

ADVANCED E-LEARNING FOR IT-ARMY OFFICERS THROUGH VIRTUAL LEARNING ENVIRONMENTS

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In this work we will present and discuss the joint experience of the IT-Army Education and Training Command and School of Applied Military Studies of Turin and the University of Turin, that worked together to designed an advanced e-learning path. This was made possible by the use of digital methodologies and integrated virtual learning environments, with the aim of supporting in the best possible way the military officers training, which has to be continuous, highly specialized, multidisciplinary, flexible, and strongly internationalized.

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1 Introduction

The training for the Army officers, and for the Armed Forces in general, is by its very nature very peculiar as, due to the assignments that will be appointed during their career, it has to be continuous, highly specialized, multidisciplinary, flexible, and strongly internationalized. The training should be both theoretical and practical, by increasing the knowledge and practicing on field, following a lifelong learning strategy.

Since 1998, the military officers have attended a five years training course composed of a three years Bachelor Degree in Strategic Sciences course and a two years Master Degree in Strategic and Military Sciences course. The first two years are organized by the Military Academy in Modena in cooperation with the University of Modena and Reggio Emilia while the third year of Bachelor and the Master degree are implemented by the Education and Training Command and School of Applied Military Studies in Turin in cooperation with the University of Torino.

After this initial training the officers continue, in different moments of their careers, to investigate some specific topics through post-degree courses, intensive seminars, practical activities or even theoretical exercises.

In the last years the e-learning (Clark & Mayer, 2008), understood as the introduction of multimedia technology and the internet to simplify the access to the resources, to distance collaboration or even to remote exchanges, has changed to the basis the way of teaching and learning, and has opened brand new and challenging scenarios which have to be taken into account by every training institution.

Following these new directions, the Education and Training Command and School of Applied Military Studies of Turin (SCAPPLI) and the University of Turin designed an e-learning training course which uses digital technologies and virtual learning environments to support the education of the military officers and the Strategic Sciences students. The extension of the University metropolitan area network to the SCAPPLI, and the activation of the Wi-Fi service to all the classrooms, were preparatory and integral parts of this project. In this cooperation the two institutions shared experiences and competences useful to design and develop innovative solutions for a modern and complete training, opening to a mutual collaboration which lead them to be recognized as reference and cohesion poles in technologic and education areas.

2 State of the art

Deep transformations have occurred and keep occurring in the Armed Forces, where they are asked to operate in different ways, both in the homeland

security and in international operations and missions.

These new operating modes need a continuous training of the personnel involved in this area, where they have to manage new challenges in all possible environments, such as sea, air and land. In addition to these, the cybernetic dimension opens new threats that need innovative defense solutions. In such a complex environment the Armed Forces started to experiment new effective teaching solutions (Lunardi, 2010) for their officers, reducing the associated management costs, which often are the goal of cost reduction in the annual budget.

The turning point dates back ten years ago, when the Armed Forces started to use the best distant educational solutions, acquiring e-learning platforms for teaching to internal personnel.

The first goal was the start-up of an e-learning platform for these main purposes:

- *investing* in new skills of military personnel, and increasing the technical and military knowledge of the staff through the use of state-of-the-art IT tools to achieve lasting and measurable results;
- *creating* an effective learning tool that can involve the individual learner (learner centric) in a continuous self-updating process aimed at achieving and maintaining a high and recognized professionalism;
- *reducing* the duration of some residential courses, particularly those with more theoretical topics and updating the Doctrine of Armed Forces, expanding the distance phase and introducing tools for evaluating acquired skills through e-learning;
- *increasing* staff “confidence” with computer based tools. The role of Informatics and new technologies has been growing in every new military operation. On the battlefield, an efficient and secure management of communications and IT tools enables, first of all, to provide the necessary information at the right time to people in charge of making a strategic decision and subsequently to complete successfully a complex military operation.

The Navy and Air Force started immediately e-learning training projects by adopting open source solutions, activating a Moodle platform as an end-to-end solution in remote distance learning and collaborative e-learning with Dione Navy Projects and the Aerospace pilot project AGP. Since 2008, the Guardia di Finanza has started its own distance learning with a series of Moodle-based courses that have been successful, particularly for the social aspects of that learning tool.

Since 2010 SCAPPLI decided to converge to the Moodle platform, now

consolidated from the software point of view and very popular in public administrations. After an appropriate period of testing, they began to use it for internal teaching needs, with excellent results. The use of Open Source system had already been adopted by the Army Foreign Language School, the only Armed Forces entity which immediately adopted the “ILIAS” solution, the most suited platform for language teaching. The recent change of Army direction towards the Moodle platform led all departments, including the aforementioned School, to a migration process towards Moodle, because it was considered more adhering to training needs. In-fact, Moodle is meant both for e-learning training and for direct teaching support. In particular, the use of the platform has been largely devoted to Education Quality Control Courses, through the provision of tests and questionnaires in the classroom and at distance. In 2013, the SCAPPLI and the University of Turin held the first meetings with the opening of technical tables to design together common educational solutions within the framework agreement that governs the Bachelor’s Degree in Strategic Sciences and the Interdepartmental University School in Strategic Science (SUISS).

3 Methodology

The SCAPPLI and SUISS E-learning Project consists of three separate phases, which took about 1 year for their implementation. In the first step, the network infrastructure within SCAPPLI has been created to deliver the UNITO network; a new WLAN was installed in all the classrooms where the lessons are held. This connection was made by linking, through the UNITO fiber optic network, to the SCAPPLI didactic LAN, also through works on public areas. Following the connection and configuration of active network devices, the SCAPPLI Moodle Server and other didactic servers necessary to support Moodle service (such as Virtual Class VTCs, a streaming server as a basis of a multimedia portal, etc.) were made accessible through the UNITO network, always in compliance with the regulations of the two entities involved. Lastly, the Moodle of SUISS and the Moodle of SCAPPLI were enabled to share their users by using the well-known Moodle Network-MNet feature (Figure 1). This interconnection is critical and allows users to access seamlessly the two platforms, so depending on where the training activities take place, each user can follow them using always the same credentials. MNet’s capabilities are also crucial to automate the enrollment in the various courses of military and civilian students. As it is well known, this cross-platform authentication method enables subscribers to a Moodle “A” platform to access completely the Moodle “B” platform and vice versa, therefore benefitting from all the resources and activities of the two platforms. The possibility to navigate from one platform to another has greatly simplified the management and delivery of

those courses involving mixed civil-military enrollment, such as the Military Erasmus. The SCAPPLI platform maintains the accreditation of users without University credentials, where the responsiveness ensures a quick and fast response, especially for teaching activities involving students from other Italian and foreign universities and academies. Numerous collaborations with various training institutes from EU Member States have been facilitated by providing these virtual environments. Splitting the management and the support tasks on the installed hardware, Help Desk tools and content production guarantees the functionality of both Moodle instances and the correct relationship with the different users (Phase 2).



Fig. 1 - A screenshot of the two moodle platforms

After the first two phases, the training of the faculty members formed by university professors and military teachers (both Italians and foreigners) has begun via courses in attendance and personalized counseling in order to respond to the different needs of the individual subjects belonging to very different areas. The first level Help Desk was offered by the e-learning section of SCAPPLI, while the second level was guaranteed by the ICT Services at the UNITO Computer Science Department to ensure the functionality and technical updating of the software used. It was thus possible to design and build an innovative training offer with the support of Moodle of SUISS and SCAPPLI. Both Moodle platforms are integrated with tools that respond to the needs of multidisciplinary teaching. The SCAPPLI, through the Open Source Xerte authoring tool, enables the creation, updating and publishing of multimedia content in a fast and secure way, making it possible to create a collaborative environment for individual projects and ensuring teachers the opportunity to “Self-publish” their works on the Moodle site itself. Thanks to Xerte, each teacher can prepare the contents of the course in a PowerPoint-like environment using tools that allow all those effects that are typically used in

a multimedia presentation. Once the multi-media content is ready, the teacher can alternatively create a SCORM compliant content, which will be uploaded into his course, or directly link the content of the product made with XERTE. Displaying XERTE content can be done using Flash Player technology or, even better, in Html5, an important standard to make it easier to use on mobile devices. This feature is undoubtedly a remarkable opportunity, as updating the lesson can be done uniquely and easily by using web-based tools; by using this integration, the lesson can be updated without having to upload it again, being updated in all courses where the lesson is referenced.

The SUISS platform, thanks to the great experience acquired in the field of e-learning (Baldoni *et al.*, 2011), is integrated with an Enhanced Calculus Environment based on Maple, an automated evaluation system called MapleTA and MapleSim, a simulation system. These integrations allow teachers, especially those who teach scientific subjects, to adopt innovative, highly interactive and personalized didactics, thus enabling students to include complex answers such as formulas or equations that can be written in infinite equivalent forms, to verify their preparation through automatic tests, and to be guided by feedback according to an adaptive logic. MapleTA software also allows to prepare questions that include responses with graphics, or with elements such as vectors or even selecting parts of an image to build the answer. The SUISS platform is also integrated with a web conferencing system that allows, in addition to the asynchronous tutorial implemented with the forums, a synchronous distance mentor, where students can talk to the teacher by sharing microphone and a screen that turns into a blackboard where they can share formulas or draw figures.

Currently, Moodle platforms are used for the following types of courses:

1. Officers attending the University:
 - Bachelor and Master Degree in Strategic Sciences;
 - International Erasmus Military Courses;
 - Intensive English Language Enhancement Program Modules;
2. Post-graduated:
 - Stabilization and Reconstruction Courses;
 - Army Staff Course (200 captains each year)

for a total of 128 courses and 4.919 users. They are also used to deliver Courses for the Special Reserve (50 professionals directly selected from the civilian to become officer), for courses on working environment security for executives and workers of SCAPPLI, for a total of 400 more people, as well as providing support for quality control.

Some university courses are held in English within the TeachMob Program by Visiting Professor of unquestionable fame from all over the world. In the academic year 2015/16, some officers, graduates of the Master's Degree in

Strategic Science, attended a Game Theory course by Prof. Simon Salamon, together with their colleagues, civilians and students from the University of Turin School of Higher Education “Ferdinando Rossi”. As the teacher’s stay in Italy is limited, especially for the mentorship and for any additional examinations, the platform availability makes it an indispensable tool for maintaining distance relationship with the teacher. Thanks to the solutions adopted, the training of officers in recent years has taken on a highly international connotation; this in response to the increasingly strong and current task oriented needs of confrontation and collaboration with foreign partners. All international courses involving many participants from abroad can include remote phases using the virtual classroom before the residential phase.

“The European Initiative for the Exchange of Young Officers, inspired by ERASMUS”, the so-called Military Erasmus, (Spinello, 2013) is an European Union program set up to promote the exchange among the various European training institutes of students/military officers during the initial training period. The initiative launched in 2008 under the aegis of the European Security and Defense College (ESDC) in Brussels (a network college that uses the institutes responsible for the training of the military and civilian personnel of the UE Member States) with the creation of a configuration of the Executive Academic Board (EAB), the Implementation Group (IG), develops joint training proposals and promotes European Union knowledge. In particular, the IT-Army has been participating in the program since 2010. The adhesion to the initiative is realized by sending the Officers to attend the initiatives proposed by the Member States and to organize, starting a.y. 2013-14, some Common Modules (academic or vocational training activity, which will be delivered in English language with a residential phase of 1-3 weeks preceded by an e-learning phase with admission test) per year. These courses are open to foreign personnel. In relation to the topics discussed, the same Common Modules are also offered to civilians of the Degree Programs in Strategic Sciences, which are an enrichment and a specificity in the national university scenario. The common modules are studied by a group of experts who periodically gather to elaborate new ones and update those already approved on topics of common interest for training and it helps the recognition of the European Credit Transfer and Accumulation System (ECTS).

For this type of modules, the possibility of accessing a common platform fulfills many functionalities, including the ones typical of Distance Learning (providing pre-didactic knowledge, reference texts, curriculum of the course, etc.) and those typical of the Support Learning (the pre-reading material prepared by each teacher, the course information, syllabus and curriculum vitae of the lecturer, slides of presentations as well as logistic info, especially useful for those who come from other countries before the residential phase) and

auxiliary functions such as the delivery of the final test and the final feedback. The common modules proposed in academic year 2015-16 were the following:

1. Common Security and Defense Policy (CSDP). For this course the distance phase was hosted on the ESDC site with two mandatory autonomous knowledge units (AKUs) and an optional third one. Distance phase test is required for admission to the residential phase. For other functions, the Moodle platform has been used. The module was attended by 8 IT-Army Officers, 4 IT-Air Force, 15 EU Member States (1 Bulgaria, 2 Croatia, 1 Cyprus, 2 Finland, 2 France, 2 Greece, 3 Romania, 2 Poland) and 14 Civilian students.
2. Law of Armed Conflict (LOAC). Fully organized on the Moodle platform. The module was attended by 12 IT-Army Officers, 5 IT-Air Force, 3 EU countries (2 Estonia and 1 Greece), 12 civilian students.

The English Language Enhancement Modules Program, within the broader internationalization program of SCAPPLI, has the purpose of preparing students to the modules delivered in English and especially in an international operation perspective. They are organized in one-week seminars.

Experienced teachers and native speakers have designed Note-taking and Active Listening activities, a deepening unit on the jargon, and the correct collocation of the verbs inherent to the discipline. In this way students, even the poorer in linguistic skills, prepare themselves both through lectures in the language labs, and autonomously by having a computer that, for example, does not stop repeating the pronunciation of a term. The program, developed in a.y. 2015-16, was composed of 2 modules attended by all the Officers of the 4th year of the course.

The Stabilization and Reconstruction Senior Management Course and Stabilization and Reconstruction Orientation Course are organized by and conducted at the Italian Post-Conflict Operations Study Center and intended for its personnel. These courses are entirely delivered in English with lessons held by military and university teachers as well as international experts in the field and/or areas of interest. Just in line with the comprehensive approach, typical of modern peace keeping operations, courses are also open to foreign personnel and civilians. The first type of courses is reserved for Military executives (Generals and Colonels) and civilians while the second one is open to civilian and military officers in the rank of Lieutenant Colonel and Major. Fundamental to their implementation is the use of a virtual learning environment, where leaders and officers become peer to peer communities while making, sharing and exchanging ideas, strategies and experiences.

4 Results and discussion

The adoption of the e-learning solution has radically changed the training of military officers. Figures 2 and 3 show activity statistics on the two platforms in the last solar year. The two teaching periods can be easily recognized the two teaching periods from the chart crests.

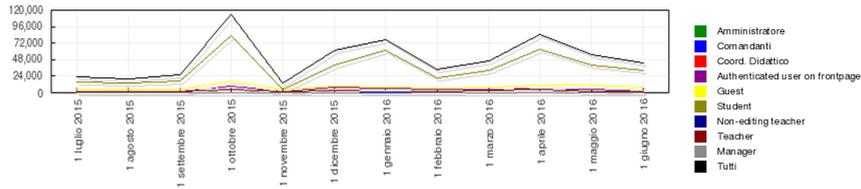


Fig. 2 - Activities on UNITO platform in 12 months (01-06-2015 – 01-06-2016).

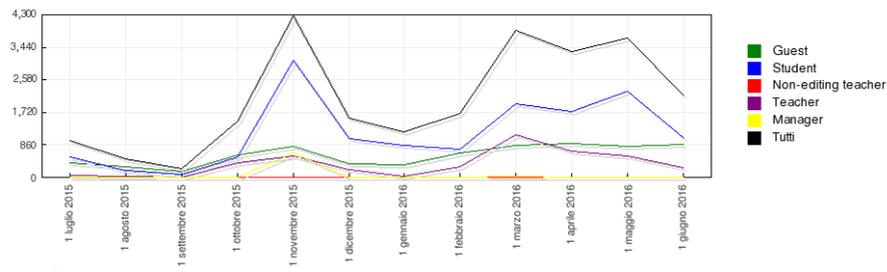


Fig. 3 - Teaching activities on SCAPPLI platform in 12 months (01-06-2015 – 01-06-2016).

Civil and military teachers, practitioners, coordinators, commanders, tutors have reorganized their teaching activities by questioning and rethinking their contents and presentations. Junior and senior students of the international online courses demonstrated their satisfaction about the distance learning opportunities as in Tables 1, 2, 3. The feedback were evaluated by using the Kirkpatrick method, used in ESDC with a gradation of results from 0 to 6. As for the e-learning use see following data:

Table 1
TESTS S&R MANAGEMENT SENIOR COURSE NOVEMBER 2015.

Materials (Welcome package, documentation for studies, learning support)									
	1	2	3	4	5	6	n/a	Answers	Avg
Materials/Relevance	0	0	0	4	8	10	0	22	5,3
General Average									5,3
Internet Distance Learning (IDL) Preparation									
	1	2	3	4	5	6	n/a	Answers	Avg
IDL Preparation - Relevance	3	2	3	7	3	2	0	20	3,6
IDL Preparation - Utility	3	1	4	7	2	3	0	20	3,7
General Average									3,6

Table 2
TESTS CSDP MARCH 2016.

Materials (Welcome package, documentation for studies, learning support)									
	1	2	3	4	5	6	n/a	Answers	Avg
Materials/Relevance	0	0	0	6	21	14	0	41	5,2
General Average									5,2
Internet Distance Learning (IDL) Preparation									
	1	2	3	4	5	6	n/a	Answers	Avg
IDL Preparation - Relevance	0	2	2	10	17	10	0	41	4,8
IDL Preparation - Utility	0	0	2	14	16	9	0	41	4,8
General Average									4,8

Table 3
LOAC TESTS, OCTOBER 2015.

Materials (Welcome package, documentation for studies, learning support)									
	1	2	3	4	5	6	n/a	Answers	Avg
Materials/Relevance	0	0	0	4	16	11	0	31	5,2
General Average									5,2
Internet Distance Learning (IDL) Preparation									
	1	2	3	4	5	6	n/a	Answers	Avg
IDL Preparation - Relevance	1	0	3	3	15	9	0	31	4,9
IDL Preparation - Utility	1	0	1	4	14	11	0	31	5,0
General Average									5,0

The lowest rating, in the case of S&R course, can be interpreted either by the minor confidence with new technologies and by the lesser use of them, or by the

lower availability in terms of time of that particular type of students. Notable were the improvements in the results especially in Math disciplines attended followed by technical army students. Testing and verifying their knowledge with automatic correction enabled them to better calibrate their preparation. Aside from learning, there are other advantages to be considered, such as the economic benefits derived from a cost reduction that allow investing more in other activities. In the distance learning, there is a reduction in the costs of the military officers' relocation; with the dematerialization of training resources you can save paper, speeding up the administrative processes of certification of activities and the registration of examinations. On Moodle the teacher has an integrated registry with Maple TA where he records all the evaluations, ensuring a better tracking of students' progress which can, in turn, be consulted when needed in compliance with transparency. Teachers, saving time for evaluation, can focus on preparing up-to-date content and more suited material for formal and informal learning. The sharing of materials readily upgradable, accessible, with interactive formats between teachers and students, both civilian and military, allows the implementation of innovative pathways that exploit the potential of new technologies available today.

Conclusion

The e-learning training of military officers may be refined in the next years by following different ways: reception and re-alignment programs for students can be envisaged after selection, so they can make an easy start with university studies. A bigger number of university courses may be provided in blended mode, where the teacher can give more attention to discussion and reasoning opposed to the traditional didactic. The provision of shared courses with other foreign training institutions allows the optimization of the resources and the wider range of training opportunities. The e-learning training of Army Officers in the next years is going to increase both to allow for up-to-date international training and to have a more thorough and highly specialized technical-scientific preparation, especially in the paths of Degree in Strategic Sciences related to Combat Engineer, Signal Corps and Logistics. The adoption of the most advanced digital technologies will be a winning choice to maintain high quality standards in the training of officers called to face complex situations. The sensitivity to these themes demonstrated by the Army's leaderships and the investment in their research by the University that collaborates with it will ensure the achievement of top levels of teaching and learning.

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