School education in 2030 and beyond –
Empowerment through personal learning navigation

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Learning in schools will in 2030 be a continuation of the intrinsically motivated learning processes that characterize early childhood development, which will be facilitated through Personal Data Spaces from which all information needed for learning navigation, monitoring and certification will be derived, all based on invisible technologies.

Background

Since the mass introduction of ICT in societies there has been a continuous debate about the need for fundamental educational reforms. This has in recent decades resulted in numerous initiatives at all educational levels aimed at realizing innovations in anachronistic education systems which were in all their characteristics suited for industrialized societies.

Most of these innovations were deemed to fail, as they were based on short term visions and planning, too much atomistic[i] and not taking into account that all system elements need to be tuned in order to realize synergic power for change.

Although 2030 is for education still a medium term perspective, our current dreams will keep us awake and oriented on taking steps towards necessary innovations.

A Leitmotiv for education in 2030 and beyond

Most children have from birth a genetically determined intrinsic motivation to intensively explore and learn about their environment. They see, hear, taste, feel, endlessly repeat and automate behaviours for interacting with their environment in order to be able to survive in their social environments. Depending on the amount of stimulation, feedback and genetic dispositions (curiosity, anxiety, strength, etc.) some develop faster than others. Often their creativity in dealing with new situations is fabulous. The period between zero and four years can be conceived as the ultimate blueprint for open education.

When children enter compulsory education their intrinsic motivation to learn is slowly replaced by a system of extrinsic motivators: teachers determine what is learned and when, how it is appraised, distinguishing the good from the bad learners, sorting children into different educational tracks which continues until the end of compulsory education. Many children who were at the start of their life enthusiastic and creative learners discover that they are qualified as not being able to learn and their school experiences become, due to extrinsic feedback, intrinsically demotivating. This is reinforced by experiences that quite often it is unclear to them (as well as their peers and parents) why certain contents need to be mastered.

An overarching Leitmotiv for education in the future (taking 2030 as intermediate benchmark year) will be that the whole education system is focussed on fostering and further developing the intrinsically motivated learning aspirations which are so characteristic for early childhood

development. The task of education actors is to help students to engage in learning opportunities that match their aspirations and to offer guidance in increasingly developing a sense of ownership and skills for managing learning processes while continuously (co-) monitoring progress over time.

Some major implications

Although the Leitmotiv seems simple, it will have major implications. First a general implication is described below and next consequences for some issues which were mentioned in the Call will be reviewed.

General implication: need for personal learner data

In order to help children to engage in learning activities that are likely to evoke their interest and lead to success experiences a lot of information needs to be continuously and instantaneously available and updated (e.g. zones of proximal development, earlier successful experiences, language skills, etc.).

However, our current education systems stem more or less from an industrialized model of mass production, which fortunately allows (or even forces) every individual to participate, but unfortunately cannot sufficiently cater for the huge variation in individual idiosyncrasies, preferences and needs. Although theoretically possible with very high teacher to student ratios, this would be financially unbearable. Moreover, educational actors currently do not have the expertise and tools for collecting and processing large amount of information about individual learners and matching this with optimal leaning opportunities while at the same time consequently monitoring progress over time. Also sophisticated tools for managing large amounts of information about the characteristics of an individual learner over a long period of time are not available.

In the future each learner will have its own personal data space (PDS) in which all relevant data about the person are stored (in an absolutely privacy guaranteed way[1]). All these data can be collected by observing each individual when engaged in several activities (virtually through algorithms or real through perceptions of 'relevant others').

In 2030 major steps have been taken to fill PDS on the basis of educational activities in which learners participated. Many of these activities will be virtual and each virtual environment will have data collection components that will store data in PDSs. These data can (automatically and/or by researchers) be processed for further extractions of composite indicators on a huge range of learner characteristics (e.g. intrinsic motivation, student competencies, aspirations, etc.).

These PDSs, which can already be initiated when children are very young (if parents see the added value) but at the latest when children enter compulsory education, will influence all the other components of the education system (management, organization, curriculum, quality control, teacher training, certification, etc.).

Some illustrations, in terms of topics mentioned in the Call, will be shortly shown below. Although the proposed orientation will have implications for all topics mentioned in the Call, space consideration prevent a review of all of them.

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[1] A distinction needs to be made between data and information. With the consent of the learner (at young age, the parent) data may be extracted for indicator construction and monitoring purposes.

Learners

Peer learning and interaction

Peers will play a very prominent role in the learning environment of learners. In particular peers will be partners in the real and virtual learning spaces in which learners will be engaged. They will cooperate in solving problems and will be sparring partners during drill and practice exercises that are regularly undertaken in order to create a sound basis of general knowledge (specified in scientifically underpinned curricula) needed for complex problem solving. A very important function of peers will be to provide data for the personal data spaces of learners through perceptions about their strengths and weaknesses.

Learner-teacher roles

Teachers will be high level experts who will be able to help learners to optimize the match between their intrinsic motives and their actual competencies with appropriate new learning opportunities. They will be able to interpret indicators from PDSs and to monitor the progress that learners are making, signalling obstructions and helping to find appropriate solutions. In the pre-compulsory period, this will be the task of parents who will have the opportunity to use PDSs for their children. They will provide data about the pleasure children experience when engaged in real and virtual games, so that the software can (in combination with the virtually 'observed' behaviour of children) generate suggestions for follow-up activities, from databases in which all learning opportunities (and their characteristics) are stored. Also during compulsory education parents will be actively involved in monitoring and guidance.

Learning practices and outcomes

PDSs contain information about all learning experiences in which learners have been involved. Their activities in virtual environments results in estimates of their latent competencies. Data about the outcomes of their behaviours in real life situations will be derived from perceptions of peers, teachers and parents (note that inter-subjectivity is a form of objectivity).

Linking formal and informal learning

The distinction between formal and informal education will be increasingly blurred, as students are continuously learning (just like pre-school). Parents will be stimulated to buy educational certified virtual games for home use that can be used for feeding data into PDSs of their children.

Learner engagement and motivation

With regard to engagement and motivation we will see the most dramatic change in comparison with 2013, because the whole system is oriented on continuously stimulating motivation, so that learners are optimally engaged.

Teachers

Teacher-learner interaction

Teacher-learner interactions will be characterized by guidance and help. Teachers are experts in using indicators from PDSs of learners and are brokers in helping them to match aspirations and learning opportunities.

Teacher training and collaboration

Teacher training is continuous, because learning opportunities are in a constant state of flux, amongst others as a result of increasingly sophisticated virtual environments, labour market changes but in particular because technological possibilities are constantly improving.

Pedagogical methodologies and practices

Teachers will (and are skilled) in particular to play a very important role in fostering and stimulating learners' intrinsic motivation by showing (when necessary) how fascinating and rewarding it can be to be engaged in certain learning activities. They also stimulate the building of peer groups and are able to foster group cohesion processes, team building, etc.

Quality and innovation

PDSs allow for the extraction of a constant stream of information about the added value of learning processes at individual, school and country level. Large data collection exercises for assessment programs that are known nowadays (PISA, IEA, national assessments, etc.) do not longer exist. All data needed for quality monitoring at individual, school, national and international level will be extracted from PDSs. Solutions for empirically demonstrated weaknesses will be found leading to innovative approaches.

Content and scope of "teaching"

Teachers are motivators and generalists who are experienced and master all core curriculum objectives. In addition they are specialists in certain curriculum areas. They are not all necessarily "instructors", although some have the reputation of being fabulous lecturers, who are regularly (in reality and virtually) performing in front of a large learner audience.

Teacher engagement and motivation

As implied from the above, teachers are fully engaged in the learning navigation of students. They are trained and selected on the basis of their enthusiastic motivation. The status of teachers has increased tremendously since 2010. They all have also their own PDSs which are used for the same purposes as is the case for all learners.

Organisational aspects

Assessment, recognition, certification

Final examinations and assessments will not longer exist in their current form. Measurement will be unobtrusive. Competencies, aspirations, etc. will be extracted from PDSs. Certification will be an ongoing automated process based on data from PDSs.

Curricula and Learning Objectives

Curricula will describe which basic core competencies learners need to acquire. Although some competencies will be the same for all learners, when learners grow up these competencies will increasingly be derived from career aspirations (therefore cooperation with the market sector is crucial).

There will be European frameworks for describing the minimal competencies students need to acquire for participating at particular levels in (virtual) educational environments. This is an important element for PDS architecture.

Technological aspects

Architecture for PDSs will be based on European standards. Virtual educational environments will be certified if they contain a number of components that are needed for learning navigation, such as:

- Competency inference modules

- Mapping of virtual activities with curriculum frameworks

- Data delivery to PDSs

- Registration of learning opportunities encountered by learners

Virtual environments will be linked to and interact with real environments

A characteristic of future educational technologies will be that they will be invisible. Inventions like Google glasses will in retrospect be qualified as utmost primitive.

Socio-economic aspects:

Equity and quality

PDSs will offer powerful opportunities for monitoring equity and quality issues. They can have a preventive function by signalling in very early stages potential groups that are at risk in terms of intrinsic learning motivation, learning opportunities and outcomes.

Addressing emerging skills and business needs

The responsibility of business will be to specify and update profiles needed for current and future jobs. This will be the basis for curriculum mapping and matching with PDSs so that learning navigation can take place.

Fostering employment, active citizenship and inclusion

The involvement of business (job and competency profiles, linkages with learning opportunities, certification) will contribute to a better match between offer and demand leading to improving employment possibilities for citizens. As certification is based on PDSs, citizens are better able to 'proof' their qualifications, counteracting stereotyping associated with ethnographic characteristics. Employers are stimulated to randomly select a candidate for a job from those who are qualified according to their PDS.

Conclusions

Personal Data Spaces will offer the key to building sophisticated learning navigation systems, which will empower the learner to maximally profit from and enjoy the learning opportunities that education systems will offer in the future. The European Commission will play a leading role in promoting standards and frameworks that will constitute the fundaments for technology enhanced education in 2030 and beyond.

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[i] For example: introducing new instructional methods without changing curriculum, organizational, assessment and examination standards; changing curriculum objectives without changing examinations contents; introducing ICT based learning methods without sufficient teacher training; neglecting ownership issues while mainly focusing on top-down changes.