

## Knowledge economies and innovation society evolve around learning

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### Summary

This article is an attempt to describe and analyse the pivotal and dynamic role of learning in shaping up and fuelling the metamorphosis of current post-industrial societies and economies into true knowledge economies and innovation societies. We start by contrasting two current European expert views on the role of learning in the emerging innovation societies and reflecting on them. Then, to gather momentum, we look back into a few classics of the modern work-based learning theory to argue for promising ways forward. We base our discussion on contemporary debates as well as on our vast experience in taking part in tackling the challenges of developing the complex interfaces and joint learning environments between academia and work places.

Globalisation has brought systems intelligence to the core of the success factors, and working life will experience a prominent shift towards an emphasis on new visionary knowledge creation. We strive to address the whole continuum from generic global traits and trends down to a specific training concept piloted by a university outreach programme. Our main concern is that the decisive importance of learning as the vehicle for pulling the contemporary societies out of the current crises has been identified, but not yet fully recognised by the policy-makers, with their mindsets constrained by past policies and beliefs. We suggest that taking off from traditional thinking is necessary for equipping the emerging knowledge economies with the mastery of systemic innovation.

**Keywords:** innovation strategy, learning environment, learning-intensive society, learning space, knowledge society, Finland, systemic innovation

## 1 Introduction

We are currently experiencing the most serious economic crisis since the depression of 1930's. At the same time the disastrous impact of the global warming on the economy is gathering momentum. These clouds shadow the horizon of the future. These severe challenges may prevent us seeing other significant trends simultaneously impacting conditions of life in the post-modern societies and emerging knowledge economies. This article aims at addressing a number of such issues related to learning which have perhaps been temporarily overshadowed by the current economic turmoil. There are interesting and important technological, pedagogical and social innovations which should be elaborated in order to harness innovation systems to foster creativity in tackling the challenges of reorganising our economies and social orders. Dedicating this year in Europe for innovation and creativity may be timelier than one could think of.

We approach the topic first through an important recent European report<sup>1</sup> by IPTS. Then, we juxtapose it with a recent national innovation strategy on the European scale. We have chosen

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<sup>1</sup> Miller, R. Shapiro, H. and Hilding-Hamann, K.E., 2008. School's Over: Learning Spaces in Europe in 2020: An Imagining Exercise on the Future of Learning. European Commission Joint Research Centre, Institute for Prospective Technological Studies. <http://ftp.jrc.es/EURdoc/JRC47412.pdf>

for it the Government's Communication on Finland's National Innovation Strategy to the Parliament.<sup>2</sup> We will reflect on them in comparison against some selected features. Choosing a national perspective can be criticised as being anachronistic in the increasingly global economy, but it nevertheless allows to draw a schematic presentation of the complexity of dependences impacting the innovation processes. The approach could help demonstrate and test some important dimensions and assumptions about societal traits and dynamics laid out in the IPTS report. We have chosen Finland as a case for obvious reasons: because we know it best, but also because in innovation policy development Finland has been one of the early and quickly moving birds and as one of the hot spots of the innovation world it has something relevant to offer to a wider audience.<sup>3</sup> Finally we try to penetrate into the dynamics within learning systems and highlight some prominent elements, again through a Finnish case.

## 2 Characteristics and dynamics of an innovative knowledge society

An interesting foresight exercise to map the complex relationship between emerging innovation societies and learning systems has been undertaken recently by the Institute for Prospective Technological Studies. Miller et alia applied a methodology which aimed at identifying the characteristics of future learning spaces (LS) framed by the future learning-intensive society (LIS). The construct is a scenario of how society might function in 2020 with open learning as the core. In the LIS scenario, LS are "the next school". The scenario is based on an assumption that the now-wavering mass-production and mass-consumption of current societies are no longer prevailing, or as they put it:

*"-- the crucial moment in industrial society when the entrepreneur or engineer or designer comes up with an idea that can then be implemented by taking advantage of economies of scale is no longer central. The aims and organization of wealth creation no longer take on the form of a pyramid or hierarchy, with the genius who generates new ideas and the technocrat manager who implements them occupying the top floor, while down below at end of the chain of command is the "front-line" worker. --. Everyone is the inventor and implementer of his or her own designs, the unique, personalized set of artefacts, services, and experiences. As a result, in the Learning-intensive Society there is a profound difference when compared to industrial society in the relationship of knowledge to production or, in more general terms, the activities that (re)create daily life."*

This scenario is then finally contrasted with the current policy assumptions about LIS, thus providing food for policy debate on how to cope with innumerable stumps blocking the way towards full-scale implementation of the LIS-LS.

The Finnish strategy proposal<sup>4</sup> drafted by the innovation task force set up by the government at the same with the IPTS strategic vision process provides an interesting possibility to put the issue of enhancing innovation in the cross light of a pan-European and a national perspective. The way how the IPTS report defines LIS-LS is akin to the LE in the proposed Finnish Innovation Strategy, but has been free to stretch its intellectual wings much further than the Finnish strategy group, which seems to have been comprised of experts more closely connected to the realities of the policy-making. Perhaps that is the reason why the IPTS report takes more critical stand to *"yoking education to the idea of 'national competitiveness'--in the open, trusted and connected context that makes LS work, the imperatives that seemed so urgent in 2008-- has receded into an old memory."*

In the IPTS's LIS scenario of 2020 both old industrial style learning and the notion of national competitiveness are declared passé. The argumentation goes like this:

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<sup>2</sup> [www.tem.fi/files/21010/National\\_Innovation\\_Strategy\\_March\\_2009.pdf](http://www.tem.fi/files/21010/National_Innovation_Strategy_March_2009.pdf)

<sup>3</sup> Kao, J., 2009. Tapping the World's Innovation Hot Spots. Harvard Business Review, 87 (3), 109-114.

<sup>4</sup> Proposal for Finland's National Innovation Strategy 2008.  
[www.innovaatiostrategia.fi/files/download/Nationalinnovationstrategy\\_EN-20080704.pdf](http://www.innovaatiostrategia.fi/files/download/Nationalinnovationstrategy_EN-20080704.pdf)

*“-- it is widely understood that nations are not firms and a successful nation does not succeed by being a better more efficient, cost competitive, profitable ‘firm’ than another country but by creating the conditions for local, unique creation. In the LIS the old industrial forms of competition around product market innovation and efficiency are marginal, since output is not standardized but unique. In the LIS of 2020 the largest share of ‘wealth’ creation is sourced locally from personal creativity - which, once again, is not a technocratic skill. Certainly, vestiges of the old forms of product market and investment competition remain, but such activities are only pertinent to a thin layer of production that is necessary but non-central in terms of its share of value, time, and lifestyle--.*

*From the perspective of learning the two most marked contrasts between the vision of Learning Spaces in a Learning-intensive Society and the current framework for learning, are (a) the abandonment of the technocratic, hierarchical and exclusive approach to education and skill achievement, and (b) the marginalization of institutionalized learning.”*

The Finnish report seems to think along similar veins about the need for new modalities for defining production and consumption and are ready to reject the old fashioned paradigm of learning, but sticks still firmly to the mantra of the supremacy of the national competitiveness as the overarching success criteria. On the other hand the IPTS report’s vision of the primacy of local sourcing in wealth creation leaves plenty of space for debate on plausible prerequisites and interpretations on doable implementation. Finland has repeatedly scored on top positions in the PISA surveys of lower secondary educational achievements. Such a success is a double sword. It does not necessarily encourage to echo the critical comments on institutional school education as the IPTS report echoes. On the other hand it allows the Finnish policy-makers to consider carefully with no panic the potential as well as the limits of reforming the system without abandoning it.

Nevertheless the summary of the IPTS report on LIS-LS fits perfectly the Finnish Innovation strategy:

*“--the ‘bottom line’ is that a rich new learning framework can be detected in the ‘learning-intensive society’ that characterizes Europe in 2020. This framework or new infrastructure of learning has LS at its centre and is the main objective of institutional enabling policies. These LS are multi-dimensional loci for learning in all its forms: intangible and tangible, experiential and reflective, individual and collective. LS are the nexus, the crossroads of all strands of learning - both the stock of what someone knows and the flow of action that alters what they know, both in hierarchical terms judged by a third-party standard and in heterarchical terms that are self-referential, complex and transparent.”*

The Finnish strategy proposal is based on four basic choices:

1. **Innovation activity in a world without borders:** In order to join and position itself within global competence and value networks, Finland must actively participate and exert influence and be internationally mobile and attractive.
2. **Demand and user orientation:** Innovation steered by demand, paying attention to the needs of customers, consumers and citizens in the operations of the public and private sector alike, requires a market with incentives and shared innovation processes between users and developers.
3. **Innovative individuals and communities:** Individuals and close innovation communities play a key role in innovation processes. The ability of individuals and entrepreneurs to innovate and the presence of incentives are critical success factors of the future.
4. **Systemic approach:** Exploitation of the results of innovation activities also require broad-based development activities aiming at structural renewal and determined management of change.

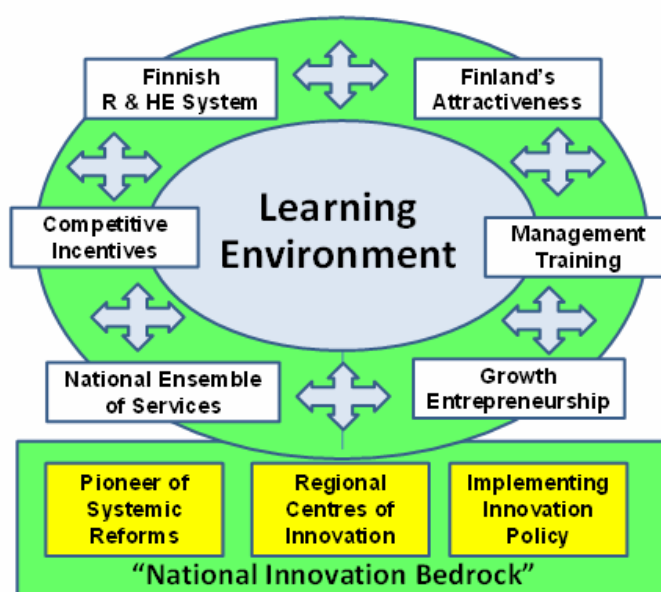
The first one is contradicting the IPTS report's post-nationalistic credo, but the remaining three approach surprisingly close the views expressed in the IPTS report.

### 3 Discussing the systemic role of learning environments in the society of the future

We think that the Finnish strategy should be pushed yet a step towards the European vision outlined in the IPTS report. As Markkula has suggested<sup>5</sup>, the pivotal organising concept in the Finnish innovation ecology should be the learning environments (LE). LE are seen as creative dynamos making the Finnish innovation system tick. There are a myriad of learning environments in a country; many are national, many local, and an increasing number are well connected and globally networked. Some of them need to be big enough (mega level) to be able to mobilise and accelerate the frequency of quality innovations to the levels boosting the economy. What is important to note is that LE are seen in this enhanced innovation model suggested to Finland so fundamental to innovation that they are actually conceived as the very spaces where innovation creation and development take place.

To be viable, LE need around an innovation ecology capable of feeding in and mediating the realities and modalities of the surrounding world. The intermediary mechanisms and services need to be organised and tuned in such a way that they optimise the interplay between LE and the organisations surrounding and supporting them. See Figure 1.

**National Innovation Strategy of Finland 2008**



*Figure 1: Renewed Finnish Innovation Strategy*

LE can be seen as a concept very close to the LS defined by the IPTS report. The development taking place at work places is decisive. As suggested in Figure 1, LE is the gravity creating impact and keeping the various impact factors in their orbits.

The core success factor is the systemic approach revealing the underlying concepts and processes. ICT enables the development of procedures as well as indicators which can be used to enhance organizational work cultures to share, evaluate and reward achievements in a result-oriented sustainable manner.

<sup>5</sup> Markkula, M., 2009. Unpublished Aalto university discussion paper.

ICT enables the emerging work culture to detach from traditional function-based management towards collaboration, co-operation and co-creation with shared parallel processes. Gains from developing processes can be significant, but the gains achievable through the creation of a new work culture of value networking can be gigantic. In improved leadership and management it is necessary to orchestrate work inputs not only within one's own organisation but developing processes and networks with strategic partners as well. When well-rehearsed, a process-orientated operational model nourishes a working environment inclined to continuing improvement. The ultimate aim would be a systemacy of professional development anchored to the work place's human and social capital, as well as a relational capital harnessing external resources for the organisation. Progress in this direction will make the organisation more resilient and expedient. The importance of conducive knowledge management is epitomized.

Attaining these goals calls for emphasising learning taking place in the work places capitalising on the concepts like innovative milieus, creative tension and developer networks. Different players in the value network connect their processes to the value adding chains. Technical integration alone will not do. Instead, genuine compatibility is required, as well as understanding what kind of inter-personal knowledge should be communicated between people and transferred within knowledge systems. This calls for accuracy in documenting the processes and interfaces of the value networks.

How LE themselves can be optimised will be discussed in the subsequent chapters.

## 4 Enriching our understanding of the social and creative nature of learning

Our understanding of learning has greatly advanced in recent years, not only through deeper understanding of how individuals learn, but in relation to innovation: particularly how work organisations are able to renew their processes, enhance their capacity to learn, acquire, accumulate and create knowledge. Interesting new theoretical approaches have been developed. For example, the KP-Lab project<sup>6</sup> researches how knowledge creation takes place in expert organisations seeking to solve problems through creating new artefacts. In the knowledge creation process, learning is seen neither monological nor dialogical but even more complex: triological<sup>7</sup>. Attention is then paid to the specific modalities, and processes how the learning discourse changes when the task of learners or designers is to create new artefacts (texts, designs, products or services), as is typically the case in schools or R&D divisions of companies and in work places in general.

It is, however, necessary to take into account the changing nature of expert work that is increasingly organised through professional networks exploiting technologies developed for such communication to facilitate the collaboration of professional communities. A paradigm shift is taking place from the so called groupware and learning management systems to wider and more flexible self-organising environments, generically labelled social software and Web 2.0 tools.

The inherent structure of knowledge-intensive work is by and large changing from excessive planning towards iterative experimentation by working together, agility and joint spurs towards the goal. Fashionable Scrum method in software development is migrating to other fields of knowledge economy. This trait is perhaps manifesting a more fundamental paradigm change in the technology foresight deducing the rationale for the technology policy-making from the notion of human interaction as the foundation for welfare.<sup>8</sup> For human interaction to be fully fledged learning must be ubiquitous and lifelong.

<sup>6</sup> Knowledge practices laboratory is a large EU project funded by the 6<sup>th</sup> Framework IST programme; see [www.kp-lab.org](http://www.kp-lab.org) 2007.

<sup>7</sup> Paavola, S. Lipponen, L. and Hakkarainen, K., 2004. Models of Innovative Knowledge Communities and Three Metaphors of Learning. *Review of Educational Research*, 74 (4), 557–576.

<sup>8</sup> FinnSight 2015 - Science and Technology in Finland in the 2010s, a joint foresight project of the Academy of Finland and Tekes, the Finnish Funding Agency for Technology and Innovation. The project was carried out in 2005-2006. [www.finnsight2015.fi/](http://www.finnsight2015.fi/)

The prime and very concrete example of this kind of development is the whole process of creating a completely new type of university in Finland by merging three universities into Aalto University<sup>9</sup>. The funding of its very first large-scale research projects “aivoAALTO” has just been granted. It will be addressing social interaction with the brain visualising methods, research on decision-making (neuroeconomics) and the impact of film on human mind (neurocinematics), thus fully exploiting the unique expertise of each of the three universities.<sup>10</sup>

#### 4.1 Ba - learning and working together

Concepts, processes and environments building the foundation for deeper collaboration are the prerequisites for innovativeness. The desired developments can be achieved through multidisciplinary research by integrating new ICT with scientific understanding of human mind, including neurological, cognitive, motivational and social basis of learning.

Based on a concept that was originally proposed in 1930's by the Japanese philosopher Kitaro Nishida, *ba* is defined as a context in which knowledge is shared, created and utilized. In the process of knowledge, creation and regeneration of *ba* is key. It can be a physical space, virtual space, mental space or any combination of these kinds of spaces. The most important aspect of *ba* is interaction.<sup>11</sup>

The power to create knowledge is embedded not just within an individual but also within the interactions with other individuals or with the environment. *Ba* is a space where such interactions take place. Knowledge held by a particular individual can be shared, recreated, and amplified when that person participates in *ba*. *Ba* works as the platform for the concentration of the organization's knowledge assets, for it collects the applied knowledge of the area and integrates it.

In all phases of life learners and teachers are challenged to develop and even to change their personal work methods, in all work and learning environments. Among other things, this requires the following changes in work culture:<sup>12</sup>

- Commitment will be emphasised. Theory will be converted into action compelling people to create a shared learning and working space - “*Ba*”, as Ikujiro Nonaka calls it. *Ba* has different dimensions: physical, mental, virtual and several others whatever they might be. *Ba* will shift the focus of action onto intellectual and virtual collaboration and a variety of collaboration networks.
- Action and results will be emphasised. As part of lifelong learning support, learners and teachers will create their own personal knowledge management “tool boxes”, emphasising systematic development and the results of action.
- Predicting the future will be emphasised. In lifelong learning, learners and teachers will emphasise the regeneration of knowledge. Consequently, the capacity and skills for critical knowledge processing will be understood to be the most crucial factors in learning.
- Rising to the challenges of information and knowledge will be emphasised. Learners and teachers will be able to use new learning and work methods to manage increasingly larger information and knowledge entities, and related sustaining networks.
- The basic knowledge management values - openness and trust - will be emphasised. It is only in an open atmosphere of trust that people can genuinely work and develop things together.

<sup>9</sup> Aalto University is named after the renown Finnish architect Alvar Aalto, who was the alumnus of one of the universities to be put together, Helsinki University of Technology (TKK). The other two are University of Art and Design Helsinki and Helsinki School of Economics. [www.aaltouniversity.info](http://www.aaltouniversity.info)

<sup>10</sup> [www.aaltoyliopisto.info/en/news/funding-to-aalto-university-s-aivoaalto-research-project](http://www.aaltoyliopisto.info/en/news/funding-to-aalto-university-s-aivoaalto-research-project)

<sup>11</sup> Nonaka, I., Toyama R. and Byosiére, P., 2001. A Theory of Organizational Knowledge Creation: Understanding the Dynamics Process of Creating Knowledge. In: M. Dierkes, A. Berthoin Antal, J. Child and I. Nonaka, eds. Handbook of Organizational Learning & Knowledge. Oxford: Oxford University Press, 491-517.

<sup>12</sup> Markkula, M., 2007. Europe Needs to Invent its Future – Desired Changes Do Not Just Happen. In: A. Boonen and W.V. Petegem, eds. European Networking and Learning Future, The Europeace Approach. Antwerp: Garant, 335-341.

## 4.2 Triple Helix have not sunk but need continuous redefining

The question about optimising the interface between working life organizations and academia is crucial for enhancing systemic innovation in knowledge-based economy. It addresses systemic communication and collaboration between parties. It is a question of how information flows freely between these poles. It seeks to optimize the mobility over time of students and employees between the academia and a company. It is all that, but it goes beyond penetrating into the issue how the science base of a particular knowledge creation process, its conditions and phases, are being formed, acquired and further enriched in a complex system of innovation collaboration necessary and beneficial to both parties. The complexity of the innovation ecology is further added by interventions provided by third party intermediaries complementing the picture into the triangle of the so-called triple helix model. In that model the third sun is broadly named "government".

Typically such government agencies are involved as technology or training funding agencies providing funding, informational, infrastructural and policy support. Sustainability is sought by long-term programmes rather insensitive to short-term economic and political conjunctures. This fairly withdrawn role of government might not be optimal and will hopefully be evolving in the foreseeable future. It could and should play an active enabler role for profound boarder crossing large-scale networks in which substantial numbers of experts from companies and universities work together. Open Innovation is the driver of change integrating university level research, teaching, learning and different collaborative multidimensional developments. The Finnish National Innovation Strategy is indeed calling for new concepts for university-industry collaboration focusing both on strategic basic research and on innovations.

## 4.3 Otafokus

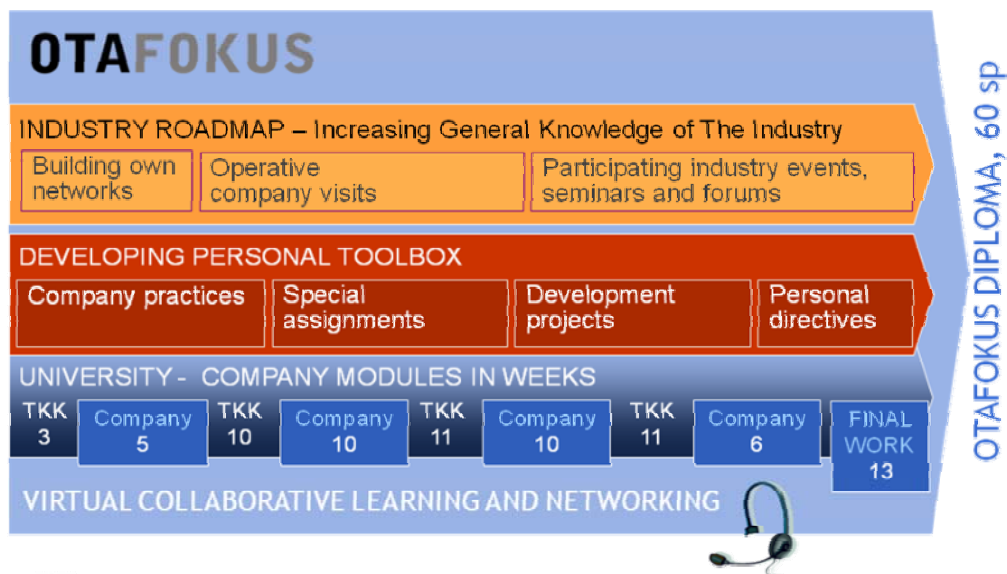
We take up one example of how an academic institution can systematically approach the needs of rapidly changing conditions and of companies. It is a concept developed by our university's continuing education centre Lifelong Learning Institute Dipoli (TKK Dipoli), which has coined the "Otafokus"<sup>13</sup> model.

Otafokus has its roots in TKK Dipoli's long-standing continuing education service provision to the technology-oriented companies. We have been privileged to become the pivot where the professional development needs of adjacent companies and the real world test-beds for technical university knowledge creation, application and dissemination have been put into a melting pot, which we have been stirring with our own pedagogical and learning technological receipts.

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<sup>13</sup> The name refers to the village Otaniemi where a substantial technology hub has grown around TKK and the State research centre. We focus on the academia-industry axis. It is the spinal cord vitalising the current knowledge economy in the region and spurring the national economy as well.

## STRUCTURE OF THE PROGRAMME



*Figure 2: The basic structure of a TKK Dipoli professional development programme.<sup>14</sup>*

Objectives and content of each Otafokus programme are defined to meet the needs common to an industry group in question, also paying attention to the individual needs of participating companies. Selection of students is run by TKK in close co-operation with the recruiting companies. TKK offers multidisciplinary and international environment for implementation of programmes into any industry-field. As part of the Aalto University, the multidisciplinary of study programmes will be enhanced. The typical structure of any Otafokus programme is illustrated in Figure 2.

The Otafokus concept is serving simultaneously three demands articulated for long in debates about the practical course of developments, i.e. facilitated work-based learning, blended learning and integrating theory to practice. Formulating the concept and fleshing it out has been quite a collaborative effort of many committed stakeholders and organizations into a long-standing development effort.

## References

Aalto University. 2009. [www.aaltoyliopisto.info/en/news/funding-to-aalto-university-s-aivoaalto-research-project](http://www.aaltoyliopisto.info/en/news/funding-to-aalto-university-s-aivoaalto-research-project)

Academy of Finland and Tekes. 2007. FinnSight 2015 - Science and Technology in Finland in the 2010s, [www.finnsight2015.fi](http://www.finnsight2015.fi)

[Government's Communication on Finland's National Innovation Strategy to the Parliament www.tem.fi/files/21010/National Innovation Strategy March 2009.pdf](http://www.tem.fi/files/21010/National_Innovation_Strategy_March_2009.pdf)

Kao, J., 2009. Tapping the World's Innovation Hot Spots. Harvard Business Review, 87 (3), 109-114.

Knowledge practices laboratory 2007. [www.kp-lab.org](http://www.kp-lab.org).

Markkula, M., 2007. Europe Needs to Invent its Future - Desired Changes Do Not Just Happen. /n: A. Boonen and W.V. Petegem, eds. European Networking and Learning Future, The Europace Approach. Antwerp: Garant, 335-341.

<sup>14</sup> SP stands for study credits.

Markkula, M., 2009. Unpublished Aalto University discussion paper.

Miller, R. Shapiro, H. and Hilding-Hamann, K.E., 2008. School's Over: Learning Spaces in Europe in 2020: An Imagining Exercise on the Future of Learning. European Commission Joint Research Centre, Institute for Prospective Technological Studies. <http://ftp.jrc.es/EURdoc/JRC47412.pdf>

Nonaka, I., Toyama R. and Byosiére, P., 2001. A Theory of Organizational Knowledge Creation: Understanding the Dynamics Process of Creating Knowledge. *In: M. Dierkes, A. Berthoin Antal, J. Child and I. Nonaka, eds.* Handbook of Organizational Learning & Knowledge. Oxford: Oxford University Press, 491-517.

Paavola, S. Lipponen, L. and Hakkarainen, K., 2004. Models of Innovative Knowledge Communities and Three Metaphors of Learning. *Review of Educational Research*, 74 (4), 557-576.

Proposal for Finland's National Innovation Strategy 2008.  
[www.innovaatiostrategia.fi/files/download/Nationalinnovationstrategy\\_EN-20080704.pdf](http://www.innovaatiostrategia.fi/files/download/Nationalinnovationstrategy_EN-20080704.pdf)

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