Elevating Competency Frameworks through eLearning Solutions: Lessons Learned from COVID & Beyond

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eLearning and Learning Management Systems (LMS) were taken to new heights in the wake of the COVID-19 pandemic as training shifted online across the globe. This shift altered how industries viewed risk and hazard management and posed new challenges for training and compliance. Competency development is fundamental to process safety, and the recent pandemic amplified the importance of training and development in building and maintaining competency frameworks quickly. It also identified the leap in value for integrating technology to improve existing work practices. This paper examines how an LMS champions competency-based training, demonstrating its benefits in building and managing succession planning to improve overall safety performance.

The IChemE Safety Centre (ISC) devised a notable roadmap plan, Process Safety Competency Guidance (2018), to help organizations establish process safety competency and develop a framework to maintain and assess competency. This guidance recommends six practical steps to support the implementation of a framework or model. Formal training with planned learning track programs and competency mapping is key to assessing its competency. A competency framework like the one developed by ISC can be further enhanced when using an LMS.

A competency-based training approach provides learners/employees with an understanding of which skills and knowledge are needed to carry out their jobs, record progression, and offers visible status tracking of a learning path for themselves and management. An LMS is a software application designed as an eLearning ecosystem to handle all aspects from delivery, management, and assessment and reporting. Moreover, a quality LMS enables individuals and organizations to identify competency knowledge gaps providing a realistic understanding of how and where to improve future training development. Several case studies will highlight these benefits “before” and “after” the pandemic to offer invaluable insight from lessons learned. Applying the ISC’s six recommended steps for Development Activities with a quality LMS designed for process safety strengthens overall competency development.

Keywords: Competency Development, Process Safety Competency, Process Safety Training, Lessons Learned

Introduction

Competency development is fundamental and key to proper process safety. The recent COVID-19 pandemic amplified the importance of training and development not only in building, but also in maintaining competency frameworks quickly. Historic work habits and routines shifted dramatically, altering how industries viewed risk and hazard management which posed new challenges for training and compliance. It set off a chain reaction for questions like: What is an adequate level of competence to carry out a core job function now that the job status quo has changed? What was now meant by being competent? And when the unprecedented happens, what does it mean to be prepared? The immediate and long-term outlook for professional learning and training was disrupted.

Interestingly, according to many experts, a competency crisis was already on the horizontal. Technological advancements and other major changes, including but not limited to employee expectations, labor demographics, and evolving regulatory changes, contributed to the need to upskill and reskill the global workforce, and were calling for a demand for new competencies. A Deloitte report on the current state of the modern workplace highlighted the World Economic Forum’s declaration that by 2030 more than 1 billion workers globally will need to be reskilled.[i] The pandemic brought this to the inadvertent forefront by levying a transformation of how learning can be delivered. This was the direct result of the fact that most working environments morphed into online learning environments, known as an OLE, or a hybrid format. Many organizations faced a “new normal”: a blurred work/learning digital environment that resulted in reduced space between “learning and work.” Thus, highlighting the need for companies to invest in more digital technologies.

eLearning and Learning Management Systems (LMS) were taken to new heights in the wake of this pandemic as training shifted online for everyone across the globe. An LMS is designed as an eLearning ecosystem to handle all aspects of delivery, management, assessment, and reporting. Moreover, a quality LMS enables individuals and organizations to identify competency knowledge gaps providing a realistic understanding of how and where to improve current and future training development.

The high adoption rate of OLEs and learning tools like an LMS identified the leap in value for integrating technology to improve existing work practices and avert a looming crisis. This paper examines how an LMS champions competency-based training, demonstrating its benefits in building and managing succession planning to propel overall safety performance. It will be discussed largely within the context of the IChemE Safety Centre (ISC) notable roadmap plan, Process Safety Competency Guidance (2018), and its recommended six practical steps to support the implementation of a framework or model. Several case studies will highlight the benefits “before” and “after” the pandemic offering key insight from lessons learned. Applying the ISC’s steps for Development Activities with a quality LMS designed for process safety strengthens overall competency development.

Background

An LMS is a software or web-based application that supports eLearning for training, compliance, and development. Learning management systems originated from eLearning, which is web-based learning where the acquisition of knowledge is paced by the learner and delivered via the LMS. Technological advancements of the LMS influence the design and learner experience but also impact the output, as will be described in this paper. eLearning is commonly mistaken with other forms of online learning and training – such as remote or virtual learning, where learning is delivered via video conference, typically facilitator-led in "real-time". Unlike other online learning forms, eLearning is learner-centric. Learning happens anytime, anywhere – removed from conventional notions of scheduled classroom/training time and physical space – at a speed and duration determined by the user/learner.

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, making it robust learning & development (LD) ecosystem. The acronym LMS represents:

- 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

Desktop and mobile devices support learning and administration. An LMS is best known for its efficiency. It streamlines the management and delivery of training and provides the technical framework for learners to accelerate competency development and much more, soon to be discussed.

The effectiveness of the LMS and how it can benefit competency-based training will be examined using Process Safety Learning®, known simply as PSL, an LMS developed by and for process safety professionals. PSL is rooted in incremental learning, where 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, incrementally build competencies within any topic and earn certifications. Each module is focused and concise, adding one aspect or layer of knowledge to an overall topic. Modules have a consistent structure: Content is streamed videos, and an assessment reinforces learning objectives to aid comprehension at the end of the module. This approach is also known as microlearning and is designed to support learner intake, boost engagement, and maximize knowledge transfer and long-term retention. This paper intends to share best practices and novel learnings to support the advancement of overall process safety.

Competency Development Framework

Defining competency and its role in training

Challenges in the process safety domain are widespread, from a simple pressure relief device calculation to the implementation of HAZOP techniques, or to complex dynamic modelling for explosions, and so forth. Maintaining competency is equally important for all individuals, groups, or companies dealing with various process facilities and regulatory organizations. Amplified by the recent worldwide pandemic, competencies are more vital now for maintaining a good process safety culture.

There is no universal definition of competency, or for that matter, there is no singular, prevailing definition of process safety competency. The Cambridge dictionary defines competence as "the ability to do something well; an important skill that is needed to do a job".[ii] Oxford reference's quick guide draws on the human management perspective defining competency as: "A competency-based approach to managing people focuses on the skills and talents needed to be able to perform a particular task to a certain standard".[iii]

Despite the lack of a 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, emphasis is on defining process safety competency 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 European Process Safety Center defines Process Safety Competency (PSC) as the set of capacities, including skills, experience, knowledge, and willingness to follow the rules and procedures that provides the necessary abilities to enable individuals to perform specific tasks. Whereas the American Institute for Chemical Engineers (AIChE) Center for Chemical Process Safety (CCPS) maintains building and sustaining competency are 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."[iv] Individual competency is developed through a combination of processes, practices, and training. It is crucial to sustain and reinforce competency at every organizational level to reduce risk.

The Institution of Chemical Engineers (IChemE) Safety Centre (ISC) devised a notable roadmap, Process Safety Competency Guidance (2018), to develop a framework to maintain and assess competency. This guidance recommends six practical steps to support the implementation and establishment of a competency management system, summarized as the following:

1	Determination of required competency level
2	Alignment with process safety competency criteria
3	Alignment with process safety organization roles

4	Develops plans to address competency gaps
5	Monitor
6	Review and update

Learning and development have the leading role as the plan focuses on tasks and activities, referred to as development activities, to attain desired competency levels.[v] Development activities are structured into a three-part approach to learning, falling into the guide's Step 4:

1	Learning through experience
2	Learning through others
3	Learning through education[vi]

This cross-functional approach enhances development by promoting 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.[vii] Formal training with planned learning track programs and competency mapping is key to assessing competency. This paper is purposed in the context that steps 1-3 have already been defined and will validate an LMS's increased benefits in steps 4 to 6.

How an LMS catapults competency development

A competency-based training approach provides learners and management with an understanding of which skills and knowledge are needed and offers visible status tracking. An LMS functions as an eLearning ecosystem handling all aspects of learning and administration. A top-quality LMS employs learning strategies that bolster knowledge transfer, and its technology monitors competency levels to identify potential gaps. Competency frameworks and development activities, such as training and formal education, are easily organized and accessible to management and learners from one central location. Once competency levels and criteria are aligned with organizational roles (steps 1-3 of the ISC's guidance), an LMS such as PSL tracks competencies to simplify and improve review and assessment processes, ensuring optimal levels are sustained. Each learner is accountable for completing their training, which is recorded centrally in the LMS. Using PSL as a case study, the remaining steps from the guide, 4-6, will be explored to demonstrate how an LMS can enhance an organization's competency development program.

Step 4 of Plan: Develop plans to address competency gaps

LMS Advantage: Incremental approach and personalized journeys

Learning and retention are maximized through PSL's unique module-based structure. This incremental learning approach, or microlearning, has gained momentum worldwide. Bite-sized content makes training accessible and adaptable to demanding schedules and various learning styles. Research demonstrates that knowledge retention is significantly increased when information is presented regularly and in digestible amounts.[viii] Studies indicate that microlearning can improve long-term retention by up to 80% as opposed to single learning events,[ix] thereby maximizing the effectiveness of corporate training for competency development via an LMS. An incremental approach endorses a continuous learning environment as training is completed module-by-module over time and ongoing to integrate competency and these key development activities as a part of the organization's culture. The PSL incremental approach supports achieving and maintaining desired competency levels by organizing training modules to skill sets to ensure competency mastery from beginner to advance to help minimize gaps.

Technological advancements have empowered the LMS to tailor learning to deliver personalized learning journeys. The LMS offers the flexibility to learn from the home or office using a desktop or mobile device and have the learner manage the pace of learning, but with a module-based structure, the learner also determines how long or how many modules to complete during a sitting. This combined accessibility and flexibility of learning mean the learner is ready to train, which boosts focus and engagement to speed up training and accelerate competency development. According to recent statistics, eLearning typically requires 40-60% less time than traditional in-person learning.[x]

Capabilities of an LMS take personalization to a new level. Its power to automate and customize empowers individual learning journeys and succession plans. Administrative roles within the LMS provide complete access and management of learners. Assigning modules or a combination of modules to as many or as few learners or teams as deemed necessary. Modules can be strategically mapped out and arranged into certification tracks to support core criteria, such as the four ISC-defined competency levels (awareness, basic application, skilled application or proficiency, and mastery or expert) assigned to organizational roles. For example, groups of modules specific to a skill level and/or job role can form a certification track of the ISC core competency topic of asset integrity – or for any of the remaining ISC identified topics – and be assigned to any individual, group(s) or team(s), or even to an entire organization. This certification track progresses from beginner level to more advanced as competencies are developed, ensuring the optimal levels are achieved – and attains consistency among all learners. This is a significant benefit for succession planning since the assurance of consistency within a subset of learners, team, department, etc. curtails vacancy, promotes professional growth, and together fosters leaders.

Because microlearning is highly focused on a single topic, learners quickly fill or improve their performance gaps with modules. Training leaders 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 a set is not relevant to a particular team, it can be tailored to a better fit. This

assignment of specific and/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 to minimize gaps and resolve them.

Step 5 of Plan: Monitor the process safety competency process to determine whether the development activities result in the achievement of the target level of competence

LMS Advantage: Reporting and Key Performing Indicators (KPIs)

The ability to monitor process safety competency process and development activities are automatic with a high-quality LMS. The reporting functionality is another unique benefit when using an LMS, providing the ability to track and monitor individual and organizational competency levels. In PSL, three main reports can be generated within a few clicks: Learner Progress, Learner History, and Competency Matrix. Learner status is tracked from the Learner Progress report that provides an individual, team, or organizational view of the overall training progress and status. It identifies whether a module is completed, in progress (conveyed by percentage), or expired and up for renewal or refresher training. The history report is self-explanatory; it provides a detailed read-out of all the modules completed with timestamps and each learner's CEU and PDH accumulation. These reports are crucial for compliance as they provide a complete snapshot of compulsory training requirements versus completion, and this automation is a value-added (and welcomed relief) by management.

LMS tracking allows one to view and track learning trends in these two reports. For instance, if a small group of front-line operators is failing a particular module on Inspections, Testing, and Preventive Maintenance (ITPM) for asset integrity, this would denote a gap or weakness and calls for the need for development efforts to be addressed here. Instead of rehauling an entire competency map, training plans can be adapted and tailored. More learning modules on asset integrity or other development activities (i.e. completion of on-the-job training or workshops, participating in mentoring, etc.) that can be representative of a module in the LMS can be created and assigned to these learners. This training can be added to the initial track or supplemental activities after completing the initial competency development program. This process with personalization of learning for a team can also be applied to an individual competency map or plan. Management or a training leader can monitor learning history and progress using learner analytics. If a gap or area of weakness is identified, additional training is easily adjusted to help mitigate the limitation and increase competence through an LMS's remarkable ability to personalize learning.

A particular strength of PSL is the competency matrix. The report offers an organizational-wide or at-a-glance view of the developmental health of the organization. This matrix is adaptable and can be organized by teams, departments, the entire organization, or specific groups of individual learners. It can be configured to be reflected as complete/incomplete or as a scoring system format, which will be the focus of this paper. This matrix has a dual role: to measure competency – its development and progression – and to identify competency or learning gaps.

A competency matrix is the optimal tool for measuring organizational competency. It takes the guesswork out of determining the level of competency across the board. It quantifies competency through the creation of benchmarks. A matrix is a visual tool that maps a team's required and available skills and competencies, revealing an organizational-wide or at-a-glance report of the developmental health of the organization. In PSL, this tool analyzes and summarizes the learner's skills and qualifications. Qualifications earned or gained are not limited to training within PSL. The addition of transcripts and certifications gained from other means is easily added and stored. Depending on matrix weight setting, benchmark levels correlate with competence. For example with using points, 500 points may be the benchmark for a basic level of competency, 2000 points for intermediate, and so forth. In addition to the training modules, development activities such as on-the-job workshops, certifications/qualifications, completion of mentoring hours, etc., can be applied and benefit both competency development and succession plans. Flexibility allows modification of the worth or points for each activity as well as the number of points that represent mastery of competency level. The matrix charts current competency levels, which can be analyzed against required or even desired levels. As you can see, this matrix integrates the ISC's four competency levels, scores development activities, aligns them to certification tracks, and assigns them to learners to assess and maintain an organization's overall competency framework.

The goal of the matrix is not only to portray the progress and status of competency development but also to fortify the entire framework by identifying gaps and, in return, improving succession plans. Scores from the matrix reveal skills or learning gaps. Trends of consistently low or lagging scores for a specific ISC core competency topic from a matrix will illuminate a gap. Similarly, a matrix formatted as complete/incomplete quickly exposes gaps, especially if many learners fail or do not complete the required training. Any gaps signify reinforcement of skill(s) and where competency criteria may need to be revisited, and additional development activities are necessary. Furthermore, using this tracking as a comparison against external safety performance reports can target performance gaps providing further guidance on changes needed within competency levels or criteria, or possibly alignment within organizational roles. This matrix becomes a driver for dialogue, emphasizing where additional training or learning support is needed to help organizations continuously improve and achieve their competency and safety goals.

Step 6 of Plan: Review and update the development of activities for each competency topic

LMS Advantage: Fresh content and automated process for renewal or refresh training

An LMS can support step 6 to simplify and speed up the process of updating training by reviewing development activities. Once a review and assessment are completed, updates to learning modules and other electronic resources associated with formal training can easily be disseminated. With a few clicks, changes can be made to update content or change the number or type of modules or certification track needed for learners. A high-quality LMS should employ content updates as quality

assurance to keep information relevant and uniform with current compliance or government regulations. PSL's parent company is an International Association of Continuing Education Training (IACET) Accredited Provider and sets requirements for annual audits. This ensures module content is updated and a high-caliber standard is preserved.

Automatic renewal or refresher notification is a huge advantage of an LMS regarding the organization of training logistics and the management of learners. The PSL LMS is programmed to send automatic notifications when renewal training or refreshers are required, eliminating a large administrative manual overtaking and, more importantly, safeguarding competency levels and compliance training requisites.

Clicking up Competency – LMS Lessons Learned Before & After COVID

Case Study #1

Client: Global leader in polymers, operating in 41 countries, employing 22,000 people worldwide

The client needing a refresher in regulatory compliance reinforcement of company-specific PSM standards requested Process Safety Management (PSM) training pre-COVID. Management sought a multi-geolocation solution that minimized disruptions to operations and could scale to other facilities to support different areas of safety training as needed in the future.

Enhancing competencies and upskilling the team was the overall goal of the training. PSL perfectly accommodated the client's remote needs for multi-language training for over 100 employees in several locations and time zones at their convenience.

When the pandemic hit, the need for this training became even more significant as the work-from-home situation intensified. Learning became the work "event" as the distance between work and learning shortened, and more and more of their staff's work environment became an OLE. The impact of the pandemic prompted the client to revisit policies and better prepare for rapid change and unpredictable circumstances. The client made a management decision to invest in training to make learning and competency development a priority. This decision put into motion a scale-up of their training to include changes to policy and more training on managing hazards and emergency response, including crisis communications and incident investigation, to increase competency in these areas. Management was able to monitor the progress of their teams across the different facilities from their dashboards.

Result: eLearning enriched the accessibility to learning across sites globally and sought to enhance the organization's safety culture and performance. The value add was that the LMS became the learning event that enables work to continue as usual for the employees. The client developed and delivered training that communicated PSM changes to corporate policies quicker and more easily with the LMS. The solution was cost-effective compared to in-person training, even considering translation fees. This scale-up was well received by staff as they felt empowered to better respond to future operational changes caused by a large-scale challenge like a pandemic.

From this case study, two main lessons tied to competency were identified, and both benefitted from the implementation of an LMS:

Lesson Learned #1: New definition of meaning and value of competent worker

The pandemic ushered in global disruption and digital adoption unlike anything seen before, redefining the meaning and value of a competent worker. It instilled a grand, new sense of what defines preparedness, underscoring the importance of upskilling and reskilling. The impact prompted a reconsideration and evaluation of the value of a competent worker for leaders and what it means to be prepared from both a leadership and individual worker perspective, as reflected in case study #1. According to a 2021 LinkedIn Workplace Learning Report, 60% of respondents agree that learning makes them more adaptable and capable of handling challenging circumstances.[xi] From a management perspective, 63% of companies now have learning and development as part of their leadership team, an increase from only 24% at the start of the pandemic.[xii] Thereby, suggesting an evaluated significance of what it means to be prepared and the value of a competent and resilient workforce during unprecedented times, like a pandemic. An LMS helps circumvent the unexpected, as evident from this case study, allowing content development and delivery to be disseminated to sites and their staff without any boundaries. A bonus for the organizations as well as staff was an immediate scale-up of training. It also ignited a need for more personalized learning and better succession planning to ensure preparedness and competency are achieved and sustained, which will be visible in case study #2.

Lesson Learned #2: Reversing the Flow

The most notable impact the pandemic has had on L&D is the new environment of a blurred space between learning and work. Thus, closing the distance between the flow of work and learning. Before the pandemic, the standard for work typically was the worker *goes to* work or takes training. COVID reversed this flow. The urgent need to transition workers to remote work resulted in the coordination of work and learning made possible by technology, giving rise to the OLE. This transformation became a real value-add for this client in case study #1. Before the pandemic, this training was perceived more as an extension of work, whereas a "learning event" became the "new normal" during the pandemic.

Moreover, with the adoption of a new digital working environment and new skills required to cope with the changes and impacts of COVID, including a changed mindset toward learning and development, there is an emphasis on the need to integrate training, learning, and competency at all organizational levels. We believe this shift makes learning and training

more accessible and equitable, as demonstrated by the scale-up from case study #1. An LMS provides more cost-effective opportunities for organizations to evaluate their progress in developing and maintaining staff competencies, benefiting the entire process safety community. Furthermore, a briefing note from the European Centre for the Development of Vocational Training (CEDEFOP) states because of COVID, there needs to be a "focus on the interplay between jobs, work, and learning".[xiii] Digital technologies help bridge this. According to a 2021 report on the pandemic and the future state of learning by Deloitte, the pandemic not only highlighted the need for companies to invest in more digital technologies but in technologies that could support the learning coming to the worker like an LMS[xiv]. One particularly effective strategy with the LMS is employing microlearning, which is short, digestible information as mentioned and is endorsed by PSL. Microlearning can easily be integrated into daily work life, as will be shown next by the client's success in case study #2.

Case Study #2

Client: Chemical manufacturing leader, operating in 75 countries, employing over 60,000 people worldwide

The client reached out after the pandemic to use eLearning as part of their training curriculum. Their workforce at this point was already well adapted to OLEs, and the client sought a flexible learning solution that could integrate into the staff's daily routines. From a management perspective, they sought to enhance succession planning by employing tools to track progression and assess learning outcomes. The client started with one specific course and site to determine ease of integration into the flow of work and daily management.

The transition was smooth, and the client was quick to have the LMS rolled out to others beyond the initial group. Technical and operations staff alike found microlearning via modules to be very straightforward and meaningful, completing a module or two in between tasks or during down-time. Others preferred starting or finishing their day with training. After a near-miss, the client identified a performance gap within one of their sites. It was determined that they needed to adjust succession plans and their competency framework. By examining their framework and the LMS reports, management could pinpoint specific groups that needed further training on a specific topic. By adjusting the training curriculum, additional modules could be created to upskill process engineers needing to improve core competency, closing the performance gap and preventing future incidents. In addition, they chose to reskill other operational workers by personalizing the initial Process Hazards Analysis (PHA) HAZOP training requested. Their training leaders could select modules most relevant to their roles based on skill level. Most recently, the client began focusing on creating certification tracks promoting solid succession planning and proactive leadership among operations. For the client, the LMS became a continuity and continuous learning tool. They were able to assess competency levels and tailor learning for specific objectives. As their needs evolve, the LMS keeps up to meet these changes to sustain competency and circumvent the unexpected.

Result: The LMS became in-house training at its best as the microlearning approach was integrated successfully and effective in resolving and developing competencies without disrupting productivity. The LMS scaled well, and as the organization needs evolved, so did the training and curriculum. The technological capability of the LMS supporting succession planning enabled learner paths to be melded to meet various objectives from an individual level to organizational-wide and at any time or stage – or even after the unforeseeable, made evident in this case study. Personalization and succession planning are equally seamless, enabling learning to be adapted to a department or specific group of an organization. The LMS fulfils vacant leadership roles with training to improve core competency and close performance gaps. Finally, PSL's unique competency matrix provided insight into the learning process, which the client believes provides a competitive advantage when considering its business impact on the assessment of risk.

Lesson Learned #3: Rise of personal learning

As the world becomes more fragmented and globalized, the need for more personalized learning becomes pressing. One size learning or training cannot apply. More than ever, employees need training that is adaptable to schedules and changing environments and needs to be tailored to learning preferences and individual needs. This urgency is even more apparent when considering the emergence of new skills and challenges brought on by the pandemic coupled with changes in technology and business pace. Organizations must perform due diligence to make training meaningful and relevant to leave no workers behind. This becomes significantly more critical when considering the process industry, where inadequate training and competency can have catastrophic consequences, including bodily harm, loss of life, massive physical property, and environmental damages to communities and their surrounding areas.

A 2021 working paper by CEDEFOP found that similar to case study #2, training strategies become more individualized because of the profound "impacts of organizational change induced by the pandemic" that led to 45% of European companies adapting their training to support individual employees and their needs.[xv] Organizations need to pivot to understand personal needs in addition to supporting specialized and specific learning needs as related to work performance. This leading training authority advocates taking a wider perspective on learning to include individual goals, motives, interests, attitudes, and learning preferences.[xvi] The LMS, like PSL, is an advantageous tool that embraces this perspective to deliver learner-centric and personalized learning paths to increase relevancy and competency development success.

Lesson Learned #4: Future is here to stay eLearning

The success of both case studies is representative of the effectiveness of eLearning and suggests a promising future as most evident from the notion of a continuous learning environment in case study #2. This opening statement on eLearning's permanent role is supported by research. The corporate learning market in Europe was valued at 27.05 USD billion in 2019, and is expected to grow to 39.2 USD billion by 2024.[xvii] The driving factors for this growth are the digitalization of learning and the cost-effectiveness of eLearning. According to research by Deloitte this "paradigm shift in the learning landscape" is "here to stay" revealing that this digitalization of learning will continue to make up for between 40% to as much as 90% of

formal organization learning structure.[xviii] The eLearning market share is predicted to experience a compound annual growth rate of 16.35% from 2021 until 2026 with only 34% originating from North America.[xix]

These reports also affirm that adopting microlearning would be a key eLearning trend and is expected to impact learners positively. eLearning architect Dr. Ray Jimenez best summarizes the benefits of micro-courses: reduces development costs by as much as 50% and accelerates learner development by up to 300%.[xx] A top-level LMS like PSL amplifies knowledge transfer to support organizational competency development. It bolsters an eLearning ecosystem by streamlining the management, delivery, and measurement of an organization's eLearning program. Likewise, the LMS supplies the technical framework for learners to set the pace and speed to accelerate and maintain competency development.

Conclusion

Competency development is the cornerstone to process safety. The recent COVID-19 pandemic reinforced its position and the importance of building and maintaining it by catalyzing many new challenges, including a full emergence of a skills crisis. Yet, it also presented an opportunity to improve by applying or integrating technology into these areas to improve existing systems and work practices. As a result, eLearning and LMSs surged due to their effectiveness, efficiency, and accessibility. This paper discussed how an LMS supports particular steps (4-6) of the ISC's guidance on process safety competency. Its incremental approach and ability to personalize learning help to resolve competencies by addressing gaps. The robust reporting monitors competency levels aiding the achievement of desired goals – and also supporting succession planning. Lastly, LMS features such as content deployment and automation of refresher or renewal training support the review and update of development activities to maintain core competencies.

A quality LMS, like Process Safety Learning®, employs microlearning and advanced analytics and evaluates competency frameworks to improve safety performance. It strengthens learner intake, boosting engagement and retention. The flexibility of an LMS allows tailoring to learning preferences and objectives to enhance competency frameworks and make succession planning achievable. Two case studies illustrated these benefits, revealing several novel lessons learned through an LMS implementation before, during, and after the COVID-19 pandemic. Clicking these elements together, an LMS champions sound competency to cultivate a stronger process safety period.

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