EU POLICIES IN EDUCATION AND TRAINING AS WELL AS TECHNOLOGY ENHANCED LEARNING

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In this document we outline some of the EU policies, related to education and training in general but also Technology Enhanced Learning in particular, which are relevant to the aims and scope of the I-TUTOR ITS. We have to state at this stage that we have advocated a rather loose notion of what is a policy. More to the point, although official EU documents are certainly considered as policy making ones, we also consider as policies the technical approaches taken by EU funded RTD projects (in the sense that they effectively implement EU policies outlined in the call for proposals for which the projects in question have applied for funding). In addition, we take into consideration analyses and studies performed by EU funded projects of the type SLA (support actions), as the outputs of such projects usually serve as a basis for drawing new EU policies on one topic or another.

In the priority areas for European cooperation in education and training ([1]), a number of strategic objectives are mentioned that are related to lifelong learning, but of particular interest is objective 4, on enhancing creativity and innovation, and more to the point the use of ICT tools to promote creativity and innovation by developing specific teaching and learning methods.

One of the most important policy making stakeholders in TEL is the Framework Program and in particular objective 8.2 on Technology Enhanced Learning. In the last few calls ([2]), a number of areas were covered that are related, to some extent or another, with the aims and scope of I-TUTOR. In particular, we note the coverage of areas such as formal, informal and non-formal education, gaming, creativity, adaptivity, personalization, collaborative learning and intelligent tutoring. Lately, FP7 has shifted its focus on demand-driven and evidence-based RTD, focusing on innovative solutions for teaching, learning analytics, and educational data mining with emphasis on large scale educational data (big data). The EU observes that there is a mismatch between real needs and offered solutions. It proposes the development of innovative solutions combining different digital media, devices, teaching practices and learning methods, and based on latest advances of pedagogical, cognitive and other relevant scientific disciplines. Both students and teachers should be supported.

In [3] it is stated that the impact of ICT on education and training has not as yet been as great as had been expected. Furthermore, embedding ICT in education and training systems, require further changes across the whole spectrum of technological, organisational, etc. environments. ICT does have the potential to develop a "learning continuum" but this still needs to be proven. The report goes on to indicate the need for policies that will focus upon: a) embedding ICT-based tools in education systems, b) enabling lifelong learning by exploiting ICT's important advantages in providing easy access to learning resources, supporting personalised learning paths, and support innovative learning tools and resources, c) leveraging innovation and change into the core functions of education. The issue of innovation is a key challenge, as far as this report is concerned, and ICT should be seen as a key-driver for creativity and innovation.

The issue of innovation is also tackled in [4], which deals with the issue of e-learning policies for enterprises in Europe. This report states that traditional e-learning in 2000 has shifted during the current decade to innovative e-learning, which possesses the following characteristics: 1) generates new knowledge, 2) is owned by the learner, 3) creates learning communities, 4) is a result of and a tool to support partnership, 5) builds on the learner's contexts and previous achievements, 6) stimulates the learner's creativity by enhancing the spontaneous and playful dimension of learning, 7) enriches the role of teachers and learning facilitators, 8) focuses on quality, processes and learning context, 9) is embedded in organisational and social processes of transformation, 10) reaches and motivates those who were not learning.

It is also of interest, some of the findings of the STELLAR Network of Excellence, a currently funded FP7 support action project. In [12] a number of technological trends are outlined that will influence the development of e-learning. These are: 1) ambient and situated displays, 2) cloud computing for seamless learning support, 3) geo-everything and smart objects, 4) mashups, 5) mobile serious games, 6) mobile augmented reality, 7) multiple interactive surfaces, 8) semantic aware applications, 9) sensor technology for usage and activity tracking, 10) smartphones as generic mobile learning tools, 11) streaming videos, 12) tangible objects for learning, 13) tools for collaborative knowledge-building. Furthermore, the report defines a number of grand challenges in elearning, one of them being personalised learning. In this grand challenge, a number of more specific issues is discussed, among them the use of ITS to create intelligent agents that model the behaviour of an effective human tutor and how adaptive learning objects can be retrieved from learning object repositories.

In another report by the STELLAR Network of Excellence ([13]), the issue of orchestrating learning is addressed and a number of related questions are asked. Specifically, in which ways can TEL learning situations be seen to be more complex than learning situations in which digital technology is not used, any potential differences between orchestrating TEL learning situations in educational institutions and in the workplace, and what characteristics of gaming contribute to learning. The role of teacher is also addressed that also leads to a number of research issues to be examined, such as how can teachers harness the collective "wisdom of students" and how could the orchestration of technology enhanced processes of learning and instruction on different social levels (individual, small group, classroom) be facilitated by different classroom scripts.

The VISIR initiative, funded by the EU LLP, has also some interesting results, relevant to the aims and scope of I-TUTOR. In particular, in [14] the results of a seminar on TEL policies are presented. Among these results, we note the focusing on new devices and concepts, the shifting from personalized learning environments to networked learning environments, and the development of creative learning spaces.

In another report by VISIR, a number of domains of change in learning systems is defined ([15]). These are: 1) aims of learning systems, 2) content and competencies, 3) orchestration, 4) valuing learning, 5) assessment, 6) funding and governance, 7) integration, 8) inclusiveness, 9) teaching, and 10) learning spaces. For each one of these
domains, the perceived role of ICT is described. In particular, in content and competencies, ICT can help increase the reflective practices of learners, where new data
tracking systems permit the recording and mapping of individual learning. Furthermore, in orchestration ICT can help the learner define its own autonomous learning path and adapt his/her pace of learning. In valuing learning, ICT can play a key role in stimulating and maintaining motivation to learn, by offering the possibility to build individualized and contextualized learning paths.

A JRC EU report on education and training in 2025 ([16[) lists as major changes the ability of learners to choose their own learning paths, the responsibility for learning shifting from an organisation to the individual, the fostering of diverse learning styles that fit personal needs, and the ability to support different learning styles and adapted teaching methods.
We conclude this section by looking at how some other EU funded projects, which also address the issue of developing ITS, approach this area. iTalk2Learn ([5]) also develops an open source ITS where the intelligence part focuses on the use of recommender systems for collecting student actions, building profiles and adaptive control of single student tutoring. Furthermore, the proposed environment will be able to analyse and reason about effective interaction with exploratory activities, and will support speech recognition.

INTUITEL ([6]) will also develop an ITS, based on interaction with existing LMS and enhancing them with guidance towards an optimal learning pathway. The system will be able to reconfigure and adapt itself to the needs of the learner but also to monitor the cultural and emotional context in which learning is taking place.

GRAPPLE ([7]) has developed a TEL environment that guides learners through a lifelong learning experience, automatically adapting to personal preferences, prior knowledge, skills and competences, learning goals and personal or social context.

ROLE ([8]) also develops an adaptive learning environment, that offers flexibility, user control and mass individualization. The project addresses also human resource management, self-regulated social learning. Learning environment elements can be combined to form mashups, which can adapt to lone or collaborative learners.

Ilearn ([9]) develops an integrated intelligent environment that supports use profiling, incorporates different learning and teaching strategies and supports the classification of learning material based on user profile, personalised content presentation and engaging and evaluating learning activities. The proposed platform is focusing on the needs of learners with dyslexia.

DynaLearn ([10]) develops an intelligent learning environment that allows learners to acquire conceptual knowledge by constructing and simulating qualitative models of how systems behave. The system uses diagrammatic representations for learners to express their ideas and is equipped with semantic technology components that are able to generate knowledge based feedback.

Finally, ALICE ([11]) aims to define models, methodologies and prototype software components able to solve some of the most relevant problems of current e-learning systems and tools such as lack of interaction, challenge, empowerment, and social identity. Alice will build an innovative and adaptive environment for e-learning and combine personalization, collaboration, and simulation aspects within an affective/emotional based approach. Moreover Alice will contribute to the overcoming of the current e-learning systems and contents' limitations. Such a learning environment will be interactive, challenging and context aware and will provide users with empowerment, social identity and authentic learning experience. Alice defined models and methodologies will be used as a basis to develop prototype software components. Such components will be integrated in the learning platform IWT (Intelligent Web Teacher).

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