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A culture shift: transforming learning at CERN

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Abstract. To accomplish its mission, the European Centre for Nuclear Research (CERN, Switzerland) is committed to the continuous development of its personnel through a systematic and sustained learning culture, that aims at keeping the knowledge and competences of the personnel in line with the evolving needs of the organisation. With this goal in mind, CERN supports learning in its broadest sense and promotes a variety of learning methods. Over the last few years, CERN has focused its efforts on expanding the learning opportunities of its personnel via newly available software and e-learning tools and methodologies, thereby bringing a shift in the learning culture of the organisation. In September 2018, CERN launched a new Learning Management System centralising all learning opportunities in a single platform, the CERN Learning Hub. In addition, new e-learning resources are now widely available to the personnel, including customised internally created e-learnings, an e-library, a commercial e-learning platform for self-paced learning and online surveys (180 feedback tools for CERN managers and leaders). This paper presents the experience gained by CERN in testing and adopting these new e-learning technologies and discusses the future vision for CERN.

1 Introduction

Learning is a key pillar of CERN: to accomplish its mission, CERN needs a highly qualified and motivated personnel, whose knowledge and skills match the job functions and are continuously developed to meet the evolving needs of the organisation [1]. The CERN Learning and Development (LD) group in the Human Resources (HR) department is the focal point for learning at CERN. Its aim is to support learning in its broadest sense, reinforce effectiveness and motivation through learning actions and systematically develop the knowledge, skills as well technical and behavioural competences of its personnel. Towards this goal, the LD group offers a variety of learning activities that are aligned with the CERN competency model [2] in order to support the personnel in building and strengthening their competencies on two main axes: technical and behavioural competencies.

Learning is diverse in its mix of design and delivery methods. It includes formal learning programmes, self-learning, team actions, but can also result from experience, coaching and feedback. So, how do people learn most effectively? According to the 70:20:10 model [3] for learning and development, only 10% of learning happens through formal actions. Most of the development happens through social interactions (20%) and on-the-job experience (70%). Although the actual values measuring how much we learn from on-the-job, social and formal

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sources may continuously evolve in the Internet age, the key concept remains: most learning occurs outside the classroom. It is therefore essential to expand learning beyond its traditional form and today's digital transformation offers enormous opportunities in this direction.

At CERN, approximately 17,000 people are trained every year. Ensuring effective and efficient learning for a such a large and heterogeneous population is a huge challenge and can only be achieved by diversifying and modernising the learning offer. Over the last few years, CERN has focused its efforts on enriching the learning opportunities via newly available software and e-learning tools and methodologies, thereby bringing a shift in the learning culture of the organisation. These new technologies bring three main advantages:

- They optimise available resources and therefore reach a large number of people;
- They offer effective and timely learning such that developmental needs can be addressed at the opportune moment;
- They address individual learning preferences, thus increasing effectiveness.

In this paper we present the latest learning technologies introduced at CERN and illustrate how they address CERN's challenges and enhance learning in the organisation. The new CERN Learning Management System is introduced in Section 2. Sections 3 and 4 describe CERN's first experience with offering online courses and e-books, while section 5 describes a 180 degree feedback tool that is used for the leadership development of managers. Finally, section 6 concludes the paper by summarising the outcome of this technological and cultural evolution and presenting the future vision for CERN.

2 CERN's Learning Management System

CERN introduced a modern learning management system, called Learning Hub, in September 2018. This digital learning platform revolutionised learning at CERN by centralising all learning activities into a single portal and by providing easy access to learning in its broadest sense. The Learning Hub counts today about 30,000 users and provides equitable access to learning to all CERN members of personnel, as well as to external people that perform activities at CERN. Users have access to 400 learning programs, as well as to a variety of events and electronic resources that provide learning opportunities (e-books, e-learning, lectures, schools, community of practice events, etc). This wide range of learning activities is the result of synergies between different learning services at CERN, which include not only the LD group, but also the Safety training group of the Health, Safety and Environmental protection (HSE) unit, and other CERN committees for academic training and schools.

Table 1. Learning Hub key figures, measured as number of users accessing the platform, number of courses available (shown also by learning type) and number of enrollments per year.

CERN Learning Hub	
Users	**30,000**
Courses	**400**
Classroom	329
Online	67
Other	4
Enrollments per year	**> 100,000**

Tables 1 shows some key figures that measure the volume of activities handled via the Learning Hub platform. In addition to browsing the available learning offer and learning

material, users of the Learning Hub can also autonomously manage their learning activities. Thorough the platform, learners can enrol and withdraw from courses, and they can take on-line courses and on-line exams that automatically grant them specific access rights. In addition, a user has access at any time to his/her own learning history and managers can view the learning activities of their team. Through the Learning Hub, the learner therefore becomes the main actor of his/her own learning and gains independence, as well as responsibility for his/her own professional and personal development.

3 E-learning at CERN

E-learnings are integrated in the CERN learning offer. As shown in Table 1, more than 60 online courses are available on the Learning Hub. The majority of these e-learnings have been made in-house and address CERN specific topics such as CERN processes and procedures, risks and awareness in CERN safety matters or specific software applications. Over 90% of such courses are mandatory to perform a function or role in within the organisation and are therefore combined with an on-line exam to certify the acquired competencies. Thanks to the integration of the Learning Hub with other CERN applications, specific access rights are automatically granted to the learner upon successful completion of the exam. In addition to e-learnings made in-house, in 2019 CERN introduced a commercial e-learning platform (Udemy [4]) as part of its portfolio. This platform, called Udemy for CERN, is described in more details in the next section.

3.1 Udemy for CERN

Udemy for CERN is an e-learning platform that offers access to more than 3,000 courses on a wide variety of topics, from IT and software, to finance and accounting, project management, languages, leadership and many others. The courses are developed by experts and practitioners on the subject matter. The business model is based on purchasing a yearly licence per user, which gives unlimited access to the full Udemy for CERN portfolio. At CERN licences are assigned on demand, upon hierarchical and budgetary approval. All requests must be motivated by a specific developmental need previously agreed by the learner with the supervisor. This model ensures that the assigned licences are used effectively and helps overcome some of the greatest challenges encountered by learners in the digital age: orienting themselves in the large landscape of opportunities and keeping engaged. By previously identifying, under the guidance of the supervisor, the learning objectives and the most suitable courses to achieve them, learners do not feel disoriented when facing the vast learning offer available. Furthermore, they have high level of engagement to achieve well-defined goals.

The CERN community immediately showed a significant interest in Udemy for CERN: 180 licences were requested in ten months, with the first 100 being sold out in the first three months. Of the 180 learners that were given access to Udemy, 95% enrolled into at least one course and, of these, 96% watched the course. This is a very high level of user adoption for online platforms. Fig. 1 shows some graphics on user activity: the majority of learners started one course only, but there is a significant number of learners who took full advantage of the platform and followed several (sometimes more than 10) courses. The number of hours of video watched varies among learners, with most learners watching between one and ten hours of videos and a few top-learners watching more than 40 hours.

It is also interesting to look at which subjects raised interest among the CERN population. Most of the requests were made for courses in the IT and data science domains, but there was also interest in a wider range of topics, from project management, to finance, communication,

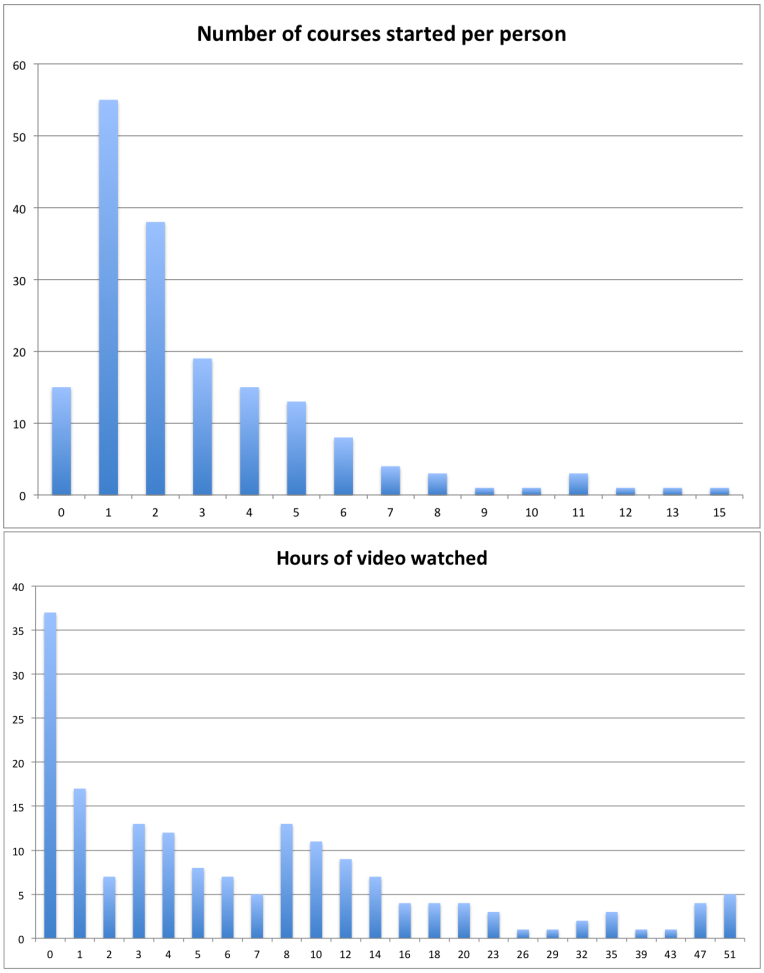

Figure 1. User activity on Udemy for CERN measured as number of courses that have been started per person (top) and cumulated number of hours of video watched per person (bottom). On average, a learner at CERN started three courses and watched ten hours of video.

leadership and languages (see Table 2). The broad learning offer of Udemy for CERN represents one of its key advantages. Classroom courses can only be organised on-site if there is sufficient demand, which means that people may have to wait a long time until a course is available or may have to take the course at an external location. With an online platform, instead, any learner can follow a course when needed in a self-pace and bite-size mode. In addition to covering a wide range of topics, the Udemy for CERN portfolio is continuously updated to include courses on the latest technology.

CERN users have shown a high level of satisfaction with online learning opportunities. At the same time, it is important to highlight that e-learning cannot be a replacement for face-to-face courses. Digitalisation represents an opportunity to enrich the learning offer by proposing a blended approach that complements traditional approach with e-learning. It also allows to address different learning preferences of the population, with some individuals preferring the self-service and self-pace mode, while others favouring in-class learning.

Table 2. Usage of Udemy for CERN licences by domain.

Domain	**Fraction of total** (%)
Technical	**82.5**
IT and Data Science	71.2
Software for Office Productivity	5.1
Electronics Engineering	3.4
Electrical Engineering	1.7
Mechanical Engineering	1.1
Technical Management	**11.9**
Project Management and Operations	6.8
Finance and Procurement	3.4
HR and Services	1.7
Communication and Personal Development	**2.3**
Communication	1.7
Personal Development	0.6
Leadership	**1.7**
Language	**1.1**
Safety	**0.6**

4 E-library

In the effort to provide broad access to learning and to enhance learning opportunities, CERN also offers a variety of e-resources beyond instructor-led online courses. In this context, the e-library Bookboon was introduced in 2018. Bookboon provides easy access to just-in-time learning to anyone via a CERN branded platform, which is linked thorough the Learning Hub. Short and precise e-books on a wide-range of topics focusing on behavioural skills can be easily downloaded from the e-library to be consulted offline.

Interestingly the 'hot topics' downloaded by our learners covered personal skills and growth, time management and communication and presentation skills. Since its introduction almost 10,000 books have been downloaded by 932 'unique users'. We have also made the link to the CERN leadership competency model and encourage all our users of face-to-face trainings to continue their learning by accessing this online resource.

5 Online feedback tool for managers

CERN also introduced a tool for providing real-time feedback to managers. The CERN 180 degree feedback is integrated as part of the leadership programme for new supervisors. Direct reports can provide feedback to their supervisors by completing a questionnaire comprising of fifteen questions based on CERN leadership competencies. The supervisor can then review the results with his/her manager and have 1:1 individual debrief with a coach. The 180 degree feedback is provided via an easily-accessible web-based tool or via a mobile application. The tool allows the users to answer the feedback questionnaire, automatically generates reports and automatic reminders, always ensuring confidentiality.

The online survey tool was introduced at CERN with the aim to encourage a feedback culture and strengthen the leadership skills in the organisation. The goal is to create an environment at CERN in which people managers develop self-awareness on leadership effectiveness, learn about their strengths and focus on areas for developments both personally and professionally.

CERN conducted two pilot programmes in three departments before the official launch. These pilot programmes involved almost 100 participants. After the successful pilots, the feedback tool was integrated as part of the leadership programme. Since late 2019, 18 supervisors have received feedback from up to 120 team members and colleagues. Going forward, it will also be offered to any leader or manager interested in further developing themselves by gaining feedback from their peers and team members.

6 Conclusions

Technology offers a tremendous opportunity to expand learning beyond the traditional classroom courses. More agile and flexible learning solutions, available just-in-time and in bite-size chunks are proving an effective way forward to develop and train our community of learners. The CERN LD group has focused its efforts on enriching its learning offer and methodologies by adopting new digital solutions that have been received enthusiastically by its community. However, this is just the beginning of a journey towards a cultural shift. To exploit the full learning potential brought about by the digital revolution, learners must embrace responsibility for their own learning and take advantage of the opportunities on offer to them. The main challenges ahead will be sustaining this wave of innovation and fully integrating it into the learning culture of the organization.

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