THE E-LEARNING PROJECT FOR INSTITUTIONAL LEARNING

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Abstract*: Every large organisation has to deal with institutional and professional learning, especially if it is responsible for the education and training of its own personnel. This paper presents the e-learning model, designed and developed in order to satisfy all potential educational needs in a lifelong learning perspective and to innovate the institutional learning in a modern work and operational environment within the Italian Army. This model is based on a long experience in the e-learning field gained through the years by the IT-Army Education and Training Command and School of Applied Military Studies – Turin with its Virtual Learning Centre and the University of Turin, which work together for the education of the officers. The e-learning model for the Army was developed in a multifunctional way, and it is human centered, because the idea is to consider the personnel under both aspects: as a provider and as a consumer of educational services. For these reasons a net of several interconnected portals was built each of them with a specific goal mainly based on MOODLE, the Learning Management System largely used by several universities, integrated with several tools. Special attention was given to defining user friendly solutions in order to ease surfing the net and to be used by a wide range of potential users, where all categories of personnel are involved, like Officers, NCOs, Volunteers and civilian staff. In the paper, a multidimensional analysis of the model is discussed with attention to three main dimensions: pedagogical, users' perspective and technical.*

Keywords: *E-learning; Institutional Learning; Military Education; Moodle; Virtual Learning Centre.*

INTRODUCTION

The training activity for internal personnel is a strategic action for every large organisation. It becomes necessary and fundamental at least in three particular moments of the workers' life within the same company or organisation, such as:
- at the beginning of the recruitment: every newcomer has to be trained according to the requirements of the new position, the expectations, the values and the culture of the organisation;
- when the worker has/wants to change positions;
- when the company or organisation adopts new relevant strategies with an impact on the work procedures and activities.

The education and training activities assume a very particular connotation when the organisation is the State Army and the workers are Officers, Non-Commissioned Officers (NCO) and Volunteers. For all of them, education has the goal to create specific competencies which, integrated with the basic

competencies, allow them to operate in a difficult, changeable and complex context. Moreover, the continuous technical innovations require a constant updating. In addition to disciplinary knowledge and competencies, they have to develop soft skills like interpersonal skills, adaptability, communication, team working, problem solving and leadership. For all these reasons it is important that the Army adopts the configuration of a learning organisation [15]. This means an organisation that encourages and develops the learning process and allows its workers to easily access the systems in order to reach the knowledge at all levels. It is important to observe that the current society is characterised by the economy of knowledge, where the human capital and the intellectual ones must be considered at the same level of financial capital: a source with a real value for the organisation. In this context the education becomes strategic: it is to be considered as the activity that permits to develop and update the capital which represents an important source of value. With this perspective, the concept of lifelong learning becomes particularly important, it being the continuous education that interests workers and organisations throughout their lives and not only in some pre-established moments. As Auteri said, people must learn to learn on the one hand and on the other have to be constantly motivated to learn [1]. The e-learning that exploits new technologies, for example a digital learning environment, contributes in an essential way to realize the lifelong learning. The e-learning, considered as the process where the subject is active and uses all electronic devices, presents a lot of strong points [5] in this context because it offers:

– possibility to constantly update contents and to develop a learning community;
– possibility to contextualise the e-learning in the workplace to increment the sense of responsibility and productivity of the personnel;
– continuous learning to avoid any risk of work obsolescence in every context;
– possibility to ease cooperation, and especially to deal with problems, by using a problem-solving approach;
– possibility to customise learning paths and to access learning resources to improve personal and work-related skills.

The e-learning allows to ease internationalisation processes and cultural integration, both of which are crucial, especially nowadays when every situation has to be faced with a global vision, and not a local one [10]. During their career officers will have some international experiences; so, it became fundamental for them to learn languages and to be able to relate with different cultures. The e-learning model developed by the IT-Army Education and Training Command and School of Applied Military Studies (COMFORM-SA) and the University of Turin, within a fruitful collaboration [9] in the education wants to try to answer to these needs by focusing on the officer as an individual and trying to value him.

I. THE STATE OF THE ART

It is not so easy to find information regarding how other Italian and foreign institutions and universities in charge of providing military education addressed this new necessity of changing the education and updating it. Within the Italian Armed Forces other similar initiatives have been taken by Air Forces, Navy and General Defence Staff. The Institute for Military Aeronautical Sciences at https://am-elearning.aeronautica.difesa.it/ offers an environment for the Air Force to improve the quality of learning, to build a learning community on the web and to keep it up to date. The Naval Academy of Livorno has been using this e-learning http://www.marina.difesa.it/formazione-in-marina/accademia_navale/Pagine/elearning.aspx for years. It is managed in cooperation with the University of Pisa to offer and support the basic education for officers. At https://el-stelmilit.difesa.it/ it is possible to find the didactic e-learning for the General Defence Staff: this website is used to provide online courses and as additional and introductory support for regular residential courses (distance learning) organised by all dependent institutions in the General Defence Staff area. Within the European Union Member States, several educational institutions adopt e-learning platforms (MOODLE, ILIAS, etc.) to provide basic courses and international modules that are shared among different institutions that offer education for officers. In the world, mainly in the Anglo-Saxon area, a lot of large organisations have a good tradition for using the Learning Management Systems (LMS) in

the education field and for other experiences. In Australia, for example, many years ago the Armed Forces set the goal to create and develop an e-learning culture [12]. In the United States of America, in 2002, serious considerations began and several models of e-learning adopted in the military education were compared [16]: great attention is still paid in the design of online courses for the military education [2]. In the United Kingdom the Ministry of Defence in 2006 allocated £300.000 for the Defence Learning Portal, which offers a lot of web-based services to support the e-learning for the entire education system for the Armed Forces [4]. At the moment there is no evidence that a similar initiative as the one adopted by the Italian Army exists. The Italian initiative has the following characteristics:

- national dimension and nature: it involves the entire Army and all categories of personnel (Officers, NCOs and Volunteers);
- vertical dimension of education: from the initial and basic education up to the advanced and specialised education, including the Military High Schools;
- research dimension: it has a strong link with a continuous research to find possible solutions to address any needs in cooperation with the university.

II. THE E-LEARNING MODEL

2.1. The pedagogical theory at the base of the model

The e-learning requires users to be engaged in self-regulation. Two theories underlie the building of the educational model: the self-determination theory and the value control theory. They explain the mechanism of motivation and self-regulation in a student and, along with the learning design theories, allow to increase active and collaborative learning. The first theory [14] states that the learner benefits more from the opportunities of autonomous learning if he is intrinsically motivated to learn and this situation is fundamental if we want to create a learning environment capable of developing skills [17]. The second theory [11] affirms that students have emotions related to the success regarding their capacities to complete an activity and reach a goal: when they give value to the activity that they have to attend, they are more focused in succeeding. These theories give fundamental advice to be taken into account when designing challenging and captivating didactic activities that allow a socially structured learning experience. In order to create the model, collaborative learning behaviours were also taken into account, in particular the ICAP scheme [6]. It contemplates four possible modes, from the most to the less captivating: interactive, constructive, active and passive. The activities proposed in the educational model of online courses aim at interactive learning, through for example peer discussions: constructive learning, such as documents preparations: active learning, with the use of multimedia materials that requires a personal elaboration before trying to respond to aimed questions. The idea is to exclude a passive learning as it was proven that a designed cognitive philosophy in line with the ICAP structure for collaboration can increase the motivation and personal commitment [13].

The model has some main goals, such as:

- to rationalise and value the military education, in particular the lifelong one, which covers the entire career and not only some prefixed and formal moments, even post degree;
- to warrant a quality education easily accessible from wherever the students are (even if they are deployed in operational theatres worldwide);
- to contribute to the development of digital competencies of the personnel;
- to create a community able to share solutions, solving strategies, best practices and to support each other, increasing the team building process in different situations, like the virtual learning environment.

2.2. The architecture

The architecture of the e-learning model is composed of ten portals. Six of them are based on the LMS MOODLE, one is a Content Management System (CMS) platform based on the Joomla software and one is an e- portfolio platform that utilises the Mahara software. To manage the support

for the users in a coordinated way a ticketing service was configured, the OSTicket software. A portal for virtual rooms was realised by using the BigBlueButton software. The ten portals are listed below:

1. Portal of Self-paced Courses;
2. Portal of Knowledge;
3. Portal for Foreign Languages;
4. E-Learning Portal;
5. E-Portfolio;
6. MOODLE Support Platform;
7. Ticketing Service;
8. E-Learning Service Portal (Portale Servizi ELEarNing dell'Esercito – SELENE);
9. Multimedia Portal;
10. Portal of Virtual Classroom.

For the description of each portal see [10]. The choice to adopt ten portals is linked to the will to group all centres and units dedicated to the educational and training processes under one educational and didactic management system. They are distributed on the national territory, thus allowing them to keep their autonomy and freedom to propose activities and develop local potentialities. The strategic choice to create various portals for each different configuration of distance education allows to supply e-learning services to the educational institutions and training centres of the Army. In this way all different needs are satisfied (long lasting not supported self-paced courses, tutored courses, language courses, etc.).

2.3. Adopted strategies

After an accurate analysis of the specific learning needs of the army, the model adopted did not belong to the e-learning models taxonomy proposed in [3] where three classes are defined: autonomous, assisted and collaborative. The adopted model could be defined as a BeL – Blended e-Learning – meaning it is a combination of several e-learning approaches within the same educational action, where the face-to-face dynamic is not in person (normally the blended term means in presence) but it is developed by using different online synchronous communication systems (video-conference, webinar, conference call, etc.). The choice of this type of blended learning derives from two motivations. Firstly, users are located throughout the national territory and sometimes even outside and, consequently, the courses in person have to be reduced. This regards especially those activities where interactions between teachers and learners are fundamental, given the peculiarity of the learning goals. Secondly, during their career, officers have to operate very often in a synchronous way while they are deployed in different places; this e-learning model is used to experiment and simulate similar situations. The three classic models are used in relation to the goal to be achieved. In Fig. 1 the model components are shown in relation to the educational processes that we want to implement, the different types of functional interactions of the learning processes, as well as the Dublin's indicators, which are used to help users reach the learning results, together with the related soft skills. The main strategies adopted in the model are:

- aimed use of micro learning objects of contents;
- use of activities which transform the lessons into an effective learning experience;
- continuous monitoring of educational process through tests and examinations at the beginning, in the middle and at the end;
- sharing of materials, social media functions (e.g. discussion forum, wiki, blog, vlog, etc.) and cooperative activities and peer evaluations, which encourage cooperation;
- self-evaluation with feedback and comments to the learner in order to improve his meta-cognition and self-regulation. The presence of immediate and interactive feedback is crucial;
- use of triggers as reminders, messages and notifications to motivate, encourage and keep the learner engaged.
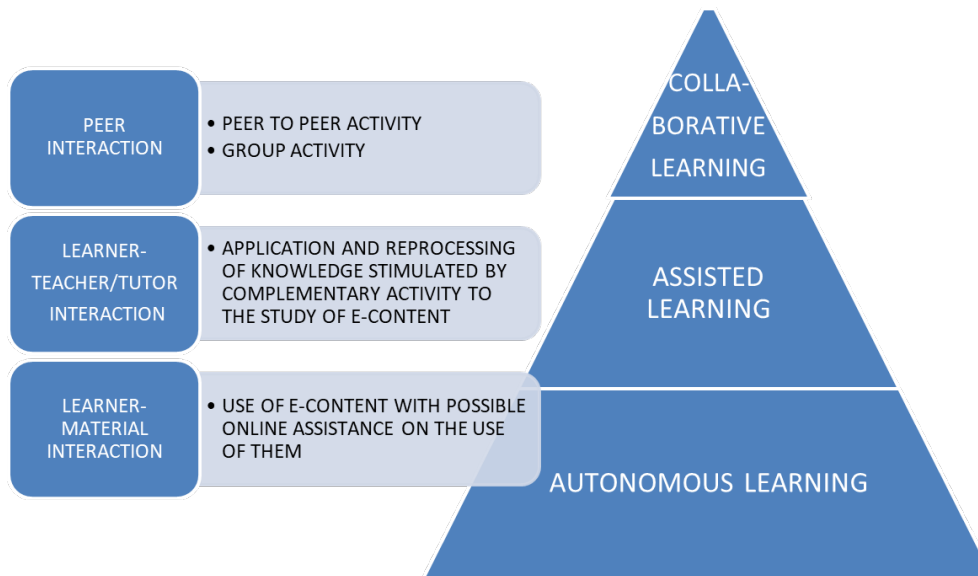
Figure no. 1. BeL Model

2.4. Contents

The model contemplates the use of various digital materials such as virtual reality applications, 3D animations, immersive scenarios; real time tools, video, interviews, tutorials, podcast, blogs, forums, wiki, automatic evaluation tests – not only quizzes, but with more options such as formula, lists, images and graphs, interactive files which allow a step by step problem solution process. It includes Job aids as materials that provide just-in-time learning, immediate answers to specific questions, thus helping learners carry out their tasks. Two examples of Job aids are technical glossaries and checklists. In the near future, thanks to the integration of sophisticated expert systems, some tools to help officers in the complex decision-making process could be developed.

2.5. Involved actors

The actors involved are several: e-learning experts of the IT-Army Education and Training Command and School of Applied Military Studies (COMFORM-SA), the military education and training area, and the University of Turin (UNITO), such as technicians, educators, teachers and tutors as providers and all categories of internal personnel, Officers, NCOs and Volunteers and civilian employees as users. The model is meant for all the employees of the Italian Army. Depending on the activities, the employees involved could be engaged by level of career, unit or operational reasons. During the implementation of this model, the constructive cooperation between the COMFORM-SA and UNITO was fundamental during the design phase and the research of solutions to satisfy specific education requests. In the future, the collaboration could be widened as to include the production of materials, the teaching of online courses, and sharing experts as educators and tutors.

III. ANALYSIS AND DISCUSSION

It is possible to analyse the model developed by using different dimensions. E.g. Khan [7] proposed a framework analysis composed of eight dimensions: Pedagogical, Technological, Interface, Evaluation, Management, Resource Support, Ethical, Institutional. We conducted the analysis by using three macro dimensions that can, in a way, group the eight dimensions proposed by Khan: Pedagogical, Users' perspective and Technical. Each dimension is composed of five sub-dimensions that we described in terms of adopted actions and verifications within the model. To implement it several data were analysed. We obtained them from the studies carried out and evaluations of the pilot

experience, organised during the model design phase, and by questionnaires submitted to the participants to the first group of MOODLE online courses, provided in a cooperative formula at the end of each activity. The following table shows the main results obtained according to the adopted actions.

Pedagogical Dimension	Action adopted within the model	Verification
Inclusion	Micro e-learning objects to help the achievement of the skills according to a costumised learning process.	Users, even those with a minimum level of digital skills, were able to accomplish the required tasks for the courses and to achieve the minimum educational goals. No impaired users were present.
Educational Evaluation	Various types of tests with automatic evaluation and immediate feedback.	It allows the users to progress only if the contents are understood, and it keeps the users engaged.
Modularity	Modules contain independent issues with a map that shows possible preparatory activities and organised according to the different educational goals.	In addition to the mandatory modules, users have built their own customised path with additional modules according to their own interests among those offered. 91% of them declared suitable the quantity of work required for each module.
Learning Efficacy	Continuous monitoring about time and results of intermediate tests. Interactive and collaborative actions. Intermediate tasks on the platform. Possible interactions between tutors and teachers and peer collaboration.	Users' questionnaire showed appreciation for the collaborative activities that had them play the game (2.7 on a scale from 1 to 4) and tutors' and teachers' support (2.9 on 4). All users prepared multimedia materials and respected the deadline for each task.
Exhaustiveness	Insertion of modules in each online course according to the educational goals.	3 out of 4 was the evaluation of clarity of materials and 3 out of 4 was the completeness of the discussed topics. 3.1 for the pertinence of the topics.
Users' Dimension	Action adopted within the model	Verification
Interface: design and navigation	Site's user interface with a clear layout and ease of use	The interface in particular for surfing the web pages was considered very user friendly according to the questionnaire.
Available tools	Social tools (forum, chat), self-regulation, help online available.	3.2 out of 4 the evaluation for using forum to exchange opinions between peers and teachers. 3.3. the grade for the tool only for reading.
Availability	MOODLE platform integrated always accessible 24/7. Access granted with one credential authentication system.	Among the comments within the blank spaces users showed a great appreciation of the possibility to connect to the platform during work time and extra time as well. Thanks to this opportunity all of them were able to accomplish the course and no one failed for reasons related to lack of time.
Usability	Multimedia materials easy to find in the platform and easy to download.	Many users downloaded digital materials and videos on their own PC.

Support	Help desk available during work hours and tutor during the course time frame. Online tutorials, glossaries and FAQs available.	Few requests were sent to the Help desk service to find materials, they were satisfied in quick time response. Asynchronous forums monitored and controlled by tutors.
Technical Dimension	**Action adopted within the model**	**Verification**
Technology	MOODLE integrated with systems for web conference, Advanced Computing Environment (ACE) and specific plugins.	Synchronous meetings organized with regularity and without any connection problem.
Reliability	Always available system 24/7. Help desk service of first level (tutor) and second level (administrator).	Users did not declare any access difficulty or unavailability of materials.
Interoperability	Materials prepared according to the standard and usable on different platforms.	Some military teachers started to use materials prepared during the course for their own teaching courses.
Efficiency	Reduction of mistakes on the platform, possibility to partially use the materials and in independent way.	Four platforms operated also independently and the access for some users was with specific limitations. Since the opening no main errors occurred.
Re-use	Online courses were re-usable also on other platforms.	Ongoing discussion on realising a co-production and co-sharing of teaching and online with UNITO.

Table no. 1. Multidimensional Analysis of the Model.

From this first analysis a series of recommendations emerge, useful for the immediate future. Preparation of materials in different multimedia formats still continue and contents are based on the cognitive philosophy of interactivity; a pre-test for users' diagnostics evaluation is submitted before the attendance to every course, providing users with a feedback so that they can be aware of their preparation and use more specific resources and activities available for them within the course; use of appropriated techniques of communication in order to maximise the learning (e.g. use of key words and conceptual maps, limitation of useless information, etc.). Inclusion of self-paced strategies to help the learner to develop his self-regulated capacities. Utilise strategies that stimulate deep levels of cognitive elaboration (e.g. the elaboration or design of new activities). Allow self-evaluation where appropriate and provide users with additional opportunities to reflect on their own competencies and comprehension of concepts. Use of feedback and comments. Promote the cooperation with Wiki, discussion and peer evaluation, online chat room to allow users' groups to verify in reciprocity different hypothesis. In a medium-long term: adopt learning analytics that platforms offer to better identify the learner's needs and to help the achievement of the learning objectives and develop new systems and methodologies which lead in a more automatic way the learner during the process. For this purpose, Artificial Intelligence will probably help. It is important to ensure the updating of the learning environment and of the materials to determine whether the educational technology environment is performing adequately, and whether the e-learning model developed is meeting the initial intent.

IV. CONCLUSIONS

The results are certainly encouraging, also because any critical issue was revealed so far. On one side, it confirms the goodness of the adopted model, while on the other side it suggests proceeding in this direction in a decisive and quick way. So, it is important to continue to invest in infrastructures

and human resources and, thanks to the possibilities offered by the model to constantly monitor the activities, to keep the research and the implementation of more advanced and adequate solutions able to satisfy the modern needs and requirements of military education.

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