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Competency Learning for Tomorrow's Process Safety Leaders

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Abstract

The role and benefits of online learning for academia (personal) and organizations (corporate) have increased in popularity and have demonstrated higher levels of learner effectiveness and efficiency, surpassing and antiquating in-person training programs. In this paper, a case study will examine how an online learning management system (LMS) with education structured as building blocks increases overall competency specific to a particular skill set. The success of this LMS is not limited to competency development and incremental learning. A key role begins with the LMS “content creators.” Together these concepts bring new meaning to lessons learned and cultivate a proactive, future learning environment that will advance the next generation of process safety leaders.

Keywords: Safety Education and Training, Training, Selection and Development of Training Program, Process Safety Competency, Competency Development, Leadership and Training

1. Introduction

Competency development and training reached new heights worldwide during the recent COVID-19 pandemic as organizations were forced to come to a halt. Business and life as we knew it changed almost overnight. This change also shifted in-person learning and training online. The demand for online learning. OLEs – online learning environments – became an everyday reality. Millions of workers and learners were engaged in remote or virtual learning delivered by video conferencing platforms, such as Zoom, MS Teams, WebEx, or web-based eLearning applications or software. eLearning dominated due to the ease of delivery and management made possible by the learning management system, or LMS, technology. The role and benefits of eLearning demonstrated higher levels of learner effectiveness and efficiency, surpassing and antiquating in-person training programs, yielding confidence, and setting the stage for a “new normal”. The lasting impact of this shift and effectiveness of online learning is summarized well by The World Economic Forum: “Research suggests that online learning has been shown to increase retention of information, and take less time, meaning the changes coronavirus have caused might be here to stay.”¹

Transforming workplace safety into process safety competency is critical to the processing industry as numerous historical catastrophes have been linked to a lack of competency. Proficient development, evaluation, and management of core competencies are central to enriching process safety leadership and preventing future incidents. A case study using an LMS developed for the process safety industry examines how education structured as building blocks increases overall competency specific to a particular skill set. The success of this LMS is not limited to competency development and incremental learning. A key component begins with the LMS “content creators.” Together these concepts bring new meaning to lessons learned and cultivate a proactive, future learning environment from which the next generation of process safety leaders will evolve.

2. The Case for Competency Development

While there is no single definition of process safety competency, professional engineering institutes agree that it is imperative to develop and maintain. Complex process practices and automation require effective competency development programs to minimize risks and mitigate incidents. In general, process safety competency can be described as the development of a set of skills and level of knowledge to perform tasks and overcome challenges to ensure safe working environments and operations.

The American Institute for Chemical Engineers (AIChE) Center for Chemical Process Safety (CCPS) considers building and sustaining competency as best practices and fundamental to a risk-based strategy. Process Safety Competency is identified as one of five key elements supporting the Risk-Based Process Safety (RBPS) pillar of “commitment to process safety.”² Competency

must be developed through a combination of processes, practices, and training, and sustained and reinforced at every organizational level to reduce risk.

Learning and development take a leading role in this regard. The Institution of Chemical Engineers (IChemE) Safety Centre (ISC) supports this positioning and provides valuable insight. *ISC Process Safety Competency Guidance* (2019) states that the following three areas can address competence development:

1. Learning through experience
2. Learning through others
3. Learning through education³

A combination of these forms of learning denotes active, interrelated learning. The goal is for learning to be accessible, continuous, and applicable for workers and teams to develop and maintain desirable or targeted competency levels.⁴ CCPS also emphasizes that learning needs to be structured to “retain people-based knowledge” and captured in succession planning.⁵ Programs must be analyzed to evaluate competency and tracked to identify gaps. Competency gaps are effectively addressed by undertaking developmental activities that include formal education such as training.⁶

3. The 411 on Learning Management Systems

The landscape of online learning has evolved tremendously in recent years, and in part of this evolutionary nature, so have the different definitions. Understanding the different forms of online learning is important as their implications and impacts are not equal. Online learning in “real-time” is known as remote or virtual learning and is delivered by video conferencing. In contrast, eLearning – the focus of this paper – is web-based learning paced by the learner/user that is delivered by the technology of an LMS. Because of the architectural framework of an LMS, eLearning is learner-centric as the learner not only paces the speed of learning but also manages the duration, whereas with virtual or remote OLEs the learner is more passive.

eLearning was already on the rise pre-pandemic, but its acclaim and acceptance was increased as a direct result of the 2020 COVID-19 pandemic. There are many benefits for the learner and organization. Among the most significant, addressed in the case study, are the impact of engagement, retention, and costs. Considering the rapid growth, its effectiveness, and successful integration, most agree that eLearning will continue transforming training and education.

An LMS is a powerful web-based software application that reinforces eLearning for training, compliance, and development. Learning management systems matured from eLearning, and as technology advances, the LMS will influence trends and designs for eLearning. An LMS is comprised of two interfaces: user/learner and admin. The dual functionality supports all learning

aspects from management to learning and analysis to be handled from one system. The acronym LMS stands for:

- L = Learning: Delivers training courses and programs
- M = Management: Organization of content/courses and learners with automation features
- S = System: Learning and management occur on a single, central system

Learning and administration can typically be accessed from desktop and mobile devices. These elements combined produce a sustainable ecosystem that enables users to learn from anywhere, anytime. An LMS is best known for its efficiency. It streamlines the management, delivery, and measurement of an organization's eLearning program. Additionally, it supplies the technical framework for learners to set the pace and speed to drive an acceleration of competency development. Furthermore, it has the technical capabilities to personalize learning, track progress, and assess learning levels to measure competency. Our case study demonstrates that the Process Safety Learning® LMS encompasses all of this, promoting competency development and leaderful practices, ultimately strengthening our industry.

4. Case Study: Process Safety Learning® (PSL)

Process Safety Learning® (PSL) is an LMS developed by and for process safety professionals for competency development. PSL is rooted in incremental learning, otherwise known as microlearning, where training is organized into modules. Content includes streamed videos followed by an assessment to aid comprehension of competencies and gain certifications incrementally. Automation features make learning and progress management easy, and PSL contains a full suite of metrics and KPIs. It has been our experience, internally as well as working with clients, that PSL is an effective learning resource providing ongoing benefits to both learners and the organization. This section focuses on how an LMS positively impacts the process, plan, pace, and progress of competency development.

4.1 Component #1 – Process: Incremental Approach to Learning

Edward Thorndike is considered the first scholar to study the learning process. His research on behaviorism and learning paved the way for modern educational psychology. In the 1920s, he published ground-breaking studies on the theory of connectionism, suggesting that “learning is incremental.”⁷

His theory was derived from the development of intelligence tests on humans and animals and their ability to distinguish between learning new information compared to already acquired knowledge. Hence learning depended on the number of trials or opportunities, and as the number of performances increased, so too did the learning because these trials or opportunities informed it of performance.⁸ Furthermore, his work demonstrated that forming connections was key to

learning. Association of proper responses through performance strengthens connections, whereas weak results or improper responses could break or dissolve the connections.^{9,10} This became known as the concept of reinforcement, and Thorndike recognized its impact on long-term comprehension, meaning successful active learning.^{11,12}

PSL embraces an incremental approach to learning to support effective competency development. Training is organized into modules. A learning module is a fundamental building block within PSL. They allow learners to absorb material at their own pace and incrementally build competencies within any topic. Modules have a consistent structure:

- Each module is typically 10-25 minutes long with clearly defined topics
- Measurable objectives are outlined at the beginning and summarized at the end of the video training
- Every module includes an assessment

Each module is a layer of knowledge to an overall topic, similar to the concept of scaffolding. A learner must first “master” the basics and build a foundational understanding before moving to the next module. Modules are classified as beginner, intermediate, or advanced levels. A group of modules, commonly known as a course, provides the full view of the overall topic. Successful completion of a set of building block topics or a series of modules successfully earns certifications. Learners advance their knowledge and skills module by module to build competency and achieve their learning or training goals. Moreover, learners receive certification incrementally. After module requirements are successfully met, the learner earns the allotted Continuing Education Credits (CEUs) and/or Professional Development Hours (PDHs) and a certificate of completion.

Learning is reinforced by an assessment that accompanies every PSL module. The assessments reinforce content shared within the training videos and use a mix of multiple-choice and true/false formats. In accordance with International Accreditors for Continuing Education and Training Accreditation (IACET), the purpose of PSL’s assessments is to bolster absorption of the learning objectives. Additional reinforcement of learning is accomplished by refresher training, another important aspect to process safety competency. Content is updated annually or as information and regulations change to ensure accuracy.

4.2 Component #2 – Plan: Microlearning and Personalized Learning

Modules are designed to deliver information online in small amounts, often marketed as delivering “bite-sized” information. Bite-sized content makes training easy, accessible, and adaptable to demanding schedules and different learning styles. This strategy is known as microlearning and is unique to eLearning programs. Microlearning also embraces our digital environment and subsequently lower attention spans by tailoring training into short segments, successfully keeping learners engaged. In recent years, research on its effectiveness has intensified. A quick internet

search yields hundreds of articles dedicated to this topic, discussing learner and organizational benefits. Here we summarize the major takeaways:

- Up to 50% of stand-alone classroom training is forgotten, whereas microlearning supports long-term retention as much as 80% due to delivering digestible, focused content in short time intervals¹³
- Reduces training and development costs by up to 50% compared to traditional forms of learning¹⁴
- Accelerates the speed of development by 300%¹⁵

Overall, PSL modules are focused and concise to keep information digestible, supporting learner intake and retention.

The technology of an LMS also enables the personalization of learning journeys or paths. A unique advantage of the PSL learning module approach is that its module structure facilitates personalized training to master competencies. Because microlearning is highly focused on a single topic, learners can quickly fill or improve their performance gaps with modules.

For example, large groups of modules at specific skill levels can form certification tracks specific to a particular role or department to ensure the learning is meaningful and relevant. As the training progresses, training leaders or managers can assign specific modules to bridge a gap or to make the training more relevant to a specific learner's needs. Similarly, if a module or set of modules is not relevant to a specific team, it can be unassigned or adapted to another focus (assignment of other modules). This assignment of specific or additional material to create more personalized learning is scalable with an LMS, enhancing learning confidence and overall experience. Thereby, the LMS is effective in formulating and implementing succession planning strategies.

4.3 Component #3 – Pace: Learner-Centric Benefits

A key advantage to eLearning is the learner-centric nature as stated earlier in this paper. Its flexibility allows a wide range of personal learning needs to be satisfied, meeting the increased demand for flexible work environments and maximizing development. Learners are empowered to set the pace according to their needs or preferences, contributing to the acceleration of competence. They determine the speed, duration, and when to learn, and research has shown these learners are more focused and engaged. Because of this empowerment, learning isn't passive; it is participatory and active.

The highlighted research on the benefits of microlearning already supported that this learner-centric approach results in a greater knowledge transfer. Coupling that with the learner benefits of engagement and flexibility from an LMS, we believe this learning acceleration will improve the

quality of competencies and increase the speed and quality of leadership development, positively impacting process safety.

4.4 Component #4 – Progress: Management of learners and KPIs

Even the best companies with effective training programs in place or well-defined competency development frameworks and established succession planning face the daunting challenge of managing all the content and learners as well as tracking and assessing progress and results. With an LMS, managing content and learners is easy with a centralized system. Modules can be organized by topic or skill level or arranged into certification tracks. With a simple click of a button, hundreds of learners can be enrolled in courses or tracks. Personalization and succession planning are just as seamless, as admins can assign or un-enroll, enabling learning to be adapted to a department or specific group of employees. For example, an individual or subsets of learners expected to fulfill a vacant leadership role needing supplementary training to improve a core competency or close a performance gap can be easily managed using an LMS.

A top-level LMS like PSL is designed for organizations to use modules as training to support and complement competency frameworks. Many topics cover areas for core competency developed as provided by the ISC guidance. Other company or industry-specific competencies required to perform their core job responsibilities can also be integrated into PSL and tracked like other modules. Individuals are held accountable for completing their training, which is tracked, recorded, and displayed in the admin and learner dashboards. Automatic notifications or reminders to complete training or refresher training is another special feature of the PSL LMS. The system also stores transcripts, which can be shared as needed by the training manager, admin, or individual learner.

The system tracks learner progression and history – and both the admin and the individual learner have access. This functionality allows the admin to view or access individuals and subsets of learners. Another unique aspect of PSL is the competency matrix, which provides a report on the developmental and health of the organization to help determine learning or performance gaps. It can be customized to be reflected as complete/incomplete or as a scoring system format.

The ability to track learning progression and compare it against external safety performance reports provides invaluable insight.

5. Once Upon a Content Creator

A learning plan without good content would simply be a plan. The success of any training or learning program relies on the quality and meaningfulness of its content. How the content comes together within the LMS and who creates it is vital; for PSL, this role is carried out by PSL Content Creators.

AICHE and IChemE have identified the retainment of people-based knowledge as a significant element of competency development. In other disciplines, this is indicative of knowledge sharing. This concept is maximized with PSL due to the role of the Content Creator. Modules are created by subject matter experts (SME) who have in-depth knowledge and experience within the industry. A guiding philosophy of PSL is that the “best” lessons learned result from passionate experts who have lived and gained knowledge from these experiences. They are passionate about sharing their greatest “lessons” with their peers to impact tomorrow’s leaders by passing on their knowledge. They bring meaning to the lessons rather than providing information, and training becomes a collaborative process.

Potential partners and their portfolio of work are carefully reviewed, interviewed, and vetted before contributing to the PSL educational accredited learning library. Content Creators are bound by the standards of the IACET (International Association of Continuing Education Training). ioMosaic is proud to be recognized as an IACET accredited provider. This accreditation provides confidence for learners in the quality of the training and also elevates the professional reputation of the Content Creator. External worldwide partners are continuously sought after to keep learning fresh, varied, and, most importantly, to ensure that it is relevant and meaningful. Every partner creator makes an impact in advancing safety leadership for tomorrow.

6. Clicking it Together – LMS & Content Creator Model: Closer to a 2.0 Learning Organization with PSL

The combination of the technological advantages that the LMS delivers with its dynamic learner-centric OLE that empowers learners and the integration of lessons learned and knowledge sharing from PSL’s content creator model truly moves us closer to achieving a learning organization. According to a landmark article published in the Harvard Business Review a learning organization can be defined as: “An organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights.”¹⁶ A top-level LMS like PSL amplifies knowledge transfer and brings forth the notion of continuous learning.

This notion is found in the technological capability of succession planning, where the learner paths can be melded to meet various objectives from an individual level to organizational-wide and at any time or stage within the learning journey or throughout different times in a learner’s career. Refresher training contributes to a culture of continuous learning. Furthermore, continuous learning is promoted and demonstrated by the role of the Content Creator. There is a rare synergy between the creator and learner where the SME passes on meaningful lessons to the next generation. And the next generation will share forward their lessons learned, and so forth.

Meaning, management, and measurement are the three basic pillars of learning organizations.¹⁷ According to this article, corporations often fail to evolve into learning organizations because two of the three basic ingredients are absent: meaning and measurement. The LMS overcomes the

measurement limitation as demonstrated by its tracking and KPIs reporting to measure and assess learning outcomes. This is even more pronounced by PSL's unique competency matrix that provides insight into learning rates and levels. This also becomes a competitive advantage when considering its business impact on assessment of risk. The second way businesses fail in their potential to become a learning organization is due to a lack of meaningfulness. Meaning is central to the PSL LMS as illustrated by the role of the Content Creators, who are instrumental from the start of this process in making the learning relevant and meaningful to learners. They not only bring meaning to the learnings, but their role within the overall PSL model encourages cross-promotion of continually learning through sharing and passing forward meaningful learnings. Together all these elements work to build and maintain effective competency development programs a reality and foster a new stronger generation of leaders.

7. Conclusion

Sound competency cultivates strong process safety leadership. Effective leadership should value the development of process safety competency, reinforcing this positioning and passing it to the next generation of leaders. eLearning can ignite this process by creating effective training and instilling its relevance in the mindsets of the next generation of professionals as they develop competencies and grow into their roles as leaders. Managing process safety institutional knowledge and competency are challenging. However, with a top-level LMS it is achievable and sustainable as demonstrated by the Process Safety Learning[®] (PSL) case study, which examined the process (incremental learning approach), plan (microlearning and personalized learning journeys), pace (learner-centric), and progress (learning management and KPIs) components of the PSL LMS.

This dynamic OLE empowers learners to accelerate competencies, promoting continuous learning where organizations can take steps forward to become viable learning organizations. It strengthens learner intake, boosting engagement and retention. Its flexibility to tailor to learning preferences and objectives makes succession planning achievable, an enormous advantage for process safety organizations. The synergy between content creators and learners promotes knowledge-sharing training, enhancing the overall meaning and effectiveness. Clicking these elements together, the future for competency learning is promising as the LMS invigorates eLearning into the organizational culture to advance the next generation of process safety leaders.

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