

# Using simulations and experiential learning approaches to train carers of seniors

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**Abstract**—To tackle the problem of training the carers of senior citizens numerous educational options may be attempted. However, the emerging complex puzzle of the diversity of training needs for the aforementioned trainee group, consisting of a mixture of formal and informal carers, calls for a careful and perhaps more radical than the usually attempted approach. To this extent, this paper describes elements of the innovative efforts followed upon the training design of the DISCOVER EU project. Specifically, simulations of virtual patients in Second Life are exploited in conjunction with educational components and objects in semantically extended e-learning environments, in an attempt to make more realistic everyday training cases and diverse topic, content rich approaches. The whole endeavor is presented in view of the existing limitations to elderly carers' training and is soon to lend itself to a rigorous pilot phase in Greece. Planned evaluation sessions are envisaged to certify successes, to inform for any required improvements but also to identify pitfalls.

**Keywords**—training of carers; elderly care; e-learning; virtual patients; second life; experiential learning; simulation.

## I. INTRODUCTION

Population ageing constitutes an unprecedented challenge for human societies, a challenge which may be moderated by recent advances in information and communication technologies (ICT). These technologies aim at assisting the healthcare of elderly people, while keeping up the quality of their carers' life and their self-confidence [1]. Recent informal statistics report that there are 1.5 million people caring for a relative or friend with a mental health problem or dementia.

It is reported in the literature [2] that for the elderly who do receive care, more than half of it is delivered as informal care, a quarter is delivered as formal care and a fifth as mixed care. From these data, it becomes apparent that family, as the main source of informal care, is the most important provider of this type of care. On the other hand, formal care supports individuals who live alone in their household and are unable to rely on the support of their spouse, children or anyone else. Additionally, the socioeconomic conditions constitute a crucial factor to the level of care provided. For example, poor elderly

individuals seem to acquire formal care less often than their more wealthy counterparts. This highlights the problems of access to resources (financial or otherwise) that the elderly may face in receiving formal care services [2].

Qualitative, observational research has found that most carers suffer a reduction in time for leisure and social activities that, consequently, limits their opportunities for much needed social support. They feel thrown into the caring role without receiving enough assistance, lacking education and training for their role as carers. Formal carers, specifically, are usually restricted to basic education due to the time-consuming type of their daily work activities and limited-access in online services. Family carers, on the other hand, are often discouraged from approaching education services through a combination of lack of digital skills and feelings of isolation. Family informal carers have specifically reported that they are poorly informed regarding their duties due to having to respond to new roles and responsibilities in caring [3].

To tackle these problems, different project initiatives have emerged around the globe. It is the aim of this paper to provide the basic rationale and strategy behind an innovative, simulation-based, experiential learning approach into the problem of "training the carers of elderly". The approach, stretched across emerging virtual platforms, as well as, contemporary web tools which have recently become available in the problem/case based learning arena, is taken against the conservative notion that "carers need something very simple and plain". The adopted approach assumes that if the excitement of new technologies is combined with the learner-centric focus of problem/case/experience based training, then existing training limitations may be overcome. So, the objective of this paper is to show how these technical and educational limitations have been tackled while designing pilots for training carers in Greece within the context of a project called DISCOVER which is funded at the European level.

So, the remaining of this paper is structured as follows. In section II we provide an account of the limitations in training carers, as well as, the related background on simulation and

case-based experiential learning. The DISCOVER approach is then detailed in section III together with the design considerations for the training pilot in Greece. The whole concept is discussed in view of the expected evaluation data collection after the kick-off of the trials.

## II. BACKGROUND

### A. Limitations to the carers' training

The main barriers to appropriate healthcare among the elderly family carers are cost, seniors' limited abilities, and low levels of clinical training received by carers. Seniors are often dependent on their carers to perform all their daily activities [4]. Furthermore, it seems that there is a gap between the perceptions of formal and informal caregivers about the needs of the cared for persons. The in-hospital informal caregivers perceived that they have more educational and informational needs (patients care, disease, treatment, nutrition, insurance funds, etc.) than the nurses. For the nursing staff, the factors that influence the training needs of patients' caregivers are the educational level and the years of working experience [5]. This emerging puzzle of the disparity of needs calls for radical and innovative, but yet well founded, in other contexts, approaches.

### B. Experiential learning approaches

Key recent policy initiatives have highlighted quality of life (Department of Health and Medical Research Council 2009) and communication (Commission for Social Care Inspection (CSCI) 2008) as target areas for improvement in dementia care.

Socio-cultural theory, as its name indicates, holds that learning is an essentially social process with procedures and outcomes that have cultural and historical dimensions. Two main perspectives are prominent in contemporary socio-cultural learning theory: one is activity theory; the other is communities of practice (COP) theory. Whilst they share the above tenets, they differ in their focus [6].

In the context of healthcare education, the experiential learning approaches are most commonly applied to educational episodes which have been included in a curriculum design to bring the learner into contact with others in a particular role and context. Experience gained in workplaces through education with real-life services can help carers, for example, to learn practicing professionally as healthcare providers. Learners in workplaces are seeking to construct a sense of identity as well as gain knowledge and skills, and will therefore appreciate any help provided to them that gives experiences that promotes their personal career goals. Offering participatory roles appropriate to each learners' stage of training, with gradual increases in responsibility, is one way to ensure that they gain a sense of purpose and legitimacy through making meaningful contributions to the needs of the workplace [7]. This kind of experiential and social learning, that is learning by asking questions and doing things relevant to the field [8], is a perfect match for simulation/virtual environments that contains meaningful interaction with realistic challenges.

### C. Simulation/Case based learning

Cant and Cooper conducted research and reported that simulation based education was more effective on knowledge

transfer, compared to traditional lectures. In that context, the simulation-experiential teaching techniques seem to be a valid method of education, and control group studies have shown additional gains in knowledge, critical thinking and perceived clinical confidence, or satisfaction [9].

Some researchers had used validated assessment instruments such as an Objective Structured Clinical Examination (OSCE) for clinical knowledge and technical ability. These are recognized as the best assessment option, even though there is some question about their validity in assessing overall competence [10]. The web based virtual patient player Open Labyrinth (OL) [11] that is also an electronic problem based (as well as OSCE-suitable) application potentially offers healthcare students and trainees the opportunity to practice decision making in a risk free, safe and protected environment and to be assessed for their performance. With the extensive feedback capabilities of the OL platform which can be given based on the user's choice, and the versatility of the platform in emulating the sequential steps of the caring procedure with textual and image feedback [12], the carers can be trained in clinical skills far off the caregiving area and unfettered from stress, from the start of studies, before exposure to real patients while at the same time being evaluated for their progress.

Reaching an even higher level of realism, simulated patients in 3d multi user virtual environments (MUVES) facilitate the learners' training goals. Furthermore, virtual environment based simulators give the carers a first non-hostile experience of computer-based systems [13]. As Jarmon et al. describe in their study, the Second Life (SL) MUVE is quite effective for a project-based experiential learning approach, particularly as students (or trainees rather) are able to learn by doing and by applying learned concepts to the real world [14]. The multiuser characteristic of the SL platform can also enable communication between students and the facilitator of a learning episode through regular interaction. This has been shown to enhance their absorption potential, as is documented in previous research [15].

Additionally, despite the criticism regarding the barriers that MUVE's in general and SL specifically impose on educational settings [16], [17], it must be noted that the Second Life (SL) MUVE is ideal for prototyping educational content. Apart from the common capacities of most MUVES, such as common control scheme, text and voice chat or mail-like IM capabilities, it provides the option to the user of purchasing virtual land on which not only she has full freedom to graphically modify the environment at will, but also can use a simple event driven, state based scripting language (Linded Scripting Language LSL) in order to create complex environmental feedback to user interaction without resorting to large scale development packages. This capacity, makes the SL MUVE ideal for rapid prototyping of solutions where the focus is not on coding optimization but on conceptual/functional testing. [18]-[23].

On a more conceptual level, Hope et al. proved that the trainees have positive responses to the simulation as a learning approach due to the enabling of theory application in a safe controlled environment. In the same study it was reported that

the learners engaged in simulation training felt prepared for practice, identifying simulated learning as the crucial factor in improving their interpersonal skills, problem solving abilities, as well as the development of psychomotor, technical skills, and overall confidence [24].

As already mentioned above, the aim of this paper is to present some of the details of the approach we have followed to carer education and training in the DISCOVER project within the context of the aforementioned socioeconomic context, while leveraging experiential immersive educational facilitation modalities such as Virtual patients in the Second Life 3d MUVE.

### III. AIM AND MEANS

The DISCOVER project, funded by the European Commission, adopted an approach of combining healthcare training and experiential learning paradigms within an online educational environment. The aim of this approach is to build a tutoring virtual environment which can provide information and knowledge on a variety of carer education topics and enhance the users' decision-making skills, thereby raising the profile of social inclusion for formal and informal carers with emphasis to those at risk of long term social and financial exclusion.

On a basic level a moodle based platform named Discover4Carers (<http://moodle.discover4carers.eu/>) was set up for the DISCOVER project, facilitating a "Discover4Carers" web platform, where educational content is organized into courses (see Figure 1).



Fig. 1 Discover4Carers instance

The learners, as part of the educational procedure, are explicitly motivated to tag their content in order to demonstrate that they have absorbed the educational material that was covered by this content. This process also controls and contains any intentional or unintentional mistake or harmful information that could emerge from the collaborative learning process [25]. In order to facilitate the accessibility, communication, and reusability of learning objects through the metadata [26] different taxonomies are used in the context of the DISCOVER project, in conjunction with metadata extensions of e-learning

systems, repositories and other recent developments [27], [28]. Moreover, different thematic tags of DISCOVER content such as the Digital Skills, Dementia and Assistive Technologies have already been developed. These topics have also been developed and enriched with tagged resources in the Scoop.It Web Curator by the content developer and linked in the moodle environment. The learners are motivated to create their own accounts in Scoop.It or other web curation tools and tag their resources with relevant topics. In a later stage, the whole tagging process is going to be linked with advances in the field of educational metadata standards, the use of folksonomies [29] and the semantic tagging of health education resources (see for example work and products in for the mEducator project: [www.meducator.net](http://www.meducator.net)) [30]. Additionally, the accreditation of online courses through the enhancement of the SCORM model, as well as the use of metadata, is a goal that is included in the Discover4Carers moodle platform.

Beyond even the semantically enhanced Learning Content Management System, in order to leverage a more case based educational paradigm the DISCOVER project also utilizes the Open Labyrinth Virtual Patient creation and deployment platform [11].

#### First meeting

After discussing extensively with her daughter on the matters concerning her mother, you jointly decide the day and time of the meeting



[Review your pathway](#)

Fig. 2 DISCOVER Virtual Patients instance

As an initial goal, a series of virtual patients were created following the instructions of expert "carer-tutors" through their work experiences. The carer-tutors setup diverse virtual cases aiming to teach skills regarding symptoms, diagnosis and treatment. Figure 2 illustrates an instance of a DISCOVER virtual case created within the OL environment.

Aiming to enhance the case-based educational content of the project, through an experiential immersive virtual environment four (4) of the OL deployed virtual cases were also repurposed and deployed in the Second Life MUVE. Utilizing the built-in scripting capabilities of Second Life (Linden Scripting Language - LSL [23]) the narrative and conditions of each step of the VPs was incorporated in the SL simulator [31],[32]. The users interact with the simulator through both a point and click interface and through multiple choice menus as dictated by the current educational task. The scenarios implemented cover a broad spectrum of subjects

from dementia to diabetes. Figure 3 illustrates a carer's avatar in front of the initial billboard of a DISCOVER SL case.



Fig. 3 The carer's avatar in front of the initial billboard of a DISCOVER SL case

#### A. Trial plan

The DISCOVER project will test its solution in 4 pilot sites in Europe, namely, in Greece, Spain, The Netherlands and the UK. Each test site will use the educational content developed. The Greek pilot takes place in Thessaloniki, coordinated by the Medical School of Aristotle University of Thessaloniki (AUTH) and focuses on training formal and informal carers in to acquire elderly care skills as well as basic information technology skills required in the job-hunting era of digital inclusion. AUTH has developed its own local components for integration into the DISCOVER platform, including the Virtual Patient components (VPCs) and the Test and certification component (TCC). During the DISCOVER pilot phases, one hundred (100) carers approximately will use the virtual patients in Second Life and utilize the Discover4Carers moodle platform.

#### B. Evaluation plan

Focus groups and interviews will be held in order to assess the usability and satisfaction as well as get an overall feedback from the users. The learning outcomes will be also evaluated and reported during the focus groups. Accessibility and user acceptance are two aspects that will be assessed in all implementations of the online and virtual learning approaches.

For the first stage of the DISCOVER project (Pilot Phase 1), focus group sessions of 8 participants and face to face or phone interviews (9 formal, 16 Informal) have already been held in order to have a first feedback on the design as well as the integrated technologies of the DISCOVER platform. In the focus group sessions, carers described their caring role and mentioned the challenges they face and the places or people they seek support from. Each focus group lasted for approximately 2 h. Participants signed an informed consent to participate in and gave their permission to be transcribed. All interviews were audio and video taped and conducted in the premises of the Lab of Medical Physics in the Aristotle University of Thessaloniki, Greece.

## IV. RESULTS

Each focus group session was facilitated by an independent coordinator (a psychologist) as well as an observer (DISCOVER content developer). A demonstration of the DISCOVER platform was conducted, introducing carers to its sub sections (using the web; connecting for care; enhancing care skills and making your skills count) as well as the integrated learning component (Virtual Patients; Second Life; VCC simulations etc.). After the demonstration, a hands on practice of the carers with various components of the platform, under the guidance of instructors took place. Open questions were mainly posed for the better interaction between participants. A general introduction was given, followed by the broad question "Can you describe to us yourself and your caring role?". Field notes were taken during the focus group.

Regarding "caring roles", carers described their experiences for the person they care for. Different cases were reported, (mobility problems, dementia, Parkinson, heart diseases etc.) and the value of the appropriate support on their work was stated. Participants' discussions revealed the lack of training and education in Health Care. The main reason to which deficiency was attributed, was limited.

Regarding "using technologies for retrieving information", carers expressed their needs for "filtered information" regarding the limitations and general information about the health condition of the person they care for. Formal carers described their needs in acquiring knowledge through new technologies and informal carers expressed the importance of being able to offer a better quality of life to the elderly.

Both formal and informal carers expressed their needs for thematic training on the condition of the persons they care for. Integration of technologies such as speech recognition and voice commands for more intuitive and transparent human-computer interaction emerged as a striking (yet uncovered need) on the use of digital technologies in their caring role. It was imperative though that training in basic digital skills was deemed of paramount importance. Targeted thematic content for the solutions available to support and improve the quality of life of their cared for persons was also deemed important, especially if there were evidence that such content would be effective for improving health (i.e. memory games, puzzles or other relevant exercises).

Regarding the AUTH "DISCOVER modules", carers expressed their interest in acquiring skills and learning through virtual environments such as Virtual Patients, simulations and the Second Life. The kind of scenarios (thematic content) seemed to be appropriate for their needs. In addition, the environments seemed to be attractive to them and their first impressions were that the kind of skills needed for their use and navigation could probably account for a good percentage of the basic digital skills. This also strongly reinforces our initial assessment regarding our choice for a MUVE platform such as Second Life. Furthermore, carers felt that the platform and its modules would be more personalized if their personal photos could be used on their avatars in the virtual environment. The importance of personalization and presence was strongly mentioned as a factor of further immersion and subsequently better envisaged performance.

In addition to their needs, carers also expressed expectations regarding information access and digital skills' adaptation after the DISCOVER pilots. Carers expect an overall well-structured and easily accessible environment, in which informal and formal carers collaborate and communicate with each other. They emphasized the importance of gaining from similar experiences of other carers.

The participants completed usability and impact questionnaires regarding their initial impression from the DISCOVER approach. The data analysis will soon be conducted after the second Focus Group for Pilot Phase 1 (end of March 2014), and would be conducted on a comparative basis (pre vs post DISCOVER platform data).

## V. DISCUSSION & CONCLUSIONS

This paper has described some of the innovative efforts that our team has been following upon the training design of the platforms to be used within the DISCOVER project. More specifically, simulations of virtual patients in Second Life are exploited in conjunction with educational components and objects in semantically extended e-learning environments.

Admittedly, the use of virtual patients scenarios in Second Life is not innovative in its own sense. Previous research attempts have investigated the feasibility and the preliminary impact of the whole approach [31], [32], [34]. The same is true if one confines the application domain in nursing and healthcare [33], [35], [36]. However, to the best of our knowledge, these technologies have not been previously exploited in elderly healthcare as a means to enhance skills of (formal or informal) carers. By combining different technologies and seeking the beneficial effects of merging technological innovations with pedagogically effective approaches such as problem based learning, it is envisaged to enhance the training experience of participants. Thus, the aimed experiential learning for carers of senior citizens or patients is believed to be quite original and ground breaking.

The purpose of the whole attempt was to make more realistic everyday training cases and diverse topic, content rich approaches, so as to facilitate easier content and skills assimilation for carers. The whole endeavor is undertaken in view of the existing limitations to elderly carers' training. Initial focus groups with carers/participants of the first pilot (training) phase have been conducted; these provide important preliminary feedback with respect to the appropriateness of tool choices and the suitability of thematic content. Currently being at an early stage in the project pilots, it would be unsafe to reach to any conclusions, as the whole attempt is soon to lend itself to a rigorous pilot evaluation phase in Greece. Planned evaluation sessions and comparative (pre-post) focus group comparisons are envisaged to certify successes, to inform for any required improvements but also to identify pitfalls.

At its current stage of implementation the DISCOVER project has utilized a cohort of information technology methods and educational paradigms in order to facilitate the education and skill acquisition for formal and informal carers of seniors. Its approach is founded on solid background work and verified technological and educational contexts. However,

only the proposed assessment plan will provide the necessary results that will allow for the tailoring of both the technological platform and the educational paradigm of the project in order to provide an optimized learning experience customized both to the target group and to the educational subject.

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