2015). This idea of "engagement" is poorly defined, generally discussed as an idea somehow important to design and outcomes. Establishing a more precise definition of learner engagement requires us to define the construct of engagement, then assess the effects of that construct within the learning experience of professional learning and development.

WHAT IS AN "ENGAGED" LEARNER?

A casual review of current literature in academic research finds more than 300 scholarly articles and more than 2,000 trade articles in 2020 alone that use the term "learner engagement". Few commentators, however, define learner engagement explicitly: often researchers conflate engagement with other constructs, most often motivation (Mayer, 2014; Yoo & Huang, 2013). It is perhaps this prevalence of the usage that allows researchers and commentators to continue the practice without a strict definition—it is assumed *everyone* knows what is meant by the term. Most practitioners in the learning and development industry—be it K-12 public education, post-secondary instruction, or industry professional training—can easily distinguish an "engaged" learner from one that is not engaged, in many cases simply on sight. Anecdotally,

it is easy to "see" when someone is not engaged but much more difficult to articulate what is meant by "learner engagement".

In the industry, learner engagement has developed into a shorthand term that loosely represents a mashup of learner subject-matter interest/expertise, attitude, motivation, and mastery. Additionally, it is often explicitly or implicitly assumed that, using measurable rubrics, an engaged learner will achieve better outcomes than one who is not engaged (Wolff et al., 2015). Most researchers who investigate the phenomenon of learner engagement either confound learner engagement with motivation (Beal, Qu & Lee, 2006), or treat engagement as some other trait of the learner that exists before the learning experience as a means to an enhanced outcome. Drawing on parallels from the organizational behavior arena, Appleton et al. (2006) provides what is perhaps the first structured approach to the concept of learner engagement, describing a model of two factors—intellectual and emotional—that define the construct, and seeks to evaluate the effect of learner engagement on outcome.

There are problems with Appleton's and subsequent research, however, as it regards the learner a standalone, isolated element. It therefore fails to address the entirety of the learning experience, instead focusing on a static within-the-learner model (Appleton, Christenson, Kim & Reschly, 2006). This approach does not contemplate the real and meaningful relationships of learning environments and the learner as a unit of analysis, and the interactions between these factors as the environment and the learner change (Anderson, Reder & Simon, 1996; Young, Kulikowich & Barab, 1997). Despite compelling differences and benefits to instructional practice, little research has been conducted with a diverse learner audience. This would help us better understand the effect of various aspects of learning environments on/with the learner, particularly the effects on the learner's attitudes, behaviors, perceptions, and performance *while learning* (Halverson & Graham, 2019).

One shortcoming of note in most approaches to learner engagement as a concept is its characterization as a stable trait of the learner (Appleton, 2006). As mentioned earlier, Appleton et al. (2006) characterizes learner engagement as an index at a certain point of time. Other researchers have found, however, compelling evidence to support the notion that the process of learning involves cognitive and social processes unique to the learner's specific intentional trajectory—whether the learner intends to learn something, develop a new skill, etc.—and the environment in which learning occurs (i.e., deliberate practice, Ericsson, 2006; learning from others, Grenier, 2009). Rather than a stable characteristic, learning is better characterized by a continuous interaction within a learning environment to develop expertise (Kuchinke, 1997; Daley & Cervero, 2016). The challenge for practitioners in learning and development is determining the optimal treatment, technique(s), and learning environment in which to address a particular training need. We need a method of measuring learner engagement within the learning experience to allow the evaluation of how it changes over time. This requires developing a standardized measurement rubric that includes valid and reliable instrumentation to assess the critical dimensions of individuals' engagement in learning. This instrument and measurement method can thus be used to advance enhanced instructional treatments, reduce instructional attrition, and improve workforce development. For learners, this means instructional treatments and environments tailored to enhance their learning experience and outcomes. (See also the **October Learning Guild research report** on adaptive and personalized learning.)

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FACTORS OF LEARNING ENGAGEMENT

More recent research has expanded Appleton's work to address the lack of observable behavior (and reverting to that proposed by Marks, 2000). Trowler (2010) notes that engagement is "more than involvement or participation—it requires feelings and sense-making as well as activity" (Trowler, 2010, p.7). Drawing on research from several sources, Fredericks, Blumenfeld & Paris (2004) first proposed a construct of learner engagement with a three-factor model:

> *...engagement is "more than involvement or participation—it requires feelings and sense-making as well as activity"*

- *Behavioral* (e.g., positive conduct, effort, participation)
- *Cognitive* (e.g., self-regulation, learning goals, investment in learning)
- *Emotional and affective* (e.g., interest, belonging, positive attitude about learning) (Jimerson, Campos & Greif, 2003)

Trowler (2010) summarizes the factors of learning engagement construct as:

- Behavioral: relating to students' actions. For example, class attendance, submission of work, contribution to class discussion, or participation in school-related activities (e.g., extra-curricular sports or school governance).
- Emotional: relating to students' affective reactions in relation to their learning. For example, an emotionally engaged student might report that they were interested in their course and that they enjoyed learning.
- Cognitive: relating to students' psychological investment in their learning. For example, the desire to go beyond the requirements of the class and the adoption of metacognitive learning strategies.

In contrast to earlier studies, Trowler (2010) makes several key assertions regarding the construct of learner engagement:

1. Engagement does not always have to be positive: a student could be negatively engaged if they report dislike or anxiety towards their learning. Thus, attrition can be the result of *negative* engagement rather than an absence of positive engagement.

2. Learner engagement is a dynamic construct within the learning experience.

3. A measurement of learner engagement relies solely on observable behaviors of the learner to assess engagement.

Subsequent work on these concepts by Wang and Eccles (2013) used a longitudinal study to look at learner engagement construct changes over time, applying a construct that used years as the timeframe for measurement of learner engagement.

WHAT'S MISSING?

What's missing in these more comprehensive approaches to learner engagement is that behavioral measures, absent a context, provide little more than frequency data, ignoring the learning environment and learner. The focus on learning environment as an element of learner engagement is of concern because while adult learners in the workplace are essentially the same as those of 30 years ago, learning environments are not. The use of educational technology and new instructional techniques has advanced to become prevalent elements in education, industry, and government over the last 30 years. Networked technology is now used to deliver and assess across a wide spectrum of intellectual domains ranging from technical literacies and declarative knowledge to task performance in immersive simulations, to licensure and professional credentialing. The adoption of a specific technology

> *...while adult learners in the workplace are essentially the same as those of 30 years ago, learning environments are not.*

implementation in instruction is largely driven by operational requirements and measured effects of "differences". Since early research in the mid-1970's, most commentators have suggested that instructional delivery courses delivered online produce at least comparable learning outcomes relative to traditional classroom-based courses (Sitzmann et al., 2006). This is based largely on comparisons of summative assessment outcomes in the two delivery approaches. Clark (1994) claims that instructional outcomes are environment and media independent and asserted that learner preferences or biases rather than any limitation of a particular environment produced variance in learner performance. These assertions are largely restricted to the specific instructional environment(s) measured and dismiss the extensive difference in learner experience and capacity to interact in the learning experience in different learning environments. In other words, they measure end-of-course understanding, but does the experience ultimately help us move the needle on performance?

ENVIRONMENT MATTERS

Confounding the issue of comparative analysis of delivery methods with respect to the learner and their respective level of engagement is the variance of instructional experience and outcome in two different instructional environments. For instance, a well-designed virtual online instructional program often employs very different methods, activities, and approaches to delivery from its traditional classroom analog (Clark, 1994; Sautter, 2007). Fundamentally, the environments that employ educational technology are different from those that do not; additional variance in program delivery stems from student attitudes and perceptions of technology, which can vastly influence success in an online delivery format (Clarke III, Emerson & MacKay, 2011; Poggio, Glasnapp, Yang & Poggio, 2005). Recent research has begun to examine the factors affecting learner

...additional variance in program delivery stems from student attitudes and perceptions of technology, which can vastly influence success in an online delivery format

retention—what keeps a learner in an instructional program—but fail to go beyond demographic or attitudinal measures (Park & Choi, 2009). Additionally, these studies eschew any form of analysis that would relate terminal outcomes to factors affecting participation while in the learning experience. The question of "equivalence" of delivery methodology between a technology-enhanced online learning experience and that of a traditional classroom misses a fundamental point—many of the most salient measures of effectiveness for the classroom experience are highly subjective or not captured at all, and summative measures miss things like attrition and lack of mastery in those that attend but aren't tested. The assessment of any learning is perhaps better understood by any measured outcomes and informed by the individual learner's set of goals and objectives within that environment (Brown, Collins & Duguid, 1989).

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To date, nearly all research relating to technology adoption and implementation within an instructional implementation for adult learners has focused on summative assessment of learning outcomes and persistence. Commentators often refer to these data collectively as indicia of "learner engagement", yet there is a pervasive lack of any hypothesis relating to the development and consequences of engagement in the learning process. These studies have largely ignored the personal subjectivities and the unique characteristics of learning environments relating to the learning experience in favor of quantitative data relating to assessments of outcome (Manwaring et al., 2017). The few exceptions noted in the literature relate to vocational training and anecdotal perceptions of worth assigned by the learner (Peltier, Schibrowsky & Drago, 2007). This approach to research fails to measure the causal relationship between engagement and learning outcome from the ecological and situated perspective: it does little to help us understand and measure learner's attitudes, behaviors, perceptions, and performance *while learning*.

LEARNER ENGAGEMENT: A DYNAMIC SITUATED CONSTRUCT

In contrast to earlier efforts, the framework developed in this research is sensitive to the dynamic nature of learning within different learning environments. It serves as a foundational step in developing a methodology to provide the optimal learner trajectory based on instructional need and learning environment. Based on literature review and ongoing instructional interventions, we hypothesized a three-factor latent construct for learner engagement based on an affective, a cognitive, and a situated dynamic interaction between the learner and the learning environment. Inquiry into the construct through interviews and a review of instructional artifacts from a variety of professional development contexts and stakeholders unearthed several common themes from which the factors were further refined. In particular, the situated learner response changed its definition extensively as a consequence of the qualitative inquiry—the interaction of learner with the environment extended far beyond the scope of that considered by previous research or this study as it was proposed. Situated learner engagement includes not just the learning environment immediately evident during delivery but includes all of the remaining operational context of the training, both for the learner and the organization.

> *...the interaction of learner with the environment extended far beyond the scope of that considered by previous research...*

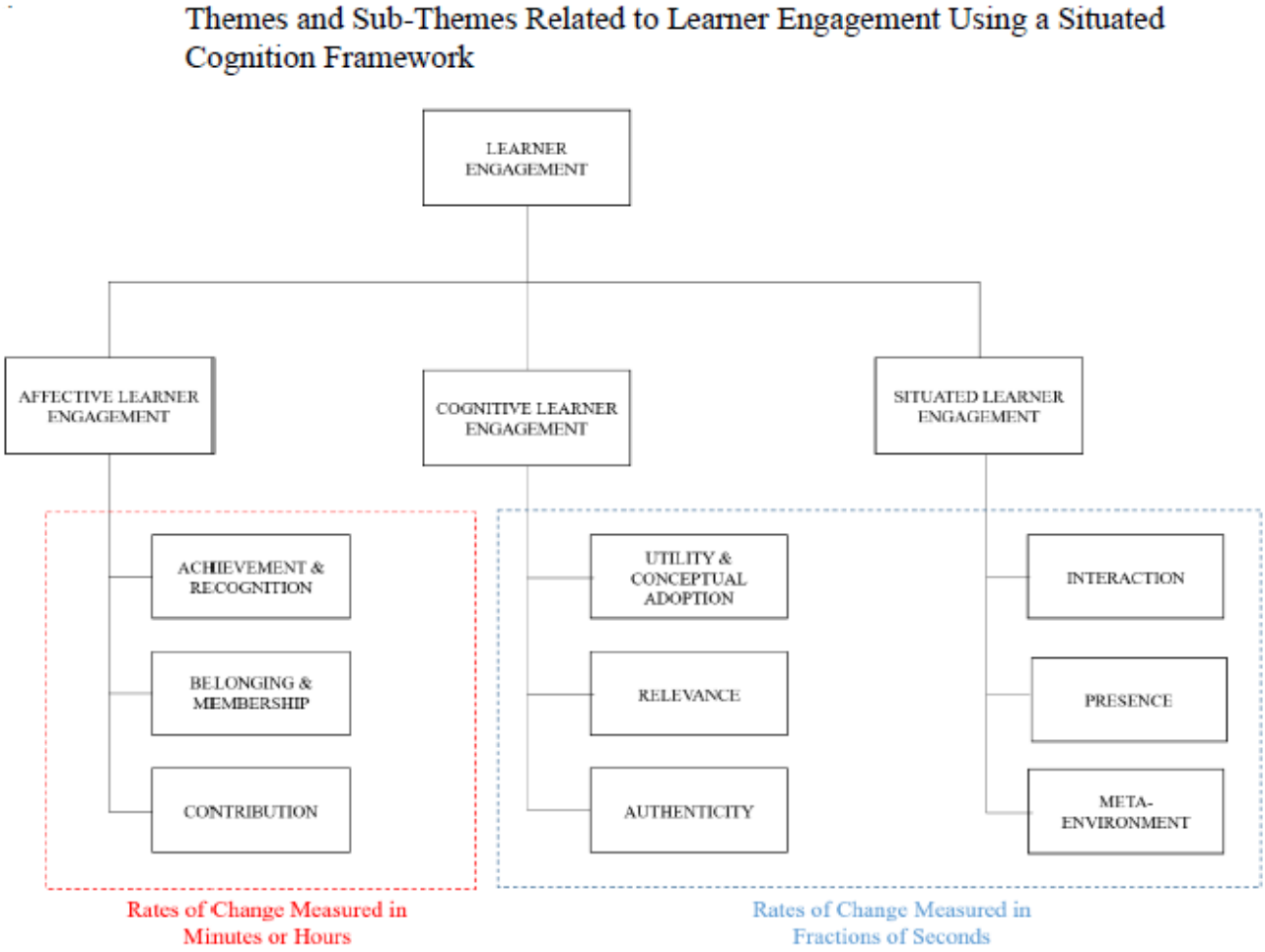

Figure 1.1: Rates of change (or dyanmism) based on the qualitative data associated with a recurring theme that learner engagment changed over time

The research developed the learner engagement construct based on a comprehensive cognitive framework, qualitative inquiry, and applied extensive psychometric procedures for instrument development. The learner engagement model that emerged from this study has two key implications. First, no one factor of learner engagement is sufficient in and of itself to result in an engaged learner. This has profound importance for both instructional design and delivery. There are myriad new learning environments; it is critical to engaging the learner that they be placed in an effective and supportive learning environment and receive relevant and authentic instructional content. While this may

seem self-evident, discussions with the programmatic stakeholders indicated that those considerations were secondary or ignored in creating an instructional program for organizational development.

The second implication of this model is that the perception of the learner of *both* the training program *and* the alignment of intent between the learner and the instructional program being delivered is critical to learner engagement. This characteristic of the model is what distinguishes learner engagement from motivation or intellectual interest, as engagement is dynamic within the learning experience. Alignment of instructional intent (stemming from an organizational need or objective) with that of the learner is the responsibility of both the designer and the vehicle for instructional delivery; no stakeholder or instructor interviewed expressed any experience in explicitly attempting to do so during an instructional delivery. This reflects the modern trend of shifting responsibility for learning and professional development from the organization to the individual (Kamoche et al., 2011; Pang et al., 2009). In such cases, learners are expected to align themselves with the perceived intent of the instructional program with little or no guidance, resulting in some likelihood that some learners will get it wrong and consequently not engage with the program.

This characteristic of the model is what distinguishes learner engagement from motivation or intellectual interest, as engagement is dynamic within the learning experience.

THE EFFECTS OF ENGAGEMENT

The most notable limitation of our initial research was the nature of instrumentation: it presents challenges as a summative measure and in its ability to effectively measure the dynamic learner engagement construct as defined. Learner engagement is best described as resulting from the interaction of a particular learner within a particular learning environment—it changes over time within that

learning experience (indeed, some measures within the learner engagement model can change in fractions of a second (*Figure 1.1*). The original instrument, designed for summative use, provides no insight into the moment-to-moment changes of the construct during the learning experience. Saunders and Gero (2004), Rømer (2002), and related research indicate that the rate of such changes is high, with individual factors changing multiple times per second as learner perception focuses on different elements within the learning environment. This instrument, instead, is a first step to addressing the actual measurement of learner engagement *as it happens* by establishing scales for the construct. Along with this is detailing some observable criteria that can be investigated more thoroughly for real-time measurement through learner analytics and more advanced analysis methods. Both the relevant observable criteria and structurally valid subscales were developed as part of the instrument development process. Thus, despite its limitations, the instrument is a foundational step in developing a measurement protocol of engagement within learning environments.

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Our subsequent research sought to establish correlative relationships between specific behaviors, artifacts, and interactions and the latent factors of the learner engagement construct, to permit *in situ* learner engagement. The focus on this stage of the research was on the changes in both the learner and the learning environment over time. We particularly wanted to evaluate the relationship between engagement and learner outcome. To that end we included techniques and measures to provide a more complete representation of all aspects of the fully defined learner engagement construct and variety of possible learning environments (online live, online self-

paced, live classroom-seminar, live classroom–lecture, simulation, VR/AR, etc.) through purposeful sampling. We developed a taxonomy of artifacts and observable criteria to look beyond the simple "did-or-did-not" behavioral approach in favor of one looking at a more sophisticated assessment of change. The analysis sought to assess the contextualized changes and *why they occurred* based on the learner-environment interaction in order to determine the engagement of a learner (Rømer, 2002). We implemented, in various instructional contexts, refined measures of data collection during instructional delivery to measure learner engagement more robustly including neurological measures of learner, eyesight tracking, response latency, dialogic analysis of conversations, and advanced learner analytics for attention tracking via relevant and available environmental affordances. In turn, relationships between these observable data and the less-visible factors of the learner engagement construct were developed and used to develop *ad hoc* measures of learner engagement.

In reviewing research related to learner engagement, it is almost universally true that the researchers in those studies assume that learner engagement results in enhanced learner outcomes. In some cases, such an assumption viewed contextually is tautologically valid because of the limited definition of engagement adopted in the study (e.g., engagement is measured by reduction in attrition, Angelino, Williams & Natvig, 2007). In other research the study methodology was too summative in nature to examine the effects of learner engagement on outcomes in a meaningful time domain (e.g., GPA outcomes against self-reported "levels of engagement", Carini, Kuh & Klein, 2006). The overarching interest is not just immediate outcome but the learner

> *...it is almost universally true that the researchers in those studies assume that learner engagement results in enhanced learner outcomes.*

trajectory of retention, application over time (aka "buy in"), and attainment of the organizational objectives the training is meant to attain. There are two profound and critical issues to this assumption that must be investigated by research derived from this study:

1. There is no established causal relationship between environment, content domain, instructional treatment method, and learner outcome (*What affects learner engagement?*); and

2. There is no established causal relationship between learner engagement and learner outcome (*What are the effects of learner engagement?*).

Applying our summative instrument and extensive data on related observable data and learner analytics, we sought to evaluate the relationships between learning environment, content domain, instructional treatment method, and learner engagement. These series of studies are ongoing; they focus on the dynamics of individual learner engagement with the particularized learning environment, content domain, and treatment and to determine to what extent engagement affects individual and aggregate cohort performance. In our current research, the learner engagement factors are measured throughout the learning experience and used to model learner performance as a function of engagement within the learning environment.

In this way we are seeking to evaluate the effect of learner engagement on learner outcome/trajectory. With controls in place relating to the learning environment, content domain, and treatment methodology, we are collecting data to measure learner engagement through an instructional experience and assess the effects of variance in learner engagement on outcome (Shadish, Cook & Campbell, 2002). Early evidence of a set of adult learners (N=328) suggests that learners demonstrating behaviors and interactions correlated to high positive scores on all three subscales (affective, cognitive, and environmental) achieve outcomes that are statistically better than those that are not. There is a high correlation between engagement and outcome as

measured by an established rubric. Learner performance and learner engagement were found to be highly positively correlated, $r(326) = .96$, $p < .001$. It must be noted that there is no claim of a causal relationship in the data, although that is the ultimate goal of this line of research. Intentional manipulation of a learner audience to adjust learner engagement is fraught with some potential ethical issues; it must be approached once the effects of varied engagement can be anticipated with appropriate remediation capabilities in place. Once the effects of learner engagement are well understood, the model can be used predictively to develop an expansive instructional framework—one that seeks to optimize instructional outcomes based on the anticipated effects learner engagement. The potential impact of a meaningfully measurable learner engagement protocol cannot be understated in the context of learning and development. Optimized instructional treatments and tailored individualized learning would foster a workforce learning-centric culture that would save industry extensive resources, enhance worker productivity, and provide a means for advancement currently denied to those who have found professional training wanting.

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ABOUT MANDATORY TRAINING

A theme that emerged had to do with relevance: the alignment of content with learner intentionality. This theme most frequently emerged when the question of whether training was mandated or voluntary/self-selected by the learner. This theme can be characterized as an alignment of intent between that of the instructional program

design (as set forth by the program sponsor) and that of the learner (Biggs, 1996). Participants interviewed in this study noted much higher dissatisfaction with mandatory training not directly useful or applicable to them as learners in their role, with one participant noting "most mandatory company-wide training is a waste of time". The concepts underlying this theme are not simple affective responses to poorly designed training; rather, this theme derives from an alignment between the instructional program and the learner's intended trajectory. If a learner intends to learn something, develop a new skill, etc., the key question under this theme is whether the instructional program provides the means to fulfill that intent. The perceived lack of relevance or utility is really a lack of alignment between what the organization and the learner want to accomplish in the training. Mandatory training was found to be a significant predictor of engagement under the theoretical model of the study. There was a high likelihood that learners who identified a learning experience for which attendance/completion was mandatory (by an employer, regulator, etc.) did not engage with the learning experience. In particular, emotional and cognitive engagement were very unlikely in mandated learning. The data suggest that you can be a great instructor, with great content, facilitate every aspect of the learning environment, respond to all questions, chats, etc., and generally be an all-star instructor, and the learners (at least within the sampled population) were not likely to be engaged. Specifics of the findings can be found in the appendix. (For additional information on the challenges of mandatory training, see the September 2020 Learning Guild research report, ***What Works, and What Doesn't, in Diversity Training***.)

THOUGHTS ON THE DELIVERY OF INSTRUCTION IN THE VIRTUAL CLASSROOM: ENGAGEMENT MATTERS

The global pandemic in 2020 forced many businesses into new learning environments and strategies to address existing and emergent instructional needs. Many of the solutions adopted were expedient and met the short-term goal of getting people online together but were less than optimal in actual learner outcome. While virtual instructional delivery adoption was certainly accelerated by the pandemic, it should now be the focus of learning and development professionals to enhance their instructional practice to revisit their approach and include a variety of instructional strategies that are effective and engaging for the learner— particularly in the virtual classroom—as it appears the impacts of the pandemic are still in effect around the globe. It seems likely that sometime in the near term the pandemic will become endemic, and we as an industry need to learn to re-focus on instructional solutions that address the learners needs longer term; not just get training done, but get it done efficiently and effectively. The framework developed in this research (*Figure 1.1*) provides a means to do that and provides a meaningful and measurable relationship between the instructional treatment, learner outcome, and organizational objective.

If we think about the learner engagement as a desired outcome within the learning experience, the instructional designer and instructional team roles can be thought of as instantiating and sustaining engagement throughout the experience. Everything begins with the design. Key strategic decisions are made in the instructional design and development process that have far-reaching consequences in delivery—this is not a new concept but the consequence of poorly made decisions early in the design process are amplified in the virtual classroom because of the lack of mitigating circumstances (a strong facilitator can make a lot of problems go away). If designers reflect on the need to engage learners, what they're really trying to do is

align the intent of the learner with that of the instruction. A failure to do so vastly reduces the chances of learner engagement and will be perceived as violating a basic adult learning principle (Knowles, 1980). The fact of the matter is that relevance is perceived, not an absolute fact: the relevance and applicability under Knowles' andragogical model can better be thought of as a consequence of alignment; of learner intent with desired learning outcome in the instructional program. This is an alignment that the designer can build into the training experience and the instructional team make clear to the learner. Such alignment promotes engagement along all three factors to some extent, most notable in the intellectual factor.

The instructional team of facilitator and producer should work within the instructional experience to manage interaction between individual learners, lead the instructional experience for learners, promote engagement within the subject matter through discourse and interaction, and manage individual needs within the environment. Leaner engagement is profoundly dynamic—it's easy to "lose" a learner if there's a misstep, intentional or not. The challenge in virtual delivery environments is that missteps are easier to make, so extensive care should be taken to ensure all learners are capable of interacting and provided an opportunity to engage with all elements of the learning environment (their peers, the facilitator, and the subject matter being discussed), and sustain the perceived relationship between the learner and the desired outcome of the instruction.

APPENDIX

SOME ADDITIONAL NOTES ON THE LEARNER AND PERCEPTIONS OF TRAINING

The initial stage of the research included participants (N=600) across 28 industry sectors and a representative population of all age demographics in the U.S. workforce. Analysis was conducted of the composite score means of learner engagement by industry sector to assess where the differences in means were statistically significant using a one-way ANOVA with a Bonferroni adjusted alpha of .0167 (i.e., typical p-value of significance /number of groups = .05 / 3 = .0167). The results of ANOVA indicated that despite the variability in industry sector, there was no significant difference in means for affective learner engagement, cognitive learner engagement, or situated learner engagement across all industry sectors.

One-way ANOVA for testing differences in learner engagement factors means across industry sector

Variable		*Sum of Squares*	*df*	*Mean Square*	*F*	*p*
ALE	Between Groups	11.16	15	0.74	0.73	0.757
	Within Groups	290.75	284	1.02		
	Total	301.91	299			
CLE	Between Groups	5.87	15	0.39	0.49	0.941
	Within Groups	223.69	284	0.79		
	Total	229.56	299			
SLE	Between Groups	11.57	15	0.77	0.78	0.703
	Within Groups	281.91	284	0.99		
	Total	293.48	299			

Lastly, with the addition of two additional items on the CFA instrument, additional ANOVA analysis was done to evaluate whether the mandatory nature of the instructional program was predictive of the engagement of the learner under the theoretical model, a point made frequently during the qualitative inquiry.

Mandatory attendance as a predictor of learner engagement under the theoretical model

Variable		*Sum of Squares*	*df*	*Mean Square*	*F*	*p*
ALE	Between Groups	21.68	1	21.68	23.05	< .001
	Within Groups	280.23	298	0.94		
	Total	301.91	299			
CLE	Between Groups	10.73	1	10.73	14.61	< .001
	Within Groups	218.84	298	0.73		
	Total	229.57	299			
SLE	Between Groups	3.76	1	3.76	3.87	0.05
	Within Groups	289.71	298	0.97		
	Total	293.47	299			

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