Employing the Living Labs methodology to support experiential improvement of processes and practices in special education

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Abstract

This paper presents our current and on-going research work on the integration of students with special education needs, so that they can be accommodated into inclusive classrooms. To this end, we describe a framework which can enable the effective collaboration between the special education experts and the teachers. The framework builds on the notion of Living Labs, and facilitates the active involvement of different teams of experts in various stages of the educational process, and their collaborative decision making and planning for each individual student.

Keywords

Living Labs, communities of practice, integration for students with special needs, integrative schooling

Introduction

Our research aims to define an integrated, context-sensitive, adaptable and interoperable environment for improving the processes and practices of teaching staff and special education experts, based on the concept of technology-enhanced experiential learning for competency, skills and performance enhancement. More specifically, we aim to the professional development and upgrading of distinct professions, such as special education experts and teachers.

The establishment and operation of a learning community is addressed by employing the Living Labs methodology to engage all relevant actors and roles across the classroom "value chain", and to mobilise, adapt and implement the most advanced e-learning technologies into a single immersive simulation framework. This approach may also be considered as a "blueprint" for other areas and application topics.

Our research aims to implement and validate a collaborative professional development model and learning platform which can deliver three types of output: in-service training courses, professional training; and interdisciplinary system-wide exercises.

Many diverse solutions may be adopted to support the above objectives. The learning process may either develop in face-to-face meetings or in web-based environments, within the established Living Labs communities.

The overall criterion of success is the extent to which the results of the research can be embedded in the business processes, human resources and organisational management infrastructures of the schools. To come up with reliable performance measures, we are catering for the design of commonly accepted benchmarks that combine quantitative and qualitative aspects and comply with field standards, as these stem from well respected and accredited bodies.

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The Underlying Concepts

Although learning, in principle, could be described as a creative destruction of old knowledge, the standard approach is to address it as a process of accumulation, where the outcomes of previous learning provide the starting point for acquiring further knowledge.

Therefore, learning is often described as an ongoing cycle (Figure 1), where the "experiential learning model" of Kolb is represented [1]. In this simple, yet influential model, learning occurs through a sequence of phases: first, concrete experiences generate an opportunity for observation and reflection; this, in turn, leads to the creation of new concepts and models that are then tested in novel situations; etc.

According to Kolb, people need four different types of skills to make their learning cycle effective; more specifically, they have to:

- engage openly and without prejudgement in new experiences,
- reflect and observe their experiences from many perspectives,
- create concepts that integrate observations into logically sound theories, and
- use these theories in decision making and problem solving.

In many learning models, learning starts when the person experiences a practical or a cognitive dissonance [2]. Then routine action breaks down, the learner realises that active sense-making is needed, and the world needs to be reconstructed. This reconstruction may require reorganization of meaning and reconfiguration of the material environment. In classroom settings, this process can be simulated by problem-based learning situations, where the student is presented with a specific construction of the world (for example using a textual description), and the dynamics of the world are shown to lead to a contradiction or a problem that needs to be solved. Students may also collaborate in solving the problem, for example, by taking different roles and presenting different interpretations of the situation.

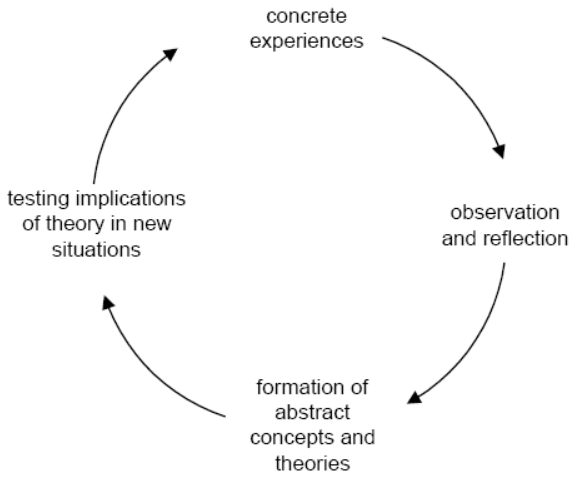

Figure 1 - Kolb's Experiential Learning Model

Such problem-based learning settings can be enhanced by immersive information environments where the learner can effectively experience cognitive dissonance, and where problem-solving resources are readily available [3]. Immersive simulation systems have also been widely used in several flight training and in military training applications. For instance, commercial PC-based flight simulators are commonly used to build systems that closely resemble professional multimillion-euros cockpit simulators.

In our research we aim to define an integrated, context-sensitive, adaptable and interoperable environment for improving the processes and practices of teaching staff and special education experts, based on the concept of technology-enhanced experiential learning for competency, skills and performance enhancement. More specifically, we aim to the professional development and upgrading of distinct professions, such as special education experts and teachers. We shall later refer to the above as 'the community'.

We envisage to achieve the establishment and operation of such a learning community by means of employing the Living Labs methodology. The essential feature of a Living Lab is the consideration of user feedback and experience as an integral part of the testbed itself. The European research has appreciated the operational value of Living Labs methodology in at least three main areas so far:

- bringing laboratory-based technology testbeds into real-life, user-focused validation environments;
- developing mobility services for citizens in a real-world early adopter community with existing and close to market technologies; and
- studying the collaborative working environments of the future from a pan-European perspective.

In all cases, the main focus has been on a user-centred, context-sensitive, multi-site and multi-stakeholder co-design or co-creation process, supported by mutual trust, and implying the joint consideration of policy, market, societal and technological aspect with equal weight, as shown in the following figure.

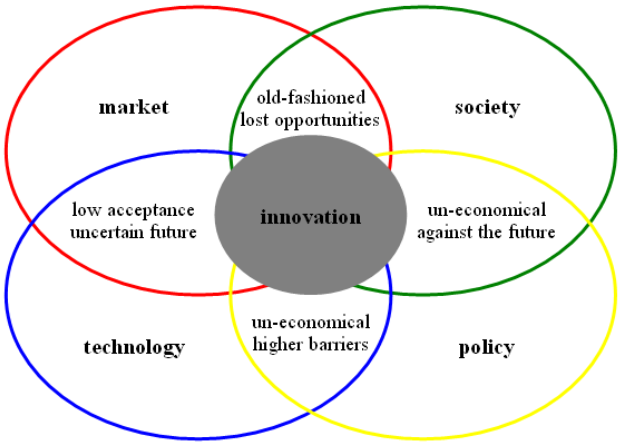

Figure 2 - Human-Centric Systemic Innovation Approach (from [4])

The main idea is to engage all involved actors with their respective roles across the classroom "value chain", and mobilise, adapt and implement the most advanced e-learning technologies into a single immersive framework; this can ease the uptake of new knowledge in the field, thus providing the ground for novel practices to be developed, and a more optimised and personalised style of accommodating individual student (special) education needs.

Background Ideas and Guidelines of the Work

The emergence of the knowledge society and the knowledge-based economy poses new requirements for education and training: the knowledge-based economy requires a flexible, very well-trained teaching workforce; and the teachers of the information society need to be continuously (re)trained in order to remain competitive within this workforce, and to fully exploit the knowledge society for their personal development.

The rapid evolution of learning technologies – exploiting the respective developments in information and communication technologies (ICT) – create numerous new opportunities for meeting these requirements: web-based learning environments (learning management systems, learning content management systems, etc.) can deliver life-long education and training applications and services to anyone, anytime, anyplace. However, most of these applications realize a learning context which is rather "traditional" in nature: it is mainly based on the delivery of digital learning material and the facilitation of communication between learners and tutors and not amongst the education experts and teachers.

On the other hand, the Internet and the World Wide Web provide the technical infrastructure for the realisation of alternative learning settings, which are heavily based on collaboration and cooperation. This is due to the fact that collaboration is widely appreciated as a key for effective learning, as this is demonstrated in a number of related studies. However, computer-supported collaborative learning

(CSCL) environments are still rather limited: collaboration is facilitated through file exchange and common workspaces, which have not proved to significantly affect the learning outcomes. This is, for example, demonstrated by the fact that most existing CSCL systems still attempt to ensure collaboration through motivation: all members in the collaboration group receive the same "utility" (e.g. the same grades for students), in order to ensure, and in fact force collaboration (i.e. "strong" members coach "weaker" peers, to increase their individual and group overall competitiveness). Other issues which can affect the collaboration group performance, such as the synthesis of the team or the nature of the tasks are less well documented and manifested in the related literature.

Moreover, the exploitation of CSCL systems at an organisational level (embedding the results into the organisation's everyday practice) is much less investigated. Finally, related literature acknowledges the fact that human-related aspects constitute the deciding factor for the acceptability and success of IT systems in schools: many early information systems failed to deliver what was expected, because professionals (teachers, education experts, etc) resisted their use. In this context, our research aims to address a number of additional issues which may affect the effectiveness of collaborative learning settings in the special education domain, including individual, organisational and managerial issues.

Modern ICT solutions recognise the importance of learning as a social process, and offer new possibilities for interacting with the learning content and for guidance from teachers, trainers and tutors. This learner-centric view has put the trainee back "in command", with a wealth of learning resources at her/his fingertips. Further to that, teachers and trainers play an even more essential role, besides virtual or traditional face-to-face interaction with their students, as they are no longer seen as "users" of a pre-determined training content, but as editors, authors and contributors to a contextualised learning scenario. A lot of informal learning happens within these social activities, where tacit knowledge is exchanged and disseminated spontaneously within the so-called "communities of practice". A typical example of these are the Open Source Software circles, where people learn or become skilled in doing things because they participate in social interactions.

As it was previously mentioned, a great part of our research does not deal with the content related to the actions and behaviours required for the teaching staff and the special education experts. This notwithstanding, the question of the reciprocal relations between theoretical and practical knowledge is included in the various syllabi intended for this purpose. Regarding the professions addressed to in this research, the question of the relations and connections between disciplinary and interdisciplinary knowledge (to which we will refer later on in the proposal) is a complex one, and worthy of careful contemplation.

To sum up, ICT clearly has the potential to stimulate learning networks and new forms of training organisation. However, "a basic principle of good pedagogy remains that the design of the whole learning process (possible supported by e-learning) is the decisive factor for the learner's success. Therefore, European countries' e-learning related measures should not be limited to questions of hard- and software, but rather focus on the pedagogy and e-learning in work processes" [5].

Professional development is development and cultivation of professional knowledge that is situational, contextual, deals with decision making and the ability to follow through on decisions made under changing circumstances and in unique situations that are characteristic of the profession. It includes a collection of successful experiences alongside theoretical learning, through which the professionals define their roles, become acquainted with their capabilities and arrive at a new understanding of what is important to do, and thus continuously construct their evolving and developing professional identity. This is a continuous process that originates in personal sources, and it is derived from the influences of the group of professionals to which the individuals belong. The group activities and experiences create desired action and behavioural norms, while maintaining a freedom of action and autonomy. The learning processes comprise a source of professional authority that helps the individual achieve a renewed understanding of the role and - as a source of influence on other staff members - on management personnel as well.

In the scope of our research, we refer to professionals whose roles involve practice as its main component. In this respect, it is important that practice enables empowerment, which can be achieved if the following aspects are taken into account in the professional development program [6]:

- practical application orientation: the process is oriented towards the professionals' (i.e. teachers and special education experts) real-life actuality, a task or a problem that they are required to deal with, and is applicable to their lives or is essential to them, so that they will optimally benefit from their learning on a personal level;
- an ongoing reflective thought process (inquiry) occurs following the experience: the concept of "reflection", as a mental activity that is critical for the professional life, occupies a central place in the definition of the professionalisation of many professions; based on this concept, the professional examines his/her knowledge from a critical perspective, as it is expressed in his/her experiences, and devotes time to thought after the activity has been completed, with the aim of understanding the activity's meanings in order to create knowledge on action;
- a meta-practice of problem resolution is created: the professional meetings are dedicated to a discussion on resolving problems of various kinds; the meta-practice is constructed from generalisations phrased on the basis of the discussions, with the exposure of incidents of success and lack of success contributing to the process; the meta-practice is translated into procedures together with new knowledge that is integrated into the performance of the tasks required within the framework of the role;
- development is defined as important when it expresses constitutive values: professionals have a "moral voice" that conforms to the ethics and values of their profession; this is especially true in the case of medical staff;
- professional development is a combined process of top-down and bottom-up: the current trend is to view the activity of these systems in a collaborative context; the activation of the systems is complex and complicated and relies on the high professional level of the staff, and not only on technical knowledge of procedures; adult learners, particularly those who are aware of what they want, need to know and understand why they must learn or be trained; therefore, it is important that the trainees will feel that the learning is not something that is forced upon them, but rather that they are, to a certain extent, partners in the program; even in programs where the content is determined in advance, it is important to allow the trainees to participate in choosing the learning strategies and methods; the right to choose is especially important to adult learners, as it exhibits respect towards them and increases their motivation to learn [7].

This trend is compatible with the increasing demand for accountability, and therefore, with growing awareness of the importance of professionalism in other important sectors of public life than the education context.

Conclusions - Configuring and Implementing a Living Lab Collaborative Environment

As already mentioned, we envisage to achieve the establishment and operation of learning communities by means of employing the Living Labs methodology. The reason is straightforward: Living Labs represent regional innovation environments focusing on user communities embedded within "real life". Our project is developed such that it can be continuously adapted and validated through the interpretations and comments given by professionals. As a result of this cooperative approach, participants can acquire full or partial ownership over the planning and their motivation to implement the pilot application in the real world school environment will increase.

Additionally to the technological aspects, Living Labs allow a deep insight into the human dimension of technology, which is of paramount importance for a successful societal deployment of new technologies. As a consequence of this potential, the Living Lab approach is taken as a natural candidate for the implementation of large scale evaluation, demonstration and validation activities at a European level.

A Living Lab refers to a setting that is created with specific targets and has a clear structure, but in the same time it is dealing with the dynamics of daily life. Therefore, its configuration holds an open

character according to which technology is shaped out of specific social contexts and needs, and which users are seen as co-producers. Researchers within Living Labs are restricted to monitoring what is going on "from the inside"; on the other hand, they are part of a Living Lab themselves, and are able to intervene in order to contribute to a better implementation of technological innovations in social practices, and deal with the unpredictable processes by reflecting upon and consequently adjusting their initial methodology.

The problem faced by current Living Labs is that, although similar services and products are usually developed, a coherent framework for cooperation inside a Living Lab is missing. Thus every new Living Lab has to start (almost) from scratch in configuring itself for the selected beneficiaries.

Within our research, we build and populate our targeted experiential learning environment according to the following steps of a Living Lab configuration process as summarised in [8]:

- contextualisation, referring to the prior exploration of the technological and social challenges implied by the technology or service under investigation;
- selection, referring to the identification of potential users or user groups, by means of non-probabilistic or purposeful sampling;
- concretisation, referring to a thorough description of the current characteristics, everyday behaviour and perceptions of the selected test users regarding the research focus;
- implementation is actually the behavioural validation and operationally running test phase of the LL, from a user-oriented and ethnographic viewpoint; and
- feedback, consisting of two research steps: an *ex post measurement* based on the same techniques of the initial measurement, to check if there is any evolution in the users perception and attitude towards the introduced technology or service, to assess changes over time in everyday life in relation to technology use and to detect transitions of usage over time; and a set of *technological recommendations* from the analysis of data, gathered during the previous implementation phase; this outcome of the feedback phase is used as the starting point for a new research cycle within the LL; in this way the iterative feature of research can be made operational.

To come up with reliable measures of the success of the application of the Living Labs approach in the project, we will cater for the design of commonly accepted benchmarks that will combine quantitative and qualitative aspects of the application exercise and will comply with field standards, as these stem from three well respected and accredited bodies namely the National Association of Special Education Teachers (NASET) in U.S.A. and the European Association for Special Education (EASE). The proposed solution aims to deal with the three aspects that create professionalism, namely Knowledge, Values and Skills, as further described below.

Knowledge

Darling-Hammond and Wise define three main characteristics of professional occupation [9]:

- knowledge is the basis for working in the profession and making decisions in reference to the "client's" unique needs;
- the professional's main concern in the good of his/her "client"; and
- the profession assumes mutual and broad responsibility for the definition, dissemination and enforcement of professional behaviours and ethical codes regarding the profession. The ethical code replaces external means of supervision and control. The implementation of the profession is carried out through accreditation and a license to work in the profession.

The professional literature contains a large variety of "quasi-professions" or "semi-professions", where there is no consensus regarding the teaching of the professional subject matters; each country defines regulations according to its needs and ability to provide training and/or professional development programs in these areas. From time to time, in these professions people who had not undergone training or professional upgrading are employed by various systems, particularly when the supply does not satisfy the demand for specific professions.

The professional position holder's knowledge in the modern world combines various types of knowledge. Professional performance at its best expresses the position holder's ability to integrate all the types of knowledge he/she has acquired, and make decisions based on that knowledge.

Values

Written and explicit professional ethics sets the foundation of defining a profession. Teaching ethics has long been developed since ancient times; even so, it must be invigorated and clarified during classroom incidents which have unique characteristics. Moreover, it is important to focus on ethics of integrative education and of the special education experts participating in such incidents. Additional values that need to be addressed in further detail are taking responsibility, acting with motivation under risky conditions, accepting or allocating authority, etc. In addition, there is a need to define constitutive values that influence actions and behaviours.

Skills

As in the first element, a position holder with a high professional level is evaluated by his/her ability to integrate different types of skills: content-related skills connected to educational or teaching activity or to classroom incidents; skills involving using various types of educational 'instruments' required for various professional purposes and tasks; skills relating to the implementation of technologies (searching for information, information transfer, etc); interpersonal communication skills, which are particularly important in the school environment, etc.

The combination of these three components usually characterizes the training and professional development processes of position holders in several professions, who act as practitioners in order to realize their roles, within the framework of their capacity.

Professional development is based on the assumption that individuals have skills, knowledge and capabilities, but require guidance, from time to time, as well as to experiences, and opportunities to express them [10]. Some researchers claim that in certain professions it is impossible to develop a professional discourse unless joint communities of professionals are created, in which they can discuss their experiences [11].

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