3rd Generation Learning Platforms Requirements and Motivation for Collaborative Learning

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Abstract

Presently collaborative learning is mainly based on physical meetings. Current e-learning platforms are focused on content based learning scenarios. Innovative learning platforms need to be built on collaborative learning scenarios which implies a paradigm change with respect to current approaches. The social context of learning needs to be the centre of attention and not an add-on feature of e-learning. The connection of the collaborative learning paradigm to recent management theories is discussed and concrete approaches and models for the realisation, both conceptional and technical, are presented.

Key words:
tele-learning, collaborative learning, community platforms, e-learning

1. The Paradigm Change in e-Learning

New information and communication technologies are the base of the knowledge society. In the past, these technologies have been developed in a technology-centred way, but currently we are now undergoing a change towards more human-centred concepts of using information technology for business, learning and communicating with each other.

Classical information-management concepts are based on the idea that it is possible to deliver the right information to the right person at the right time. The consequence of this idea has been the development of all-encompassing information systems, with the aim to collect, manage and distribute the whole knowledge of an organisation.

However, for these concepts it is necessary to predict who will need when, which information. This is not possible in companies which change their business areas rapidly, as it is the case for today's technology-rich, globalised industries. The resulting problems such as low acceptance of information systems and work-arounds are well known.

Recent concepts of knowledge-management [1] state that not the technology must be the centre of attention when considering knowledge processes, but the humans and their relationships. The management concepts arising from those principles are manifold: virtual teams [2], knowledge- and learning communities [3], networked economy [4], all integrate the same basic concepts: orientation on the communication processes between people and the necessity for support of their collaborative processes through information and communication technology.

The related paradigm-change in e-learning has not yet taken place. Still Resource- Based Learning (RBL) [5] prevails. Resource- Based Learning – as information-management – focuses on an interaction between human and computer. The approach is to support individual learning providing interactive, media-rich resources for learning. Though in this approach several advantages, such as flexibility in time and place, feedback through interactive media and straight forward concepts for evaluation have been found, also several disadvantages have been identified. Those main disadvantages are:

- High initial costs of preparing materials;
- Extra costs of maintaining, revising and updating courses;
- Students need to be well-motivated and self-organising learners;
- A lack of peer contact and interaction for students working alone;
- A need for flexible available tutorial support;
- Problems in ensuring materials are pedagogically of a high quality.

Many human resource development departments and training institutes lately have become more critical on e-learning based on RBL, integrating phases of group learning into face-to-face situations. In this way the flexibility advantages are greatly diminished, which in the first place were main advocates introducing e-learning concepts.

The upcoming paradigm in e-learning again is putting humans and their relationship in the centre of attention, propagating learning scenarios, which are communication-rich, collaborative and put attention to the social environment and organisational framework of the individual learner. Currently there are no systems available, which can support effectively such processes [6].

We call these envisaged platforms "3rd generation learning platforms", initiating a third wave of learning paradigms. As the first one, we identify the development of computer-based training (off-line applications, dominated by closed, objectivist learning models), followed by the integration of content into the WWW (development of learning platforms supporting RBL) as is the dominating paradigm now.

In the following we want to present our concept of what are the pedagogical foundations, the requirements for such platforms and current research initiatives, working towards the realisation of this new paradigm.

2. The Pedagogical Approach: Social Interaction in Learning

The analysis of social interaction between learners has a long history in pedagogical theory. In order to understand the roots of collaborative learning we want to summarise the underlying theories behind collaborative learning and describe several current approaches, which serve as a base for the development of collaborative e-learning platforms.

Collaborative learning in general is defined as any kind of group learning in which there are at least some meaningful learning interactions between the learners. If these interactions manly take place in virtual environments we speak of collaborative e-Learning.

2.1 Theoretical Roots and Background

The theoretical foundations of collaborative learning can be seen as built in a dialectic process on different theoretical approaches. This was starting with early

1. social learning theories, shifting to more
2. individualistic theories which were integrated by
3. socio-cultural approaches (still within a constructivistic, basically individualistic understanding of the process). At the moment
4. non-individualistic, group-oriented theories are most significant especially in the area of collaborative e-Learning.

(1) The main question of early social learning theories, about group influences on the individual, based on experiences of the 2nd World War. K. Lewin claimed that behaviour is a consequence of "the field" that exists at the time the behaviour occurs [7]. Powerful experience in a group leads to changes in behaviour and personality. Asch conducted in the 1950's pioneering studies on independence and conformity under group pressure. M. Deutsch, Asch's student, led researches on human behaviour in collaborative work-groups [8], and the third generation of Lewin's students, D. Johnson, E. Aronson, R. Schmuck and J. Cooper, studied the implications in the educational context, an effort which led to an increasing interest in group-based learning. This group developed in the 1970's the first leading theories for collaborative learning.

(2) Piaget's theory of cognitive development, an individualistic approach, has been advanced by the Genevan School during the 1970's and 1980's and started to influence the field of collaborative learning in the 1980's. Researchers borrowed Piaget's structural framework and major concepts: conflict and the co-ordination of points of view ("centrations"). The central idea is that through interacting with others, and through co-ordinating his approaches to reality with those of others, the individual widens his intellectual and cognitive "vistas" [9]. Individual cognitive development is seen as the result of a spiral causality: a given level of individual development allows participation in certain social interactions, which produce new individual states, which in turn make possible more sophisticated social interaction, and so on. This approach inducted socio-cognitive conflict in the discussion. (Conflict between different answers based on different "centrations") The social dimension of a situation is seen as a catalyst for resolving the conflict. Even though this approach is not distinctly social interaction-oriented, it played an important role in allowing the collaborative learning theory to disengage itself from the above perspective of social learning theory, thus allowing a shift towards a synthesis which takes into account the individual as a distinct developing mind, rather than as an instance of larger collective mind.

(3) Vygotsky's socio-cultural theory of learning emphasises that human intelligence is formed in the society or culture, and individual cognitive "growth" occurs first through interpersonal interaction (i.e. interaction with social environment) and than intrapersonal. Cognitive development is described as an ongoing process of dialogue between the child and the society through which the child internalises social knowledge and norms and constructs his own "self". The two phases (interpersonal à intrapersonal) were

observed in students development too. In the first phase of problem solving, students support and guide each other, in the second phase students come to their own conclusions, argumentation etc. They gain new strategies through peer collaboration by interpersonal discourse [10]. Vygotsky saw collaborative learning as a primary medium in any educational and cognitive process. In his terms, collaborative learning is essential in transferring any learner from what he called his/her own "Zone of Proximal Development (ZPD)" – namely, what that person could accomplish independently – to a shared social knowledge zone, which can be reached only by co-operating with others [11].

The integration of Piaget's and Vygotsky's view can be seen as responsible to a large extent for the emergence and diffusion of the social-constructivistic category of collaborative learning models at the end of the 1980's and 1990's. These approaches in general focus on the following points:

- the importance of the relevance of knowledge to the learner in order to achieve effective learning;
- the concept of the learner as constructing his own world of content, as he confronts newly-learned material with his existing knowledge;
- the importance of social interaction as an inherent ingredient of the learning process;
- the importance of a meta-cognitive level of learning and discussion.

(4) In the 1990's a non-individualistic understanding of learning and work was established, which sees the basic unit of learning to be either the heavily socially embedded individual, or the entire group. While the previous developments took place in the general domain of learning theories (also in the area of collaborative learning and collaborative e-learning) the recent development currently discussed takes place especially in the area of collaborative e-learning - or more specifically within the domain known as Human Computer Interaction (HCI).

Shared Cognition
The concept of shared cognition is closely connected to the situated cognition theory [12]. The environment is seen as an integrative part of cognitive activity; all cognitive tasks have a social component. Situated cognition emphasises apprenticeship, coaching, collaboration, articulation of learning skills, stories and technology [13]. Learning is seen as a function of the activity, context and culture in which it occurs. Two main principles of situated cognition should be integrated into the classroom practice:
1. present in an authentic context and
2. encourage social interaction.

Collaboration is viewed as the process of building and maintaining a shared understanding of a problem. While the previous approaches were concerned with the inter-individual plane, this approach focuses on the social plane, where emergent conceptions are analysed as a group product.

Activity Theory
The foundation to Activity theory was laid by Vygotsky's socio-cultural theory of activity (see above). Leontiev introduced the second stage, by putting an emphasis on the distinction between activity, action and operation (three-level model of activity). He pointed out the crucial difference between an individual action and a collective activity and brought about the emergence of division of labour as a fundamental historical process behind the evolution of mental functions. Since an individual's activity is not viewed in isolation, but rather within the larger cultural context, the theory believes that any educational process that involves individual action should be explained in that context, rather than in an individual one. In addition, it regards collaborative learning as contributing to the process of externalisation, which transforms internal activities into external ones. Externalisation is important when any collaboration between several people requires their activities to be performed externally in order to be co-ordinated. [14]

Distributed Cognition
The Distributed Cognition approach was developed by Edwin Hutchins and his colleagues in the mid to late 1980's as a new paradigm for rethinking all domains of cognitive phenomena. The traditional view of cognition is that it is a localised phenomenon, which is best explained in terms of information processing at an individual level. Distributed cognition assumes that "functional systems comprising more than one individual have cognitive properties that differ from those of the individuals that participate in those systems." [15]

Distributed Cognition aims at understanding intelligence on a system level. In doing so, it can highlight the complex interdependencies among people and between people and artefacts in their collaborative activities. This can give us a better understanding of why seemingly trivial breakdowns in the communications and interactions between them can have significant and sometimes drastic consequences on the group performance level, which adds another dimension to collaborative learning theory.

Activity Theory and Distributed Cognition are closely related, in the sense that both concentrate on objects as the key to understanding social activity. The main difference between them is the equal weight that Distributed Cognition allocates to human beings and material objects ("artefacts") in understanding cognitive processes, in contrast to Activity Theory.

On the other hand, Shared Cognition, which is closely related to "Situated Activity" theory, underscores the

importance of understanding any social human activity not only *in situ,* but also in real time. Objects retain meaning only in the context of the on-going action [16].

2.2 Main Advantages and Disadvantages of Collaborative Learning

We can find different answers to the question why collaborative learning is successful and why it should be deployed. Following five basic answers given in the discussion about collaborative learning in theory and practice will be shown:

- **Practical:** Collaborative Learning should be implemented when there is need for several people in an organisation to learn together [17]. Or, to put it differently: CL is simply a natural outcome of daily organisational practice, without being necessarily related to any pedagogical or organisational theory or ideology [18].
- **Organisational:** In business it is common practice to achieve goals by bringing together experts, multidisciplinary teams etc. The challenge in these settings is to get the group to learn and work together and to motivate each member to bring in his expertise. Collaborative Learning is also beneficial for the organisation in the longer term. It enhances the employee's ability to acquire collaborative and decision making skills within the organisation. These may help individuals to perform and co-operate better with employees, peers and managers in the work place. Collaborative Learning is an essential part of the Learning Organisation approach, which is the emerging power in organisational theory [19].
- **Learning-Theory:** As shown above new theoretical approaches distinguish Collaborative Learning as a very effective form of learning. This is supported by
- **Empirical answers:** Continuous research has shown that Collaborative Learning (in comparison with individual and competitive learning scenarios) brings students to a higher achievement level, offers cognitive advantages to learners, raises their problem solving- abilities and also plays a positive role in enhancing the development of personality traits that are beneficial for future learning, or future autonomous or co-operative learning and working [20; 21; 22].
- **Ethical:** Collaborative Learning empowers the individual and enables people to live a more autonomous but also co-operative and satisfying life in the future. This answer, referring both to children and adults, has emerged mainly from radical views such as critical pedagogy [23; 24] and other radical criticisms of prevailing educational structures.

Disadvantages of Collaborative Learning can be detected on the one hand because of structural conditions – see a & b below – (i.e. attempt to implement an open learning model in basically closed organisational settings), on the other hand in disadvantages stemming from its essential group-based nature – see c & d below. In both categories we can point out two basic problems:

a. There is an incongruence between the teachers' classic role (hierarchy, vertical communication, ...) and the requirements to teachers in Collaborative Learning. Many teachers feel that they are loosing control over the learning process and that therefore their effectiveness and their contribution to the learning process are being diminished [25].
b. Difficulties in evaluating Collaborative Learning students with traditional individual teaching criteria, especially when it comes to higher cognitive skills, which are emphasised in the more open and reflective CL models [26].
c. Pressure on the more introvert among the participants, and on those that find it difficult to get along in groups in general. Following the loss of their contribution to the CL processes - and even more gravely, to decrease their level of self-esteem, and their readiness and capacity for future learning (either collaborative or individual).
d. Dangers of opportunism, groupthink, stemming from proved human tendency to conform with group pressure or with authoritative leaders (even if the authentic is a charismatic non-institutionalised one) [27].

2.3 Autonomy Oriented Education

Autonomy Oriented Education [28; 29; 30] is a theoretical framework which addresses as well advantages as disadvantages of Collaborative Learning, focuses on an educational process supported by Information and Communication Technologies (ICT) and is an approach combining theories mentioned above. Its object is to enhance the development of autonomy, morality and belonging in people. Autonomy Oriented Education relies on a combination of an open-ended learning process with systematic and structured didactics.

On the didactic level, the Autonomy Oriented Education paradigm is guided by the basic values of Western Humanism which are basic to liberal democracy: *Liberty, Equality* and *Fraternity.* The three basic educational derivatives of liberal democracy are the development of *Autonomy, Morality* and *Belonging* in people. The paradigm transforms the process of reflective experiments in living into an actual educational process, supported by Information Technology designed for this purpose.

Autonomy is composed of authenticity and self-direction**.** "Authenticity" regards to the individual's ability to be aware of his feelings, desires, interests, talents and characteristic styles of activity and learning, and to

adapt these to one another. "Self-direction" refers to the individual's ability to form action-plans rationally and to realise them.

Belonging refers to the individual's conception of himself as being involved with or committed to one ore more social group(s).

Morality is understood as the individual's awareness of the need to avoid hurting others.

Autonomy, Belonging and Morality are best formed through the individual's experience of voluntarily chosen situations occurring on all essential levels of human life, and through the individual's reflection on these experiences. This process requires a carefully designed learning environment which is characterised by eight basic principles: Referring to the educational environment: "Flexible Freedom", "Plurality of Experiences" and "Physical and Emotional Security"; referring mainly to didactics: "Rationality", "Meaningfulness", "Reflectivity", "Empathy" and "Commitment/Involvement".

Flexible Freedom enables individuals to construct an environment which suits their own wishes and needs and to change its components according to their personal development.

Plurality of Experiences: An environment allowing for a diversity of experiences actually makes it possible for freedom to be realised. It also provides the opportunity to develop a significant reflective ability, nourished by the comparison between the various experiences.

Physical and Emotional Security refers to three types of security: Physical security (i.e. no threat of being physically damaged), the security that comes from the individuals certainty that one will be accepted by the environment and the security derived from this environments stable and sequential nature. These three conditions will contribute to the individuals' self-confidence and thus to his ability to be productively involved in a process of reflective experiments in living.

Rationality: Education towards practical rationality is vital for the development of self-direction and hence of autonomy, education towards moral rationality for the development of morality.

Meaningfulness requires that tutors encourage learners to respect their wishes and personal characteristics, to seek out and identify activities that are meaningful to them, and to strive to be involved in these activities. Meaningfulness is what enables individuals to be in touch with their true self and thus to be authentic.

Reflectivity makes it necessary for educators to encourage learners to be self-aware, to "look into themselves" and to identify wishes, styles, talents and emotions. Reflectivity makes learning possible by producing and linking together personal meanings (Salomon 1993).

Empathy: In order to achieve this condition, educators must encourage learners to understand and - to a certain extent - to feel the other's point of view and emotions.

Commitment/Involvement requires that educators encourage students to conceive themselves (also) as belonging to a certain group of people. Different groups are appropriate in different contexts for different persons (learners), and that belonging to one such group should not exclude membership in another. A sense of commitment or involvement is of course a prerequisite to educating people towards a sense of belonging.

Basing on this theoretical approach we suggest that Autonomy Oriented Education has high effectiveness when studying a given subject, by developing meta-cognitive abilities and in contributing to personal enhancement. Autonomy Oriented Education basing on principles of Collaborative Learning is also highly effective for learning organisations.

A pre-condition for these contentions on the effectiveness of Autonomy Oriented Education is the existence of a minimum one a dynamic learning organisation, and of individuals of a minimal disposition for personal autonomy and for self-reflection. Once these two conditions do not exist, Autonomy Oriented Education based on Collaborative Learning can be counterproductive, unless it is very cautiously managed and monitored.

3. Requirements for Third Generation Platforms

In the current situation, one is confronted with a plethora of pedagogical theories, many of them little deployed in day-to-day educational processes, and almost none of them being considered in the design of learning platforms.

The path from the abstract theories to a system which can support the corresponding learning processes, is a long one. It is therefore necessary to extract from those theories, general but also concrete requirements, which can be used as basic requirements for system design.

3.1 Open, Participative and Reflective

The framework of socio-cultural theories and constructivism has been integrated in the autonomy-oriented learning theory. Though Autonomy Oriented Education is more far-reaching, the requirements resulting from it, regarding the learning organisation, can be used as a basis for the development of collaborative e-learning platforms [31].

We recommend a collaborative learning environment characterised by:

1. *Openness*, characterised by a low level of structurality and a high level of open-endedness. The opener the environment is, the greater are the learner's opportunities to construct his/her own educational process according to his/her own interests, styles, capacities and other unique characteristics, with a greater exposure to others' different ideas.
2. A *participatory* environment, characterised by a high level of horizontal relations (i.e. relations between the learners themselves and not between learner and tutor) and a high level of symmetrical relations (equally reciprocal support between students). A highly egalitarian social context, characterised also by a high level of mutual dependency among the participants, is a necessary (and maybe also sufficient) condition for a social atmosphere of acceptance. The requirement for a participative environment can be deduced from all the pedagogical theories described in the last chapter (shared cognition, activity theory and distributed cognition). It is the main requirement distinguishing the new learning paradigm from current e-learning concepts, such as RBL.
3. A high level of *self-reflection*, which means self-reflection on an individual level – through which the individual strives to understand his/her learning and performance styles, interests, values, capacities, and emotions, weaknesses and strengths concerning emotional maturity, as well as to learn to develop rational learning and planning strategies and implement them and group reflection – reflection (either by the individual or the group) on group-explicit communication strategies as well as on its implicit dynamics. On the individual level the self-reflection should not only give the learner information about the learning process but should analyse all the unique personal characteristics that are bound to characterise him/her: interests, values, performance styles, capacities, emotions, rational strategies, strengths and weaknesses regarding emotional maturity, and the relations between some of these characteristics. The aim of this reflection is to increase the persons self-esteem and self-consciousness, improving the learners' autonomy not only in the learning process but also as a person. This requirement is a very important one in the framework of the AOE. Beyond the learner as the subject of self-reflection, the group can be its subject as well - reflecting either on some of the individual's characteristics or on the group's strategies and dynamics.

3.2 Learning in Communities

"Virtual communities" is one of the major buzz-words in the Internet literature of the last years. Following the term and respective software-products, also the term learning communities has been born. We want to show that learning communities adhere to the above-mentioned basic requirements and make the connection to these explicit.

The term Virtual Community has been defined in different ways in the multidisciplinary field of people who are researching, developing on or participating in online communities. A broad definition given in Preece [32] outlines online communities as consisting of:

- people, who interact socially to satisfy needs, perform roles etc.;
- a shared purpose, that provides a reason for the community;
- policies, that guide peoples interaction;
- computer systems, to support and mediate social interaction.

According to this definition the need and shared purpose of an education community is learning. Online communities can offer a lot of opportunities to students which are comparable with face to face meetings like working together, exchange of information, sharing resources, commenting the work of others etc. In addition students can take all advantages of working online. Thereby the main thing is that interaction is not bound on a physical meeting in the same place. In the wide field of distance education online learning communities can force students to learn together and benefit from sharing ideas and resources. Salmon [33] sees that moderators or mentors are important for learning communities but these people have primarily the function to guide students to meaningful learning activities rather than to provide knowledge. Before focusing on the question how online communities can support best collaborative learning, open points and questions of the discussion should be mentioned. As it was shown above collaborative learning is a very effective way of gathering knowledge and it is seen as an intrinsically social process. Most educators promote *constructive learning* [34] which advocates learning through social interaction and by building and exploring things in meaningful, authentic real world contexts. But how can students which may never meet their classmates in person get a feeling of belonging or commitment to the community? Which conditions are motivating people to stay and interact in a learning community? How can it be ensured that given information is correct?

To answer these questions firstly we will look at two general requirements of successful communities which satisfy their users needs and contribute to the well being of the society. These two terms should not be seen independently – there are a lot of interrelations between Usability and Sociability. *Usability*

focuses on the human-computer interaction – *Sociability* on the social interaction processes.

Usability is a requirement which focuses on the software design. The basic requirement sounds simple: People should be enabled to interact and perform their tasks easily and intuitively. Software with good usability supports high productivity, lower error rates, rapid learning and efficiency. Catchwords for usability are: Navigation, Feedback, Registration, Interaction dialog and possibilities, Support tools and help functions, Archives, Representation of the users, etc.

Sociability is conjunct with planing and developing policies which are understandable and acceptable to members and which are supporting the communities goals. This includes policies for membership, security, privacy, copyright, free speech, moderators, codes of behaviour, etc.
Thus, usability and sociability and their interrelations, base on the communities needs and shall support the communities evolution.
In addition to these basic needs, successful learning communities must support additional needs of students and tutors like resources, guidance, feedback and enjoyment [35].

- Resources: To communicate with all group members, within small groups, one-to-one, with the instructor; to access resources in the WWW and to search the Web, to collaborate in projects, to share work etc.
- Guidance: Teachers/Professors have to guide students effectively, to challenge them to use the internet creatively and ensure that they are rewarded for their efforts. This includes to filter information and prove the correctness and to view communication flows.
- Feedback: Feedback can be given in several forms in the learning process. It can come from the tutor, from peers or from both. Also automatically feedback functions can be implemented in the system.
- Enjoyment: Learning is more meaningful when it is fun. Features that encourage sharing, empathy, trust, support and collaboration, as well as discourage aggression, self-centred behaviour etc. help to make learning enjoyable.

Compared to the general requirements defined before, a clear connection can be pointed out: The requirement for resources can be seen as part of the requirement of openness: it expresses the need of learners to organise themselves the way they work and the resources they would like to access. The guidance and feedback are related to the concept of self-reflection.

The interesting difference between the general requirements and the requirements of Preece is the one regarding a participatory environment. However, since communities are based on symmetrical and horizontal relations, it could be said that this requirement is fulfilled a priori. However, we stress the importance of the participatory processes and claim that this is the key requirement for collaborative learning processes.

4. Concrete Approaches

4.1 INVITE – Using a 3D Environment for Collaborative Learning

The *INVITE* project aims to focus on the support of social learning with the means of a tool for synchronous e-learning. *INVITE* develops a virtual environment, on the basis of a 3D multi-user communication platform. The aspects of virtual presence – the essential feature to make people feel that they are working as a group rather than alone in front of a computer – is enhanced by the deployment of photo-realistic avatars, which to some extent are able to articulate feelings through face expressions and gestures and real audio communication.

These technologies are used to construct a learning environment. In addition tools for monitoring learner actions and recording sessions, tools for structuring learners into groups and control their communication channels, display learning material as well as tools for evaluating and reflecting the learning progress in the group will be developed and implemented.

It is perceived that demand will be high for tools like *INVITE* in the targeted market-segment that is international companies, networks of companies and training institutes with highly specialised training offers. All these institutions have in common that for learning in a group, international, if not intercontinental travel is necessary, involving personal fatigue, highly reduced flexibility on the learning models and high investment of time leading to less efficiency and increased costs.

Potentially *INVITE* offers to those customers a solution to reduce the travel effort and being able to design a more flexible learning process. Scheduling shorter, more regular sessions, integrating learning better into the working place and having more continuous support from tutors are prime desires of persons involved in training, which, because of the above mentioned constraints, can only be held in very structured, tutor-driven workshop-like learning scenarios.

Current meeting-based tools are mostly based on video-conferences, and seem to have been designed to virtually represent the concept of frontal learning. A general problem of these tools is the reduced social presence of the participants that are represented in windows by means of live pictures which mostly are not

fluid, occur with time delays, have a low resolution and are quite small. Thus, participants are rather given a feeling of distance than a feeling of nearness and group awareness.

Being built on a 3D multi-user communication platform, *INVITE* offers the advantage of creating nearness and social presence, thereby making participants aware of the communication and interaction processes with others. Besides audio, written chat or using a shared application system, they can additionally communicate by gestures, mimics and their positioning within this virtual space. Learners act intuitively and do not spend any effort in thinking how to operate their learning environment.

The development within *INVITE* is based on the AOE theory and aims to realise a platform satisfying the general requirements, that is open, participatory and reflective collaborative e-learning.

4.2 Learning Communities – A Medical Environment as Case Study

Imagine there is a small group working in a very specific area, having specific learning needs, problems and questions in their working field. Imagine this small group is distributed in different countries all over the world. Presently group members meet for basics training and have to meet for advanced training sessions. This requires a high effort of resources, because the group has to meet on one place.

VirRAD is an EC-founded project basing on such pre-conditions. The primarily target group are radiopharmacy post-graduate students and professionals but the widened target group for building a learning community are nuclear medics. The project aims to create a easily accessible virtual environment, where the nuclear medicine community can meet to learn, exchange views, and discuss best practice. Part of this environment will address the particular needs of trainee radiopharmacists, a sub-specialisation of nuclear medicine, through providing distance learning material. This will be an intelligent learning environment with courseware and shall overcome the economic and logistic difficulties in course provision for this specialist community. The development of multimedia learning material will be closely coupled with the pedagogical theory of mindful learning. Collaborative learning and community processes will be supported by a 3D virtual worlds platform.

Thus, the provision of "classical" and multimedia on-line learning material and the provision of community facilities should build a learning environment which meets the requirements of this target group. On the one hand radiopharmacy students can gather basic knowledge and discuss their questions in the community – on the other hand advanced nuclear medics can support them and discuss with students as well as with other advanced nuclear medics.

As group learning processes are highly efficient especially in problem solving, the virtual environment will support collaborative processes.
VirRAD aims at the integration of current RBL concepts with collaborative e-learning strategies. The basic pedagogical aims are the development of

1. an instructional design from Mindful-Learning theory;
2. a multi-layered meta-cognitive learner model within the context of an intelligent, virtual reality enhanced, distance learning environment for vocational training;
3. the embedding of this environment within an enriched learning structure that gathers together learners, practitioners and specialists in a knowledge community, using radiopharmacy as the target learning and knowledge exchange area.

VirRAD will investigate the integration of a personalised, yet social, learning environment; with technologies that explore protocols for communications between virtual reality and the facilitation of communities of learners; and learner modelling and instructional design. It will also satisfy the real needs of the specialised radiopharmacy community.

While in INVITE purely the collaborative e-learning of "small groups" (that is, groups as would participate in a traditional training) is at the centre of attention, VirRAD tries to integrate these results to support a full community learning process, including asynchronous communication, RBL and synchronous learning. It is expected that both projects will substantially contribute to the research of collaborative e-learning.

5. Conclusions

Recent market studies show that most European companies already are familiar with e-learning. However, much of this learning is dedicated to pure computer-based training, with the major application in the field of software training, where world-wide standardised training packages are available.

Only few companies have turned towards training over networks, should it be Recourse Based Learning or other. And – collaborative e-learning is a concept of which only few have heard off. However, collaborative work is one of the main strengths of the networked economy. Working with people, one has never met, forming dynamical teams over continents in order to solve problems, are becoming common in many globalised or networked companies.

The challenge in collaborative e-learning is now to design innovative solutions for such third generation platforms but on the other hand observe closely the way people are working already in the net.

Especially, one needs to be careful, not to re-introduce the concepts of vertical communication (between tutor and students), which have been abandoned in an economy of changing responsibilities. We have expressed this requirement, as one for a participatory process, which we view as the most important in the paradigm change from resource-based to collaborative e-learning.

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