

LEARNING AND TEACHING TECHNOLOGY OPTIONS

The education system is very wide and no technology will be adequate to solve all problems. Moreover there are many and fast evolving technologies while every region and country face specific challenges and have specific contextual factors. Therefore the policy options are intended as strategic approaches that provide a framework for decision-makers to define more concrete policies.

I. Technology-related policy options

1. Extensive deployments of technology at the school level

The extensive deployment of technologies in schools contributes to reducing the digital divide between schools at the infrastructure level while achieving ratios of technology penetration close to saturation. However, a lack of evidence linking the level of infrastructure to technology use and educational performance and certain potential problems, such as high maintenance costs, require these policies to be carefully designed upon evidence about their real effectiveness, and adapted to the concrete context.

2. Pilot based deployment

Policy-makers may design a pilot-based approach to boost innovation among early adopters of emerging educational technology. In this approach, small scale pilot projects are implemented, assessed and replicated when evidence supports its feasibility and benefits. In this way the deployment of initiatives at a lower scale, although delaying the process in the short-term, may yield better medium-term outcomes and promote innovation. Europe provides a natural laboratory to test different initiatives. Detecting and properly assessing national and regional initiatives can provide very useful insights. Moreover, the EU can play an important role in supporting governments by sharing evidence among countries. It can also offer categorical grants to participants in pilot projects, provide technical support, and assess and disseminate the results.

3. Defining and reaching a minimum threshold infrastructure at schools

One alternative to massive infrastructure deployments at schools consist on providing a sufficient level of school technology complemented with shared centralized services. An ultra high-speed Internet connection, a school local area network and a sufficient number of school computers are the core elements of this infrastructure. Additional elements, such as projectors, interactive whiteboards, and printers, are advised. Defining the optimum level of infrastructure is the most complex element of this option. It will depend on contextual factors, such as local teacher involvement, technical capabilities in the school and connectivity availability. The EU can define this minimum and optimum level of technology infrastructure by using previous research. Once the threshold is defined, the EU can provide funding and technical support to Member States below the threshold.

4. Sharing infrastructure and services in the cloud

Promoting cloud models in the educational environment provides several benefits and allows the implementation of shared services and infrastructures. It increases flexibility and quality of services, reduces local maintenance, promotes innovation, reduces the time of deployment, and reduces costs. However, this approach can only be effectively implemented if all educational centres have a minimum infrastructure, particularly fast or ultra-fast Internet access. Security, privacy and standardisation concerns can hinder the deployment of these models.

5. Drawing upon students' devices

Students' devices are an untapped source of resources that can contribute to increasing the number of devices available at schools with minimum impact on public budgets. By using these devices 1to1 models can be deployed in a flexible, effective and straightforward way in the so called Bring Your Own Device (BYOD) model. However this option should be accompanied by providing devices to those students from low income families to avoid increasing inequalities. This can be done by direct delivery by schools – even in borrow or rental models - or providing vouchers to low-income students. Other considerations that should be taken into account are standardisation and interoperability of contents across the platforms and services and privacy issues.

6. Drawing upon open and collaborative environments to create educational resources

Educational contents and services can be developed by the community (teachers and students) and can be shared on the Internet, both for formal and informal learning. Promoting these environments can be beneficial if contents' quality is assured and tools and training to facilitate access to contents by teachers are provided. This option requires a comprehensive approach involving regulatory (copyright and reutilisation), technical (standardisation and interoperability), training, and cultural measures.

II. Stakeholders' engagement policy options

Teachers

7. Reforming educators' training and assessment systems

Teachers can get the required skills and confidence by being trained in initial teacher education and by further acquiring the skills through formal and informal lifelong learning. Initial teacher education should include subjects regarding pedagogical use of technology and skills to promote educational research. Admission to teacher education should always include interviews and tests to assess that they have the right motivation, skills, and attitudes to succeed in a technological environment. These methods are only applied in a third of European countries.

8. Implementing specific Continuing Professional Development (CPD) plans

Educational organizations in Europe should promote Continuing Professional Development (CPD) plans to assure that teachers are able to adapt their teaching practices to the changing needs fostered by technology. This can be done by aligning CPD activities to promotion and salary increases while providing free activities and financial support for paying the training. Formal appraisal and receiving relevant feedback can also contribute to improve teachers' skills and personalising their CPDs.

9. Promoting collaborative transnational educators' communities

Eventually, the Internet supports collaborative continuous professional development. Creating national and transnational teachers' communities where teachers can share concerns, knowledge, best practices, and tips can contribute to increasing confidence and acquiring new skills.

Industry

10. Promoting Public Private Partnerships

A stronger and more effective collaboration can be established by promoting Public Private Partnerships (PPP) between businesses and education agencies through collaborative, organizational, and contractual means where both parties share goals and risks. There are several areas where this collaboration can be enhanced, such as: providing technology (devices, networks, connectivity, data centres), providing contents

and services, providing maintenance and support, training the education community, helping to raise awareness among stakeholders, and offering advice to stakeholders engaged in the policy making process.

11. Involving the industry in the policy-making process to better align its needs and education

A further extension of shortening the relationships between the government and companies is to involve more closely the industry in the policy-making process to better align the needs of the industry and the education system. There are several fields where this cooperation can be particularly relevant such as redefining the curricula and the assessment methods.

12. Strengthening cooperation in innovation and research

Both formal and informal education at all levels can benefit from the innovation in the sector but Europe seems to be lagging behind. The European Union can support research activities in educational technology while strengthening the links between research departments and the industry. The EU can support research activities in educational technology and stronger cooperation between universities and businesses in this field. For instance, the EU could create a specific area of educational technology in the framework programmes for research and innovation.

13. Boosting the industry of educational contents and services

The implementation of a comprehensive set of policies to support the European industry would foster innovation and the development of new business models. The policies should include, at least, measures to (1) improve the intellectual property regime, (2) promote the transnational creation, reuse, and use of contents by harmonising the European market, providing information about property rights, and reducing administrative burdens, (3) improve access to funding for innovative projects (particularly for SMEs and risk finance), (4) encourage entrepreneurship and (5) promote an adequately skilled workforce for the industry.

Families

14. Carrying out awareness raising campaigns

One way to tackle inequalities pertains to altering incentives by increasing low-income households' demand for technology. This demand can be stimulated by making technology more appealing. This is a top-down approach where governments, supported by other stakeholders such as NGOs and companies, can raise awareness about the use of technology in our daily lives, and particularly in education.

15. Implementing economic incentives

The demand can also be stimulated by providing economic incentives to help the low-income families to purchase technology goods and services for the children. Financial support for services should also involve training activities for children and their families.

16. Direct provisioning of technology and training services

Governments can directly provide technology services at public facilities –libraries, town halls, schools– to make it easier for low-income families and students to use the Internet out of schools while being trained.

III. Competitiveness policy options

17. Adapting the curriculum

The reform of the curriculum can be tackled in a systemic way through a profound revision of the educational scheme and a revision of its core element. Such a transformation should be driven and coordinated at the European level and would require a wide consensus among the educational community, the industry and the society as a whole. In most cases it would require legislative modifications.

18. Designing and officially recognizing new assessment methods

Evaluating the learning outcomes of new learning practices requires a new assessment approach. This must be a holistic approach that gives room for new assessment strategies, such as formative learning strategies, that helps learners to understand their progress and self-regulate their learning process. New assessment policies should comprise the formal recognition of practices such as self-assessment or peer assessment, and include the use of web-based tools and mobile devices.

19. Shaping the role of MOOCs to effectively contribute to lifelong learning

Adults with lower skills, who could particularly benefit from training, are less likely to be involved in adult learning activities. Policies focused on reshaping the role of MOOCs to reach less educated and disadvantaged workers could contribute to increasing the efficiency of this new way of learning. The EU should encourage European universities to develop new courses targeting the specific needs and requirements of less educated, unemployed and older population.

20. Increasing the recognition of informal education

Technology fosters new ways of lifelong training beyond traditional education. The EU can accelerate the creation of alternative credit recognition means shared by the countries to increase the value of quality non-formal education. The EU can contribute to this goal by aligning the interest of the different stakeholders, sharing best practices, supporting national initiatives to establish national qualification frameworks aligned with the European framework based on learning outcomes, and assessing the results.

IV. Cross-cutting policy options

21. Creating tools to properly evaluate policies

One of the main challenges affecting technology-related educational policies is the lack of reliable information about the effects of the different intervention on educational outcomes. A lack of adequate datasets about the use of technology is particularly relevant when considering higher and lifelong education. Creating an open homogeneous European longitudinal dataset including extensive information about technology use could substantially improve the quality of educational technology policies in the medium term.

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