

eLSE 2019

Editors

Ion ROCEANU

Daniel BELIGAN

**Ioana Andreea ȘTEFAN
Ștefan TRĂUȘAN MATU**

Alin MOLDOVEANU

New technologies and redesigning learning spaces

Volume I

eLearning and Software for Education Conference

Bucharest, April 11 – 12, 2019

Publisher:
"CAROL I" National Defence University Publishing House
Director: Gheorghe MINCULETE
Panduri Street, 68-72
Bucharest
Phone: +40213194880

ISSN 2066 – 026X
ISSN-L 2066 – 026X
ISSN – CD 2343 - 7669

Further information on all eLearning and Software for Education – eLSE – events can be found at:
www.elseconference.eu

**All the papers published in this book were verified for plagiarism using the
Plagiat-Sistem Antiplagiat prin Internet software**

©This work is subject to copyright. All rights are reserved, whether the whole part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting reproduction on microfilm or in any other way, and storage on databanks. Duplication of this publication or parts thereof is permitted only under the provisions of the Romanian Copyright Law of March 14, 1996 in its current version, and permission for use will always be obtained from Carol I National Defence University. Violations are liable for prosecution under the Romanian Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of the specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for the general use.

Administrative & Technical Committee

Daniel BELIGAN	"Carol I" National Defense University, Romania
Gheorghe ANGHEL	"Carol I" National Defense University, Romania
Ștefanel ROSCAN	"Carol I" National Defense University, Romania
Catalin RADU	"Carol I" National Defense University, Romania
Gabriel DOBRESCU	"Carol I" National Defense University, Romania
Simona HERTANU	"Carol I" National Defense University, Romania
Roxana NITU	"Carol I" National Defense University, Romania
Florin DRAGHICI	"Carol I" National Defense University, Romania

Technical editor
Liliana ILIE "Carol I" National Defense University, Romania

eLSE 2019

**The 15th International Scientific Conference
“eLearning and Software for Education”**

New technologies and redesigning learning spaces

Volume I

Conference Chairman:

Professor Dr. Ion **ROCEANU**, "Carol I" National Defence University, Bucharest, Romania

Scientific Committee:

Dr. Sae **SCHATZ**, Director of Advanced Distributed Learning (ADL) Initiative, USA

Prof. Dr. Gheorghe **CALOPAREANU**, Rector "Carol I" National Defence University, Romania

Prof. Dr. Romita **IUCU**, Vice-Rector, University of Bucharest, Romania

Prof. Dr. Vasilica **GRIGORE**, Vice-Rector, National University of Physical Education and Sport, Romania

Prof. Dr. Neculai Eugen **SEGHEDIN**, Vice-Rector "Gheorghe Asachi" Technical University of Iasi, Romania

Prof. Dr. Lucian Ion **CIOLAN**, Dean, Faculty of Pedagogy University of Bucharest, Romania

Assoc. Prof. Dr. Virgil **POPESCU**, University of Craiova, Romania

Dr. Jerry **GORDON**, Advanced Distributed Learning (ADL) Initiative, USA

Dr. Doina **BANCIU**, National Institute for Research & Development in Informatics Bucharest, Romania

Prof. Dr. Alin **MOLDOVEANU**, Politehnica" University Bucharest, Romania

Dr. Adrian **ADASCALITEI**, "Gheorghe Asachi" Technical University of Iasi, Romania

Dr. Diana **ANDONE**, "Politehnica" University of Timisoara, Romania

Dr. Mihail **ANTON**, "Carol I" National Defence University, Romania

Dr. Jannicke **BAALSRUD HAUGE**, Bremer Institut fur Produktion und Logistik (BIBA), Germany

Dr. Dragos **BARBIERU**, "Carol I" National Defence University, Romania

Dr. Daniel **BELIGAN**, "Carol I" National Defence University, Romania

Dr. Mirela **BLAGA**, "Gheorghe Asachi" Technical University of Iasi, Romania

Dr. Vasileios **BARKOUKIS**, Aristotle University of Thessaloniki, Greece

Dr. Teodora Daniela **CHICIOREANU**, "Politehnica" University Bucharest, Romania

Dr. Carmen Elena **CIRNU**, National Institute for Research & Development in Informatics Bucharest, Romania

Dr. Anca Cristina **COLIBABA**, "Grigore T.Popa" University of Medicine and Pharmacy of Iasi, Romania

Dr. Stefan **COLIBABA**, "Alexandru Ioan Cuza" University of Iasi, Romania

Dr. Calin **CORCIOVA**, "Grigore T.Popa" University of Medicine and Pharmacy of Iasi, Romania

Dr. Maria-Iuliana **DASCALU**, University POLITEHNICA of Bucharest, Romania

Dr. Sara **DE FREITAS**, Serious Games Institute, Coventry University Technology Park, United Kingdom

Dr. Christian **GLAHN**, Open University of the Netherlands, Netherland

Dr. Alessandro **GLORIA**, University of Genoa, Italy

Dr. Gabriela **GROSSECK**, West University of Timisoara, Romania

Dr. Carmen **HOLOTESCU**, "Politehnica" University Timisoara, Romania

Dr. Phil **ICE**, American Public University System, West Virginia, USA

Dr. Knud **ILLERIS**, Aarhus University, Denmark

Dr. Anca Daniela **IONITA**, University POLITEHNICA of Bucharest, Romania

Dr. Olimpius **ISTRATE**, International Federation of Red Cross and Red Crescent Societies, Switzerland

Radu **JUGUREANU**, Siveco Romania, Romania

Dr. Theo **LIM**, Heriot-Watt University, UK

Dr. Bogdan **LOGOFATU**, University of Bucharest - Faculty of Psychology and Educational Sciences, Romania

Dr. Cristina **MIRON**, University of Bucharest, Romania

Dr. Laura **MURESAN**, Academy of Economic Studies Bucharest, Romania

Dr. Cristina **NICULESCU**, Research Institute for Artificial Intelligence "Mihai Draganescu", Romanian Academy, Romania

Dr. Michela **OTT**, Institute for Educational Technology, CNR, Italy

Dr. Valeriu **PATRICIU**, Military Technical Academy, Romania

Dr. Florin **POPENTIU -VLADICESCU**, Academy of Romanian Scientists, Romania

Dr. Dragos Marian **POPESCU**, University of Medicine and Pharmacy of Craiova, Romania

Dr. Catalin **RADU**, ADL Romania Association, Romania

Dr. Emanuel **SOARE**, University of Pitesti, Romania

Ioana Andreea **STEFAN**, ADL Romania Association, Romania

Dr. Veronica **STEFAN**, "Valahia" University of Targoviste, Romania

Dr. Monica **STANESCU**, National University of Physical Education and Sport of Bucharest, Romania

Dr. Katheryna **SYNYTSYA**, IRTC ITS, Ukraine

Dr. Ștefan **TRAUSAN-MATU**, "Politehnica" University Bucharest, Romania

Dr. **Danut TURCU**, "Carol I" National Defence University, Romania

Dr. Marius **TURNEA**, "Grigore T Popa" University of Iasi, Romania

Dr. Marin **VLADA**, University of Bucharest, Romania

CONTENTS

Exploring the Use of Gamified Systems in Training and Work Environments	11
Ioana Andreea ȘTEFAN, Antoniu ȘTEFAN, Ioana Raluca GOLDBACH, Felix HAMZA-LUP	
Learning Object-Oriented Programming by Creating Games	20
Ladislav VÉGH, Veronika STOFFOVÁ	
Story-Oriented Learning	30
Antoniu ȘTEFAN, Ioana Andreea ȘTEFAN, Jannicke BAALSRUD HAUGE, Jackie CALDERWOOD, Jayne BEAUFOY, Sylvester ARNAB, Michael LOIZOU	
Educational Computer Games in Programming Teaching and Learning	39
Veronika STOFFOVÁ	
Autonomous Driving in Games	46
Ioan-Alexandru BRATOSIN, Ionel-Bujorel PĂVĂLOIU, Nicolae GOGA, George DRĂGOI	
Visual Function Testing and Training for Children with Different Visual Impairments, by Using a Software Interface, Serious Game Type for Laptop and Tablet	53
Barbu Cristian BRAUN, Mihaela Ioana BARITZ	
Improving Training Methods for Industry Workers through AI Assisted Multi-Stage Virtual Reality Simulations	61
Alexandru BUTEAN, Marco Leon OLESCU, Nicolae Adrian TOCU, Adrian FLOREA	
Learning Enhancement Through Video Games	68
Nicoleta CĂLINOIU (ION)	
Serious Games in Engineering Education	78
Elizaveta CHACHANIDZE	
A Gamified Intervention Combining CBM-I and Social Skills Training for Children with Aggressive Behavior: Proof of Concept	83
Alina Cristina CHIVU, Cătălin NEDELCEA	
A Computerized, Gamified Intervention Training Visual Perspective-Taking. Theoretical Rationale and Proposal of a Randomized Controlled Trial	91
Ana Maria COSMOIU, Cătălin NEDELCEA, Ioana Roxana PODINA	
Hit by Weibull: Play to Learn Now!	98
Corina GROSU, Marta GROSU	

Rationale and Development of a Proof of Concept Gamified mHealth Attention Training App Towards Healthy Food Cues	104
Ioana PODINA, Ana TOMA, Ana Maria COSMOIU	
A Playful form of Teaching and Learning using Micro-World Applications	110
Veronika STOFFOVÁ, Krisztina CZAKÓOVA	
Digital Badges at NATO School Oberammergau	116
Gigi ROMAN, Tanja GEISS, Remi TREMBLAY	
E-Learning Tools for IT Project Teams	122
Ileana Ruxandra BRADAU (BADEA)	
Future Studies, Forecast and Foresight - Critical Considerations and Relevant Findings	130
Stefan-Antonio DAN-SUTEU, Graziano GIORGI	
Models and Theories of Unethical Use of Information Technology in Higher Education	138
Liliana MĂȚĂ, Roxana Maria GHIAȚĂU, Alexandra Georgiana POENARU, Ioana BOGHIAN	
Considerations for Specialist Training in the Field of Critical Infrastructures Protection	145
Daniel ROMAN	
A Full Spectrum Lifelong e-Learning Project for the Army	152
Enrico SPINELLO, Gianluca TORBIDONE, Marina MARCHISIO, Sergio RABELLINO	
ADREM: System Call Based Intrusion Detection Framework	159
Jan-Alexandru VĂDUVA, Radu-Emanuel CHIȘCARIU, Ioana CULIC, Iulia-Maria FLOREA, Răzvan RUGHINIȘ	
Semantic Author Recommendations Based on their Biography from the General Romanian Dictionary of Literature	165
Laurențiu-Marian NEAGU, Teodor-Mihai COTEȚ, Mihai DASCĂLU, Ștefan TRĂUȘAN-MATU, Laura BADESCU, Eugen SIMION	
LibQuest - Revitalize Libraries and Reading Through Gamification	173
Maria Anca BĂLUȚOIU, Alexandru GRĂDINARU, Alin MOLDOVEANU, Florica MOLDOVEANU, Anca MORAR, Ana-Karina NAZARE, Mireille RĂDOI	
Romanian TreeAnnotator	181
Daniela GÎFU	
A Survey on History, Present and Perspectives of Document Image Analysis Systems	188
Iulia-Cristina STĂNICĂ, Costin-Anton BOIANGIU, Giordiana Violeta VLĂȘCEANU, Marcel PRODAN, Cristian AVATAVULUI, Răzvan-Adrian DEACONESCU, Codrin TĂUT	

Collaborative Object Recognition for Parking Management	194
Cristian VASILESCU, Cristian BECEANU, Ijaz HUSSAIN	
Designing a Document Image Analysis System on 3 Axis: Education, Research and Performance	202
Giorgiana Violeta VLĂSCEANU, Costin-Anton BOIANGIU, Răzvan-Adrian DEACONESCU, Marcel PRODAN, Cristian AVATAVULUI, Răzvan RUGHINIȘ, Irina MOCANU	
Virtual Interaction for Visually Impaired and Sighted People.....	209
Silviu IVASCU, Alin MOLDOVEANU, Florica MOLDOVEANU, Anca MORAR, Oana BALAN	
On Using ADDIE/SAMR Methodology to Improve the Performance in Blended Learning.....	215
Grigore ALBEANU, Florin POPENTIU-VLADICESCU	
A Novel Free Cloud Service for Machine Learning and Beyond	221
Alin Adrian ALECU, Bujor Ionel PAVALOIU, Ciprian Gabriel DOBRE-TRIFAN	
Developed a Hardware and Software Application to Monitor Eye Movements and Evaluate the Visual Field	228
Mihaela Ioana BARITZ, Barbu Cristian BRAUN	
Modern Procedure for Applicative Teaching, by Using a Flexible Software Interface for Simulation of Some Optical Phenomena.....	234
Barbu Cristian BRAUN	
Laboratory of Things: Virtual Laboratory for Signal Processing Experiments.....	242
Corina CÎMPANU, Robert-Gabriel LUPU, Florina UNGUREANU	
Teaching Computer Engineering Concepts to Non-Technical Students.....	249
Ioana CULIC, Alexandru RADOVICI, Jan Alexandru VADUVA	
New technologies in medical education: The Potential of Video Resources – YouTube Channeling	255
Cristina Gena DASCALU, Vasile Lucian BOICULESE, Mihaela MOSCALU, Magda Ecaterina ANTOHE, .	
NTC (Nikola Tesla Center) Camp and Information and Communication Technologies – Kids Evaluation of Innovative Learning Techniques	264
Andrea DEBELJUH, Maja RUŽIĆ BAF, Ranko RAJOVIĆ	
Using a Web-Based Framework to Build and Experiment with Virtual Reality Worlds	273
Andrei George FLOREA, Cătălin BUIU	
A Review of Eye Tracking in Elearning.....	281
Alexandra HUȚANU, Patricea Elena BERTEA	

AdABI: an Adaptive Assessment System Based on Bayesian Inference	288
Anata-Flavia IONESCU, Dragoş SBURLAN	
The Impact of the Virtual Assistant (VA) on Language Classes	296
Ana Mihaela ISTRATE	
Comparison Between Assisted Training and Classical Training in Nonformal Learning Based on Automatic Attention Measurement Using a Neurofeedback Device	302
Dan MUNTEANU, Nicoleta MUNTEANU	
Implicit Evaluation of Chess Knowledge in Non-Formal Learning Using Automatic Image Processing and Deep Learning	310
Dan MUNTEANU, Nicoleta MUNTEANU	
The Integration of IoT Projects in Undergraduate Education	318
Marin OPREA	
The Role of Disgust and Fear in the Educational Environment: Theoretical Aspects and Proposal of a Computerized Intervention	326
Simona Alexandra PASCAL, Cătălin NEDELCEA, Ioana Roxana PODINA	
A Very Practical Approach for System Engineering Curriculum	334
Mihail PASCU, Radu Nicolae PIETRARU, Adriana OLTEANU, Maximilian NICOLAE	
Providing Semantically-Enabled Information for SmES knowledge workers: Multi-agent-based middleware	341
Ramona Cristina POPA, Bujor PAVALOIU, Nicolae GOGA	
E-business Learning Tool for Online Banking Based on BPM (Business Process Management)	350
Radu RĂDESCU, Tudor ARDELEAN	
Study Platform for Complex Data Analysis of Telecommunications and Social Network Applications Using Business Intelligence	358
Radu RĂDESCU, Valentin MURARU	
Development and Validation of a Multimedia Instructional Package for Teaching Basic Electronic Devices at Upper Basic Education Level	366
Mustapha Sumaila SANI, Bello HASSAN	
Applying Kolmogorov Complexity for High Load Balancing Between Distributed Computing System Nodes	376
Maria STEPANOVA	
Finding General Guidelines for Redesign of Learning Spaces	383
Robin STØCKERT, Piet VAN DER ZANDEN, Duncan PEBERDY	
Mobile Application and Wi-Fi Network Security for e-Learning Platforms	393
George SUCIU, Muneeb ANWAR, Cristiana ISTRATE	

Strategic Technologies: Innovation in Higher Education in Romania	400
Luiza-Maria TURLACU (LAZAR), Gheorghe ORZAN, Raluca-Giorgiana CHIVU, Tania HERREZEEL	
Teaching Object Oriented Programming by Visual Devices	407
József UDVAROS	
Methods of Artificial Intelligence in Economical and Logistical Education	414
József UDVAROS, Ákos GUBÁN, Miklós GUBÁN	
The potential of City Information Modeling (CIM) in Understanding and Learning from the Impact of Urban Regulations on Residential Areas in Romania	422
Teodora UNGUREANU	
Visual Tool for Learning GPU Programming	429
Alexandru Mihai VULCAN, Maximilian NICOLAIE, Radu Nicolae PIETRARU	
A System for Modelling and Visualizing Processor State During Code Execution	438
Alexander YERMAKOV, Iurii STROGANOV	
An Object-Oriented Reasoner for Saturation of Logical Knowledge Bases	444
Andrei ZAMFIRA	
Using the Activity Theory to Identify the Challenges of Designing Elearning Tools based on Machine Learning for Security Operations Centers	452
Mihail CAZACU, Constanța BODEA, Maria-Iuliana DASCĂLU, Cristian CUCU	
A Quantitative Research for Determining the Medical User's Interest and Interact with E-Learning in the Medical Social Media System Targeted for the Iraqi Environment	462
Sarmad Monadel Sabree AL-GAYAR, Mohammed Safaa Mohamed SHUBBER	
E-School Management System Based on Satellite IMT-Advanced Technology	472
Naseer Abdulkarim Jaber AL-HABEEB, Sarmad Monadel Sabree AL-GAYAR	
Didactic Instrument Developed in Geogebra for the Determination of the Coordinates of an Earthquake Based on an Inquiry Based Learning Method	481
Fabiola-Sanda CHIRIACESCU, Bogdan CHIRIACESCU, Cristina MIRON,	
The Impact of E-Learning on the Future Job Market – Predicting a New Educational Type of Learning Style for The Next Generations	489
Alexandru DARIE, Roxana POSTELNICU, Cezar SCARLAT	
Relearning Life: A Study on Learning Experience and Life Satisfaction while Recovering	495
Cristiana LOTREA, Adriana Sarah NICA, Ilinca Brîndușa MITOIU	
Treatment Assignment Based on Automatic Learning for the Pregnant Women Suffering from Preeclampsia	501
Iuliana MARIN, Nicolae GOGA	

E-Learning to Support Online Training in Software Project Management for Better Work-Life Balance	507
Roxana POSTELNICU, Alexandru DARIE, Cezar SCARLAT, Elena Laura TRIFAN	
Developing Intercultural Competences by Means of a Technology-Mediated Learning Model	517
Roxana Anca TROFIN	
Improving Patient Education and the Transition Process Using Virtual Reality	523
Tamara VAGG, Sabin TABIRCA, Cathy SHORTT, Claire FLEMING, Barry PLANT	
Index of authors.....	527

The 15th International Scientific Conference
eLearning and Software for Education
Bucharest, April 11-12, 2019
10.12753/2066-026X-19-020

A Full Spectrum Lifelong e-Learning Project for the Army

Enrico SPINELLO, Gianluca TORBIDONE

*The IT-Army Education and Training Command and School of Military Applied Studies, Via dell'Arsenale 22, Turin, Italy
enrico.spinello@esercito.difesa.it, gianluca.torbidone@esercito.difesa.it*

Marina MARCHISIO, Sergio RABELLINO

*Department of Mathematics, Via Carlo Alberto 10, Computer Science Department, Corso Svizzera 185,
University of Turin, Turin, Italy
marina.marchisio@unito.it, sergio.rabellino@unito.it*

Abstract: Nowadays a large organisation requires a solid and efficient system for managing the learning process of internal organisation in a lifelong learning perspective. The Italian Army decided to boost the lifelong learning concept for military personnel in a modern and digital way by using the e-learning environment. This decision was based on the long experience of the Education and Training Command and School of Applied Military Studies (COMFOR-SA) Virtual Learning Centre (VLC) and its cooperation with the University of Turin in the field of e-learning. This cooperation allows to adopt innovative teaching and learning methods and enhance the internationalization program of the Bachelor and Master Degree in Strategic Sciences attended by Officers and civilian students. In order to reach the entire potential target audience, composed of all categories, such as Officers, NCOs and Volunteers, and to maximise the use of e-learning for different didactic purposes, a full spectrum lifelong e-learning project was developed. Initially, the focus was based on the development of a special Hub composed of the Portal for Self-Paced Courses in combination with the Portal of Knowledge and the Support Portal. Then, the User's E-portfolio and the Language Portal were added. The Hub expanded its area of competence and additional portals were created. All e-learning resources and activities were properly reorganised and structured in a full spectrum new concept for a more effective e-learning experience for all military education and training purposes. The aim of this paper is to present and discuss the structure of the project in terms of contents, design and solutions adopted.

Keywords: Army; E-learning; Life Long Learning; Military Education; Military Training.

INTRODUCTION

Nowadays, large organisations cannot avoid dealing with themes like the education, the transfer of specialized and sectorial knowledge, the professional updating and the spreading out of information linked to a specific working environment and job profile, to all internal personnel in a lifelong perspective. In other words, the permanent learning that accompanies the individual during the entire working life and not only. Consequently, the focus is moving to how it is possible to make the lifelong learning process more efficient and effective than we realize and how to use modern technology to make its use easier and define a more attractive way for it. When the potential target audience involved is extended and widespread within the country, and sometimes even abroad, the situation requires a model based on quality, functionality and efficiency. In this way, it is possible to merge the easy way with the modern time frame to use it (when and where). The Army is a large organisation with all the above mentioned requirements and, some years ago, it started to invest resources in e-learning as a key factor for enhancing the internationalization process, for having a modern didactic and recently also for an effective permanent learning. The IT-Army Education and Training Command and School of Applied Military Studies with its Virtual Learning Centre (VLC)

initially satisfied the educational needs by using e-learning as a distance learning tool before the residential phase, and later, in cooperation with the University of Turin, it started a new program for enhancing a modern quality didactic by using new technologies in support of all courses provided in face to face modality., [4], [6], [8]. In order to reach the entire potential target audience, composed of all categories, such as Officers, NCOs and Volunteers, and to maximise the use of e-learning for different didactic purposes, a full spectrum lifelong e-learning project was developed. Initially, the focus was based on the development of a special Hub composed of the Portal for Self-Paced Courses in combination with the Portal of Knowledge and the Support Portal, [7]. Then, the Hub expanded its area of competence and additional portals were created. All e-learning resources and activities were properly reorganised and structured in a full spectrum new concept for a more effective e-learning experience for all military education and training. The aim of this paper is to present and discuss the structure of the project in terms of contents, design and solutions adopted.

I. THE STATE OF ART

The learning needs within the Army are grouped in two different types. The first group is composed of all needs as an education and training provider, since the Army is responsible for enrolled personnel and giving them initial, basic and advanced education and preparing them for the specific tasks (specialization). It is also responsible for whenever a transfer between categories occur including high level education. At the same time, it is necessary to train and qualify soldiers, NCOs and officers before they become committed for specific tasks in missions and operations in Italy or abroad. In all these cases it is necessary to reach and maintain high quality standards, to invest economic resources in the best way possible and to ease the achievement of all goals by using all available instruments and tools.

The second group is linked to a general necessity for every single person who works in the Army independent of his/her position within the organization: Soldier, NCO or Officer. The individual during his career will be involved in different commitments, in several situations, often in a complex environment. Thus, he requires to be updated quickly and whenever he is deployed when he recognizes to have some gaps and he consequently needs to find technical information and regulations. He has to have access to colleagues with similar job profiles and specialized personnel with whom to collaborate and share solutions and best practice. We also need to add the natural desire to enlarge the personal knowledge in order to progress in their careers or reach a better position.

In order to satisfy these requirements the Army initially requested to an external company to provide an e-learning platform, but without the necessary flexibility and with a budget consuming way. Later on, it opted for an open source Learning Management System (LMS) and at the same time it obtained to value internal personnel and develop their competencies in cooperation with the University of Turin. In this way it was possible to use e-learning not only for distance learning but also for blended courses, also in post-degree learning activity. These opportunities enriched the regular face to face courses [4]. Consequently, the demand arises to redesign a new model in order to be able to reply globally to all possible learning requirements and necessities.

Other military institutions have similar requirements but none create a global solution able to reply to a large spectrum of learning requirements. All of them moved to an open source LMS but with tailored solutions for a specific need.

II. RESEARCH QUESTION

The main research question is how it is possible to satisfy all military learning requirements in a global way, or, in other words, how to create a learning model able to:

- alternate collective learning moments to individual ones;
- provide an active tutoring service and at same time an adaptive path.

The person is the centre of the project independent of his function as student or teacher. Moreover, the model was conceived in a multiform and easy to use way in order to avoid efforts being cancelled out by difficulty-of-use and the individual is the only one responsible for his learning, methods, way and time for realizing it.

III. THE FULL SPECTRUM LIFELONG E-LEARNING PROJECT

E-learning is the instrument identified as able to realize the lifelong learning project with the idea to provide all personnel with an effective and modern tool. In this way, it is possible to contribute to a development for the entire military community based on knowledge. The main concept is based on the idea that in adults' learning (knowledge, skills and competencies) the key word is a constant and lasting engagement of every individual during the entire career in the organization. The project adopted the e-learning definition given by Clark and Mayer in [2] "as instruction delivered on a computer with the following features:

- includes content relevant to the learning objective;
- uses instructional methods such as examples and practice to help learning;
- uses media elements such as words and pictures to deliver the content and methods;
- may be instructor-led (synchronous e-learning) or designed for self-paced individual study (asynchronous e-learning);
- builds new knowledge and skills linked to individual learning goals or to improved organizational performance."

In other words, e-learning represents one of the possible answers that education could offer in a changing environment: the physical distance between teachers and students where interactions with computers and tutors, collaborative learning in a virtual environment, simulation in real time, as experimented in [5], flexibility, timely updating and accessibility are reality. With the e-learning, it is possible to manage the entire didactic process with several aspects such as provision, fruition, interaction, evaluation, tutorship, collaboration, self-management and self-determination of personal learning.

3.1 The instructional Design Framework adopted

In order to foster learner engagement in online learning, the E-Learning Engagement Design (ELED), described in [3], was adopted. ELED is a procedural framework that applies many of the common steps of instructional design models to the question of how to incorporate best practices for student engagement in online learning.

The methodology consists of four phases.

- In the first one, we identified the instructional needs using the class observations made by teachers, test results, questionnaires and interviews to personnel. The characteristics of the learners were described in order to better understand their instructional needs. The learner analysis was considered important because their experiences, motivational beliefs, and self-regulatory competence in online situations are relevant factors for a positive impact in their online learning and performance [1].
- Using the results on instructional needs, goals and objectives of each portal were defined (phase 2). Different methods were adopted in order to reach the goals. For instance, as for the activities in which the learner is not helped by a tutor, many activities with immediate and interactive feedback were adopted; moreover, the objectives to be achieved and the mandatory contents were indicated in each unit.
- In phase 3, the Learning Environment was developed, integrated with many tools, with particular attention to online learning activities as online discussions, online lab activities, problem solving activities, peer evaluations and formative assessment, in order to allow learners to check their preparation.
- Finally, in the fourth process phase of ELED, summative assessment activities covering both learning and instructional effectiveness assessments were inserted, such as tests, assignments, and questionnaires.

3.2 The integrated portals

The entire system has a structured net composed of ten portals where the LMS is MOODLE, the Content Management System (CMS) is Joomla, the e-portfolio is a Mahara platform and a OSTicket platform exist. In the phase 0 of the Project the Portal for Self-Paced Courses was created, in combination with the Portal of Knowledge and the Support Portal, and afterwards the User's E-portfolio and the Language Portal were added. This allowed to verify that the entire system works.

The Portal of Self-paced courses

The Self-paced portal has the function to guarantee continuous education for dependent personnel and it is for all categories, Officers, NCOs, Volunteers and civilians. The platform hosts courses in the e-learning format and can be attended at any moment during the career. It is possible to create a specific and personalized learning path and some steps will be compulsory in case the individual wants to upgrade. The educational progresses are highlighted by competencies obtained (clearly described in each course) and electronic badges will testimony them. In this way, it is possible to profit by using the capacity of MOODLE LMS for designing specific competencies that can be outlined and planned in a centralized mode.

The Portal of Knowledge

The Portal of Knowledge has the task to provide a multimedia library with all military publications and videos for all disciplines. It was created with the idea to set up a sort of circle of readers where users can have access to required contents and eventually confront with subject matter experts in an interactive and multimedia environment. Virtual classrooms are available, where it is possible to provide short lessons for deepening classes by using webcam and microphone. The direct link between users and experts is allowed. The MOODLE Database resource allows the creation of a repository of publications in order to speed up the research of topics and issues. The system is indexed by using keywords. This way, an important evolution is obtained: from all MOODLE platforms it is possible to link to the publications, to update them, etc.. Everything is transparent to the courses because the link is preserved. If in a specific course there is a link to a publication and this publication will be updated there is nothing to do.

The Portal of Foreign languages

The Portal of Foreign Languages has the purpose of providing in e-learning format Foreign languages courses. Due to the complexity of the discipline it requires a lot of plug-ins available on MOODLE and a dedicated platform was created. The high specialization of this platform permits to have a peculiar environment tailored for deepening a foreign language with multimedia resources. This platform is managed by IT-Army School for Foreign Languages and will host courses for keeping and updating the NATO Standard Joint Forces Language Test (JFLT).

The E-Learning Portal

The E-learning Portal was created for hosting all courses with a tutorship service, virtual classroom and teachers' availability. The difference between the portal described as above and this one is that here courses are under teachers' control with the help of tutors and mentors and students have to fulfill required tasks and may have synchronous or asynchronous meetings with them. For these reasons, this portal will host all distance phases organized as mandatory or optional parts of a residential course.

The E-Portfolio

This platform, based on Mahara but fully integrated with Moodle, provides the environment where learning and sharing are combined and it is possible to create a net of contacts by using the social aspects of Mahara. Every person can upload achievements, paper works, studies and materials and then share them with other experts or interested people.

MOODLE Support Platform

This portal, based on MOODLE integrated in the portal system, has the task to support students and teachers in the use of MOODLE. The goal is to create an integrated environment where it is possible to overcome technical or didactic problems with the supervision of experts of e-learning and technician. Teachers can request a specific space where it is possible to evaluate and test MOODLE plug-in, resources or activities. MOODLE mini-courses are available for users so they can familiarize and explore all potential resources in MOODLE environment. A dedicated space for MOODLE Administrators is available for technical discussions and forums.

The Ticketing Service

The Ticketing Service was created as an integrated part of the system and it is possible to have access with the same authentication procedure. Every user identified in the system can create a ticket and request help for solving his problems. The problem will be solved by the right Administrator (course or platform) with a potential reduction of waiting time. The ticket is limited to malfunctions, help request for registration and identity problems while for learning how to use the platform the Support platform was created.

The E-learning Service Portal (Portale Servizi ELEarning dell'Esercito - SELENE)

This portal has a double purpose. The first one is to create and manage the federate account to the E-learning system. By using SELENE, the personnel can create his own account and use personal data in line with new General Data Protection Regulation (GDPR), consequently he can manage them (change password, etc.) and eventually send specific requests according to the GDPR. In order to research a course in all portals a keyword research is available. All courses are listed in a dedicated Hub that provides course descriptions and all related info. The registration of every course within the Hub is fully automated and the activation is demanded to the teachers by clicking a specific button.

The Multimedia Portal

The Multimedia Portal is the entry point for the e-learning system. This portal contains all the info for a proper use of the system and allows to consult all categories of courses provided by the entire system. This way, users can have an idea of how to reach the right course, search and choose the right path for looking for or creating a specific course. It is designed in order to ease the access to all multimedia video resources (like Youtube).

The Portal of Virtual Classroom

The Portal of Virtual Classroom is based on Software Open Big Blue Button (BBB) and allows to create virtual classrooms within regular courses, if activated by teachers. It will be possible to virtually take part to the courses by using webcam and microphone. Students can participate during the lesson by using whiteboard and chat communication systems.

3.3 Contents

The contents produced by teachers and experts and uploaded to the system can be grouped in three different categories, related to the different military education needs:

- Contents for self-training: all contents created for this group are available to be attended by students whenever and wherever they can or need. These courses are provided in a self-paced mode and the positive end of the course allows the participation to higher level activities. Normally, this type of courses are not mandatory but they can help personnel in future applications for specific positions;
- Contents for supporting face to face didactics: all resources and materials that can be used in order to deepen topics developed in regular courses (face to face) by providing additional items such as didactic materials, lessons, slides, multimedia objects, videos, automated tests and everything that can be provided by teachers in order to better prepare students for the regular lesson. The best practice requires that materials are provided before the lesson for a better preparation or/and at the end for deepening topics for additional tasks or the final exams;
- Online Module: they can be provided within the Virtual Learning Environment (VLE) with the support of tutors. During the participation to the course, users can be monitored by teachers or other people with the authority like tutor/mentor. Internet Distance Learning (IDL) phase or international module that are delivered partially in IDL can be considered in this category.

IV. ANALISYS AND DISCUSSION OF THE PROJECT

4.1 Technical solutions adopted

The portals, mainly based on MOODLE, have an organization of back-ends for the link among them that grant the essential features listed below:

- self-registration to the portals due to the numbers of users (up to 100.000);
- identity security for personnel when they register;
- SSO integrated environment;
- back-end security (database and personal data);
- front-end security;
- online tool authoring implementation.

The graphic below shows interaction between portals created for implementing the project.

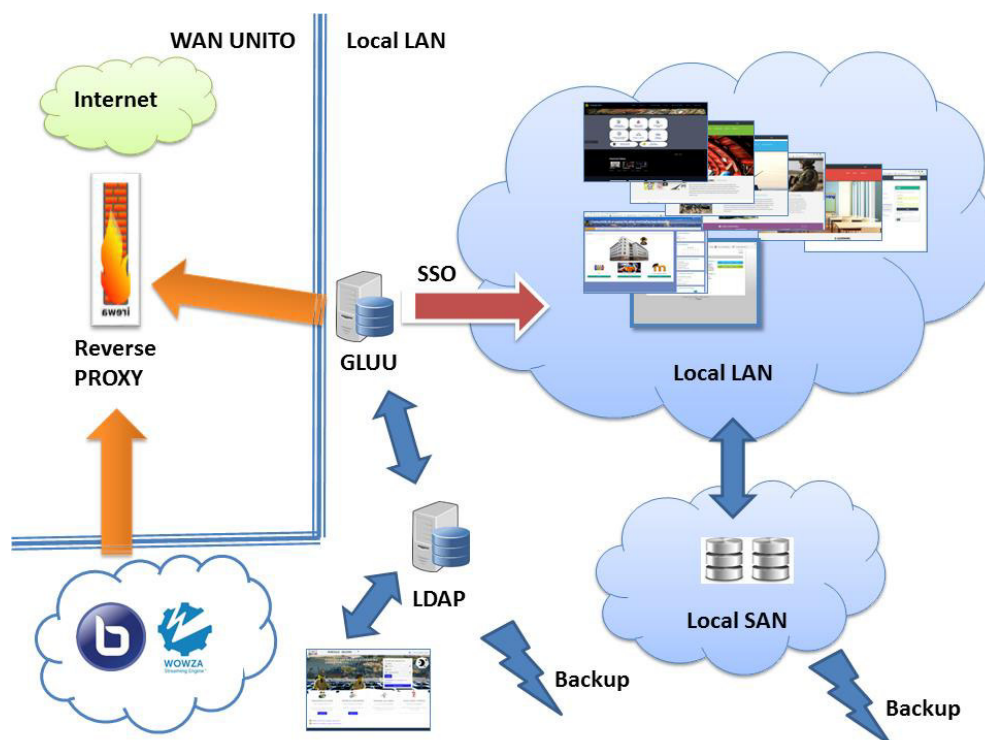


Figure no. 1. Portal interactions

All servers are fully integrated in a LAN (Figure 1) and they go online by using a Reverse Proxy on the UNITO Net via GARR. The Single Sign On (SSO) environment is granted by GLUU, it permits through a SAML2 Protocol the interconnection between all MOODLE applications with the internal LDAP in GLUU. This last one is synchronized with the external LDAP, where all utilizations are managed and where the initial registrations of users are realized. A self-registration procedure is managed by a dedicated MOODLE application (SELENE Portal) that allows the accounts management under every aspect (creation, modification and cancellation) with a plug-in of self-registration via email. The mail procedure is linked to the personal domain of the person who wants to have access. This is the only application outside the SSO because it has direct access to LDAP Directories for their maintenance. In addition, this portal is configured as MOODLE HUB for the registration of courses. In this way, the search procedure for course is transversal on all platforms: the research is given by key word for every course available on each platform.

Database and MOODLE-Data are hosted on a SAN realized ad hoc, they are replicated on several NAS as snapshots of virtual machines and as master-slave technology. Due to the Reverse Proxy, all machines are linked in a load balancing and so they are able to face malfunctions of back-ends or front-ends.

The Multimedia Portal has a specific catalyst and switching functions and it works as a container for SELENE application by JOOMDLE plug-in. The portal works as an information center for all info (like opening new courses, forwarding news, etc.) and offers research procedures because it is interconnected with the SELENE Portal. It also offers the collection of all didactic videos published on all platforms, VOD created ad hoc, the possibility to create a personalized playlist e due to a link with a dedicated WOWZA server gives the possibility to attend in streaming meetings, interviews, cultural activities, etc.

4.2 The VLE users' community

Since the opening of the first group of portals and after first operators' MOODLE courses, we can affirm that a military MOODLE community was created. Now, they work in autonomy and they exchange information. There are 5700 users, 129 courses are uploaded and used, 13 of them are dedicated to foreign languages. Currently, 1540 people have attended courses for peculiar training. Initially, there was a shyness during forum sessions and uncertainty before uploading courses and materials. The tutors' presence during basic and advanced MOODLE courses helped a lot in the first case while for the second one it was offered the opportunity to participate to a course for instructional designers. It helped to think about contents and modalities and on how to prepare Learning Objects ready to be used and shared. This model was tested in several courses for basic education by using MOODLE platform for Military personnel, some of these courses were at university level, especially for scientific disciplines, for young Officers and in some specific exercises for post-graduated Officers at level of Captains and Majors.

V. CONCLUSIONS AND FUTURE

The challenge is to create an effective and useful lifelong learning process for the Organization and the personnel involved in the learning process by using this specific model.

The feedback and results of the pilot experiments were extremely positive and pushed the organization to invest more resources in this field. In the next future, we are going to collect additional data in order to understand how it is possible to move on from this stage and trying to evolve the entire process. For instance, we are interested in studying the learning analytic for improving didactic but also for understanding the difficulties of the learners and intervene whenever necessary, in enhancing the internationalization process and helping small entities (like small units and barracks) and encourage them to use the system for several different activities.

We think that the model could offer new educational strategies coherent with future changes and needs.

Reference Text and Citations

- [1] Artino, A. R., & Stephens, J. M.: Academic motivation and selfregulation: A comparative analysis of undergraduate and graduate students learning online. *The Internet and Higher Education*, 12(3–4), 146–151 (2009).
- [2] Clark, R. C. & Mayer, R. E.: Learning by viewing versus learning by doing: Evidence- based guidelines for principled learning environments. *Perf. Improv.*, 47: pp. 5-13 (2018).
- [3] Czerkawski, B. C. & Lyman, E. W.: An Instructional Design Framework for Fostering Student Engagement in Online Learning Environments. *TechTrends*, vol. 60(6), pp. 532–539 (2016)
- [4] Marchisio, M., Rabellino, S., Spinello, E. & Torbidone, G.: Advanced e-learning for IT-Army officers through Virtual Learning Environments. *Journal of e-Learning and Knowledge Society*, vol. 13(3), pp. 59-70 (2017).
- [5] Marchisio, M., Rabellino, S., Spinello, E. & Torbidone, G.: Impiego di strumenti near-realtime per condurre una esercitazione pratica in ambito militare. *Proceedings della Multi-conferenza EM&M ITALIA 2017*, pp. 641-649 (2018).
- [6] Marchisio, M., Rabellino, S., Spinello, E. & Torbidone, G.: Innovazione della formazione: il modello di e-learning adottato dall'Esercito Italiano. In *Exploring the Micro, Meso and Macro Navigating between dimensions in the digital learning landscape: EDEN 2018 CONFERENCE*, pp.774-783 (2018).
- [7] Marchisio, M., Rabellino, S., Spinello, E. & Torbidone, G.: The COMFOR-SA Virtual Learning Centre Becomes a Special Hub for Gaining New Modern Standards for the IT-ARMY E-Learning Programmes. DOI:10.12753/2066-026X-18-068.. In *ELEARNING AND SOFTWARE FOR EDUCATION - ISSN:2066-026X vol. I* pp.479-486 (2018).
- [8] Marchisio, M., Rabellino, S., Spinello, E. & Torbidone, G.: E-learning as winning tool for supporting teaching and for enhancing the internationalization processes. DOI:10.12753/2066-026X-17-015. In *ELEARNING AND SOFTWARE FOR EDUCATION - ISSN:2066-026X vol. 1*, pp.101-108 (2017).

INDEX OF AUTHORS

- ALBEANU Grigore, 215
ALECU Alin Adrian, 221
AL-GAYAR Sarmad Monadel Sabree, 462, 472
AL-HABEEB Naseer Abdulkarim Jaber, 472
ANTOHE Magda Ecaterina, 255
ANWAR Muneeb, 393
ARDELEAN Tudor, 350
ARNAB Sylvester, 30
AVATAVULUI Cristian, 188, 202
BAALSRUD HAUGE Jannicke, 30
BADESCU Laura, 165
BALAN Oana, 209
BĂLUȚOIU Maria Anca, 173
BARITZ Mihaela Ioana, 53, 228
BEAUFOY Jayne, 30
BECEANU Cristian, 194
BERTEA Patricea Elena, 281
BODEA Constanța, 452
BOGHIAN Ioana, 138
BOIANGIU Costin-Anton, 188, 202
BOICULESE Vasile Lucian, 255
BRADAU (BADEA) Ileana Ruxandra, 122
BRATOSIN Ioan-Alexandru, 46
BRAUN Barbu Cristian, 53, 228, 234
BUIU Cătălin, 273
BUTEAN Alexandru, 61
CALDERWOOD Jackie, 30
CĂLINOIU (ION) Nicoleta, 68
CAZACU Mihail, 452
CHACHANIDZE Elizaveta, 78
CHIRIACESCU Bogdan, 481
CHIRIACESCU Fabiola-Sanda, 481
CHIȘCARIU Radu-Emanuel, 159
CHIVU Alina Cristina, 83
CHIVU Raluca-Giorgiana, 400
CÎMPANU Corina, 242
COSMOIU Ana Maria, 91, 104
COTEȚ Teodor-Mihai, 165
CUCU Cristian, 452
CULIC Ioana, 159, 249
CZAKÓOVA Krisztina, 110
DAN-SUTEU Stefan-Antonio, 130
DARIE Alexandru, 489, 507
DASCALU Cristina Gena, 255
DASCĂLU Maria-Iuliana, 452
DASCĂLU Mihai, 165
DEACONESCU Răzvan-Adrian, 188, 202
DEBELJUH Andrea, 264
DOBRE-TRIFAN Ciprian Gabriel, 221
DRĂGOI George, 46
FLEMING Claire, 523
FLOREA Adrian, 61
FLOREA Andrei George, 273
FLOREA Iulia-Maria, 159
GEISS Tanja, 116
GHIAȚĂU Roxana Maria, 138
GÎFU Daniela, 181
GIORGI Graziano, 130
GOGA Nicolae, 46, 341, 501
GOLDBACH Ioana Raluca, 11
GRĂDINARU Alexandru, 173
GROȘU Corina, 98
GROȘU Marta, 98
GUBÁN Ákos, 414
GUBÁN Miklós, 414
HAMZA-LUP Felix, 11
HASSAN Bello, 366
HERREZEEL Tania, 400
HUSSAIN Ijaz, 194
HUȚANU Alexandra, 281
IONESCU Anata-Flavia, 288
ISTRATE Ana Mihaela, 296
ISTRATE Cristiana, 393
IVASCU Silviu, 209
LOIZOU Michael, 30
LOTREA Cristiana, 495
LUPU Robert-Gabriel, 242
MARCHISIO Marina, 152
MARIN Iuliana, 501
MĂȚĂ Liliana, 138
MIRON Cristina, 481
MITOIU Ilinca Brîndușa, 495
MOCANU Irina, 202
MOLDOVEANU Alin, 173, 209
MOLDOVEANU Florica, 173, 209
MORAR Anca, 173, 209
MOSCALU Mihaela, 255
MUNTEANU Dan, 302, 310
MUNTEANU Nicoleta, 302, 310
MURARU Valentin, 358
NAZARE Ana-Karina, 173
NEAGU Laurențiu-Marian, 165
NEDELCEA Cătălin, 83, 91, 326

NICA Adriana Sarah, 495
 NICOLAE Maximilian, 334, 429
 OLESCU Marco Leon, 61
 OLTEANU Adriana, 334
 OPREA Marin, 318
 ORZAN Gheorghe, 400
 PASCAL Simona Alexandra, 326
 PASCU Mihail, 334
 PAVALOIU Bujor Ionel, 46, 221, 341
 PEBERDY Duncan, 383
 PIETRARU Radu Nicolae, 334, 429
 PLANT MD Barry, 523
 PODINA Ioana Roxana, 91, 104, 326
 POENARU Alexandra Georgiana, 138
 POPA Ramona Cristina, 341
 POPENTIU-VLADICESCU Florin, 215
 POSTELNICU Roxana, 489, 507
 PRODAN Marcel, 188, 202
 RABELLINO Sergio, 152
 RĂDESCU Radu, 350, 358
 RĂDOI Mireille, 173
 RADOVICI Alexandru, 249
 RAJOVIĆ Ranko, 264
 ROMAN Daniel, 145
 ROMAN Gigi, 116
 RUGHINIŞ Răzvan, 159, 202
 RUŽIĆ BAF Maja, 264
 SANI Mustapha Sumaila, 366
 SBURLAN Dragoş, 288
 SCARLAT Cezar, 489, 507
 SHORTT Cathy, 523
 SHUBBER Mohammed Safaa Mohamed, 462
 SIMION Eugen, 165
 SPINELLO Enrico, 152
 STĂNICĂ Iulia-Cristina, 188
 ŞTEFAN Antoniu, 11, 30
 ŞTEFAN Ioana Andreea, 11, 30
 STEPANOVA Maria, 376
 STØCKERT Robin, 383
 STOFFOVÁ Veronika, 110
 STOFFOVÁ Veronika, 20, 39
 STROGANOV Iurii, 438
 SUCIU George, 393
 TABIRCA Sabin, 523
 TĂUT Codrin, 188
 TOCU Nicolae Adrian, 61
 TOMA Ana, 104
 TORBIDONE Gianluca, 152
 TRĂUŞAN-MATU Ştefan, 165
 TREMBLAY Remi, 116
 TRIFAN Elena Laura, 507
 TROFIN Roxana Anca, 517
 TURLACU (LAZAR) Luiza-Maria, 400
 UDVAROS József, 407, 414
 UNGUREANU Florina, 242
 UNGUREANU Teodora, 422
 VADUVA Jan Alexandru, 159, 249
 VAGG Tamara, 523
 VASILESCU Cristian, 194
 VÉGH Ladislav, 20
 VLĂSCEANU Georgiana Violeta, 188, 202
 VULCAN Alexandru Mihai, 429
 YERMAKOV Alexander, 438
 ZAMFIRA Andrei, 444
 ZANDEN VAN DER Piet, 383