Mapping and analysing prospective technologies for learning in Europe

EU policies are focussing on strengthening of Europe's innovative capacity and the modernisation of Education and Training systems. Technologies for learning could make an important contribution to this endeavour as they are considered to be enablers of educational innovation and change.

The study "**Mapping and analysing prospective technologies for learning (MATEL)**" was launched by the Information Society Unit at JRC-IPTS and was carried out by the MENON network from January 2012 to January 2013. MATEL contributes to the objectives of the Europe 2020 strategy, in particular the Agenda for New Skills and Jobs, Youth on the Move, the Innovation Union Agenda and the Digital Agenda.

The MATEL study brings evidence to the debate on technologies that are expected to play a decisive role in shaping future learning strategies in the short to the medium term (5-10 years from now) in three main learning domains:

- Formal education and training (i.e. primary, secondary and higher education; vocational education and training);
- Work-place and work-related learning (i.e. professional development strategies that are integrated into and/or directly relevant to a specific job or career path);
- Re-skilling and up-skilling strategies in the lifelong-learning continuum (e.g. re-qualification schemes; strategies for regaining employment; career development strategies an individual undertakes voluntarily to change her/his job or professional profile etc.).

The final report on the MATEL study, to be published online by JRC-IPTS in July 2013, highlights the main messages gathered from the three main phases of the study: an Online Consultation, a State of the Art Analysis and a Roadmapping Workshop.

Through the extensive **Online Consultation**, which followed a bottom-up, multi-stakeholder approach, eight technology clusters and a set of related key technologies that could enable learning innovation and educational change were identified, as depicted in the Matel Cluster Map graphic on this page.

Eight of the abovementioned key technologies were analysed in depth in the State of the Art Analysis to highlight their current and potential use in education, the relevant market trends and their on-going policy initiatives.

Based on the previous phases and on a following **Roadmapping Workshop** attended by external experts, three roadmaps, one per learning domain – Primary and Secondary Education, Workplace and work-related learning, RE-skilling and Up-skilling strategies – were developed. The long term goals and specific objectives for educational change and also the specific technologies that support these changes are then discussed, leading to the immediate strategies and actions to be undertaken by policy and decision makers (see table on next page).

The Matel Cluster Map
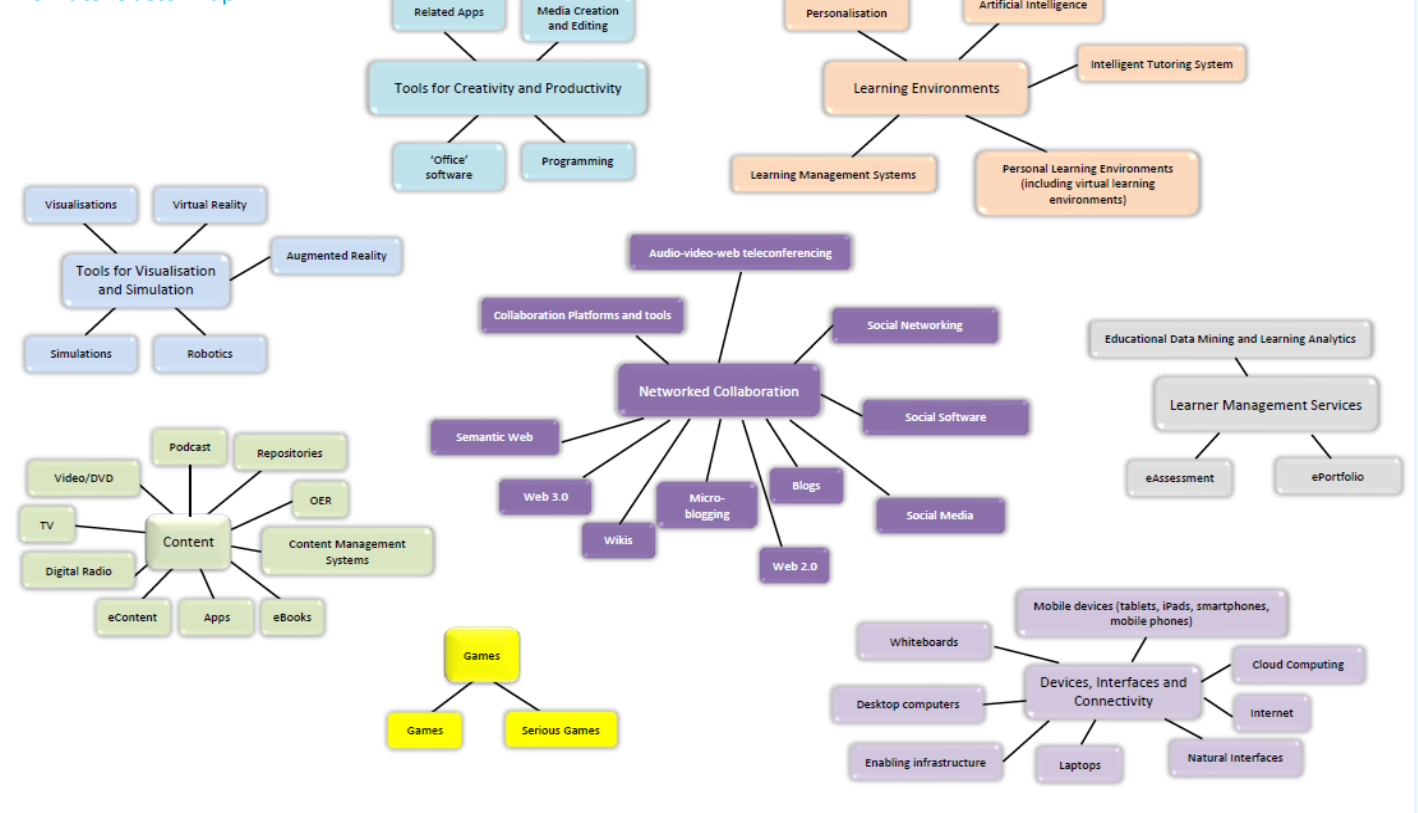
Primary and Secondary Education	Workplace and work-related environment	Re-skilling and Up-skilling strategies
Increase awareness of the individual behaviour patterns in learning and in the use of technologies in everyday life.	Update policy strategies at a European level: Adult learning needs to serve new objectives.	Keep on investing in the new Europass CV incorporating skills acquired informally and non-formally.
Connect with the health sector to assess the risks associated with the intensive use of technologies in learning.	Promote the "Learning Identity card/ passport" for individuals and companies (to show competencies and skills and to enhance motivation to learn).	Assess the feasibility of the establishment of a "European Skills' Bank".
Invest heavily in reinforcing the enabling infrastructure.		Establish local learning centres for the enhancement of critical skills and make sure their offer takes into account local (for instance local labour market needs) as well as individual needs (for instance their age).
Increase piloting in the use of mobile devices in the classroom.	Set reward schemes and benchmarking criteria for the valorisation of outcomes developed through communities of practice across companies.	
Focus on equity of access to the above-mentioned technologies.		
Establish rules of conduct for the responsible use of technologies in schools.	Fund competence development	

Strategies suggested by the MATEL roadmaps

In conclusion, the first key policy message that the MATEL study brings to the policy making and research community is the need to always consider the introduction and implementation of technologies in learning in relation to the dynamics, evolution and needs of learning systems. Learning takes place in a complex ecosystem where one must be aware of technology trends but not be "technology driven".

The second key policy message that MATEL delivers is that the world of technologies is also a complex ecosystem with strong interdependencies, which must be taken into account to ensure the effectiveness of technology implementation in learning.

The third and final key message of MATEL relates to the fact that most of the key MATEL technologies were not developed, in the first instance, with learning in mind. Therefore, attention should be focused on filling the gap in professional profiles able to ensure a meaningful use of technologies in learning. For example, designers are needed who are able to adapt technologies to learning purposes; anticipate the needs of practitioners; understand and face their concerns.

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Leading the debate on ICT and Education

JRC-IPTS has just guest-edited a special issue of the European Journal of Education on ICT and Education, taking stock of progress and looking at the future. The issue provides a critical review of evidence and opens the discussion on identifying and implementing major changes in education systems to meet the challenges of 21st century learning and society.

In-house research by the JRC contributed to 3 of the 7 articles for this special number: 'Measuring ICT Use and Learning Outcomes: Discussing Evidence from Recent Econometric Studies', 'Changing Assessment: towards a new assessment paradigm using ICT' and 'Framing ICT enabled Innovation: The case of one-to-one learning initiatives in Europe'.

A key message cuts across all the contributions in the issue: although ICT use is becoming mainstreamed in education and training, technologies cannot and should not be the centre of attention and activity. Rather, it is about changing practices, pedagogies, ways of learning and teaching and how they are organised and serve the purposes of society and the economy. It is

also about educational transformation in a digital world which is urgently needed, but which will not be realised easily or quickly.

This aligns well with recent discussions at European policy level. In times of economic constraints and with high rates of early school leavers and youth unemployment, urgent efforts must be made to boost the full uptake of ICT. This could enhance both the acquisition of digital competences and the modernisation of education and thus generate growth, employment and social inclusion, according to the communication 'Rethinking Education' (COM 2012 669 final; 20.11.2012).

Download The European Journal of Education, Vol 48, No. 1, March 2013, on ICT and Education: taking stock of progress and looking.

For more information, please visit the JRC-IPTS Learning and Skills Research webpage.
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