SOCIAL IMPACT AND FORMS OF INTERACTION BETWEEN UNIVERSITY RESEARCH AND SOCIETY IN HUMANITIES AND SOCIAL SCIENCES

Terhi Esko, Juha Tuunainen & Reijo Miettinen
University of Helsinki

ABSTRACT

This article discusses the interaction between university research and society and examines various forms and means of that interaction. In addition, it considers the impact of university research in the humanities and social sciences. Three case studies are followed in the fields of 1) Finno-Ugric and Baltic-Finnish languages, 2) multidisciplinary urban studies, and 3) research on learning difficulties. The case examples are discussed in relation to innovation policy, innovation research and the third mission activities of universities. The article concludes that there has been too much emphasis in the current literature on the commercialization of research results, and that quantitative indicators are not able to capture the whole array of social and cultural impacts of research. Therefore, more qualitative research on the impact of university research should be conducted so as to provide historical and discipline-specific accounts that acknowledge the long time span behind important societal developments that intermingle with academic research.

INTRODUCTION

This article discusses the interaction between university research and society and examines various forms and means of that interaction. In addition, it considers the impact of university research on the society in the humanities and social sciences. In recent research, the role of universities has been debated in terms of changing science systems and modes of knowledge production (Gibbons et al. 1994) as well as changing contract between science and society (Martin 2003). At the same time, university research is expected to contribute to other parts of the society, particularly by enhancing university-industry

cooperation and commercialization of research results (OECD 2003). In the context of university policy, this cooperation has meant the re-emergence of the so-called third mission of the university.

Research in the area of the third mission has focused mainly on the university-industry relationship and commercialization of research results (Nedeva 2007, p. 94). This has meant the formation of a particular view on university-society interaction, which draws attention away from the more diffuse role that the university has in generating new knowledge (Grimaldi et al. 2011). A lot of debate has emanated from these innovation policy initiatives and because of this we feel more attention should be paid to different forms and means of interaction in different disciplines.

We shall begin this article by discussing the role of universities in connection to innovation policy and the changes that have taken place in the relationship between universities and industry since the 1980s. This background will serve as a framework for understanding how the science-society relationship has been interpreted and why some fields of research have been neglected. We shall then continue to address the questions related to the interaction and the social impact of university research through three case studies. The focus will be on the relationship between university research and society in the humanities and social sciences at the level of specific research areas. Our case examples consist of the following fields of research: 1) Finno-Ugric and Baltic-Finnish languages, 2) multi-disciplinary urban studies, and 3) research on learning difficulties.

INNOVATION RESEARCH AND THE NATIONAL INNOVATION SYSTEMS APPROACH IN POLICY MAKING

Since the 1980s significant changes in the relationship between universities and industry have taken place, first in the United States, and later in other countries. Motivated by the increased globalization of national economies, universities have been assigned a central role in fostering societal development and national economic prosperity. A characteristic feature of this development was the broad structural movement towards an intermingling of the previously separate fields of science and industry (Kleinman and Vallas 2006). In particular, activities at the university level were linked to the Bayh-Dole Act implemented in the United States in 1980. The Act was supposed to boost university-industry cooperation, technology transfer and patenting in universities by means of creating a uniform patent policy in the United States. As a result, universities retained their intellectual property rights to the outcomes of scientific research. As

an offshoot of this development, new organizations and activities to enhance the commercial utilization of academic research were established, including technology transfer offices, industry-sponsored research projects and spin-off companies. The OECD considers the Bayh-Dole Act as an important landmark in the growth of productivity and innovation in the U.S. economy (OECD 2000, pp. 75, 77; OECD 2003). Hence, governments in many countries have been eager to emulate it regardless of its limitations (Mowery and Sampat 2005, p. 123).

During the 1990s and 2000s innovation policy emerged as a new holistic horizontal policy approach partly replacing the previous science, technology and industrial policies. The new innovation policy constitutes a background for the Bayh-Dole framework and for understanding the third mission of the university. It also fostered development of the present-day innovation studies that has often been characterized as follows: First, innovations studies is theoretically based on so-called evolutionary economics of innovation and technological change that was developed as an alternative to neoclassical economics. Second, it led to the formulation of systems view on innovation and to the adoption of the National Innovation System (NIS) as the key framework for practical policy making. Third, it suggested that the linear model of innovation, which dominated science and technology policy since the Second World War, should be replaced by the systems view. Fourth, it developed in keen interaction with the OECD policy programs that contributed to the rapid distribution of NIS policy framework in the 1990s (e.g., Fagerberg and Verspagen 2009).

According to innovation researchers, a new economics of innovation was needed, because neoclassical economics was unable to take into account technological change in its explanations of economic growth. Inspired by the work of the Austrian economist Joseph Schumpeter (1883-1950) evolutionary economists studied the significance of technological innovations for economic growth. Later on, the neoclassical growth models were replaced by a neo-Schumpeterian idea of economic cycles caused by technological revolutions, and the idea of rational choice by interactive understanding of learning.

From the Second World War until the mid-1970s, basic research was seen as the most important source of innovation, an ever-expanding knowledge base, on which applied research and technological development depended. In the late 1970s and 1980s, this linear model was gradually replaced by an interactionist approach. Christopher Freeman (1979, p. 211) summarized the new conception of innovation in his paper 'Determinants of Innovations' as follows:

"Innovation is a 'coupling' process, which first takes place in the minds of imaginative people somewhere at the ever-changing interface between science, technology and market." Taking heed of this, the interactive conception of innovation focused on how the interactions between institutions and actors contributed to the emergence of innovations.

At the same time, the NIS approach was being developed by a group of economists who were actively involved in the activities by OECD and, later, in the creation of the EU innovation policy (Mytelka and Smith 2002; Miettinen 2002; Sharif 2006). These researchers played a key role in the production of two OECD reports, "Technical Change and Economic Policy" (OECD 1980) and "Technology and Economy: the Key Relationships" (OECD 1992) that were landmarks in the formation of a new innovation policy. National Innovation System refers – according to the definition adopted by the OECD (OECD 1997, pp. 9–10) – to the system of interconnected institutions that individually and jointly contribute to the development and diffusion of new technologies. It was through various OECD policy programs that the framework was distributed to member countries thus forming a basis for governmental implementation of innovation policies. Finland, for example, adopted the concept as a basic category of its science and technology policy in the beginning of the 1990s. In the 1993 Review of the Science and Technology Policy Council of Finland (1993, p. 10), this leitmotif was formulated as follows:

> In the final analysis, it is the efficiency of our own national innovation system that determines our place among the industrialized countries (…). In this sense, the comprehensive development of the system of innovation is 'an offer one cannot refuse'.

Many observers found that the national innovation systems approach represented "an economistic worldview": companies were seen as the most important actors of national systems (Godin 2009), whereas the value of institutions contributing to science, technology, education and social well-being was primarily being defined from the viewpoint of how they fostered economic growth and enhanced the competitiveness of nations and businesses. The national innovation systems approach did not discuss other societal values, such as social equality, democracy, welfare, solidarity, care of the weakest, ecological sustainability or enhancement of cultural traditions and dialogue between them. It conceived the third mission of the university – like the Bayh-Dole Act – in terms of how the results of university research can be developed into commercial products.

However, in the 2000s even the economists of innovation found the Bayh-Dole framework problematic for several reasons (e.g., Kenney and Patton 2009). First, only in a few areas (such as biotechnology and pharmaceutics) did patents prove to be an important means of technology transfer from universities to industry (Cohen, Nelson and Walsh 2003). Second, it was found that extended and strict patenting regimes may even hamper the production of scientific knowledge by means of limiting access to and further development of research results (Nelson 2001). So, in the 2000s, innovation policies of many countries were expanded by means of introducing the concept of social innovation into the policy frameworks (Howaldt and Schwartz 2010). Social innovation refers to the organizational and institutional conditions of deploying the possibilities of new technologies in the provision of public services. Public services, in turn, constitute the cultural and material infrastructure that has an important impact on the development of the so-called knowledge society. They constitute the innovation environment of the society and crucial foundation from which excellence that is needed in the global economic competition grows. Furthermore, universities have always played an important role in the articulation of the national identity based on the language and cultural heritage. Although this mission assumes different forms in the age of globalization than, for instance, during the nation building, it has not become less important, and needs to be researched in its own right.

METHODOLOGY, RESEARCH QUESTIONS AND DATA

Our approach to studying science-society interaction is based on four methodological premises. The first of them concerns the recognition of the specificity and partial autonomy of scientific work and institutions from other societal activities, such as technology development, industrial production, provision of health care, societal planning and political decision making. Science differs from these by being committed to specific epistemic norms and procedures (e.g., Tuunainen and Knuuttila 2008) meant to optimize the objectivity of new scientific knowledge. Methodological transparency, evaluation of scientific work by peer-review method and application of scientific reference practice belong to such commonly used procedures. Second, we recognize the disunity of science, that is, the existence of various qualitatively different methodologies, and even ontologies, of different disciplines (Galison and Stump 1996), as well as the specificity of the science-society interaction in different research areas (e.g., Burawoy 2005; Nussbaum 2010). Third, the development of science-society

interaction can, in our view, be effectively studied by focusing on how researchers select and define their research problems and objects, and how the societal problems and epistemic concerns influence this definition (Lacey 2004). Fourth, in order to understand the evolving forms of collaboration between university researchers and societal actors, the nature of joint projects have to be analyzed.

Since the mainstream of research on the third mission of the university has focused on the commercialization of research results, we have chosen in this study to focus on university research in the humanities and social sciences. Our case examples come from the fields of Finno-Ugric and Baltic-Finnish languages, urban studies and research on learning difficulties, and they are closely linked with the societal development in Finland since the mid-nineteenth century, namely, social modernization, urbanization and the coming of the knowledge society. The cases will be presented in detail later on, but each of them will answer the following questions:

1) What societal developments and problems have the studied research areas chosen as research objects?
2) What are the specific, local forms of interaction between researchers and societal stakeholders in studied cases?
3) What kind of impacts have the studied researchers had on societal questions?

The data used in answering these questions consist of interviews with different stakeholders in the respective fields of research. In addition, documentary material, such as scientific publications, reports, theses, administrative documents, web pages and news in the media was gathered. A short description on the data related to each case is presented below.

In the case of the Finno-Ugric and Baltic-Finnish languages the data consist of seven interviews with stakeholders from the University of Helsinki, Ministry of Education and Culture, civic organizations, trust funds and Finno-Ugric societies. In addition, the analysis rests on a series of scientific and professional publications written by academics, as well as on a seminar on Finno-Ugric minority nationalities held in April 2011 at the University of Helsinki, Finland. Within this case, a special interest was directed at the so-called language nest activities.

The second case, which focused on the multidisciplinary urban studies, was related to a specific attempt of developing a suburb in the city of Riihimäki located in the south of Finland. Various stakeholders were involved in developing the suburban area leading to a full-scale research and development project, called the Peltosaari project. In this

case, seven interviews were conducted with the officials from Riihimäki as well as professors and students from the University of Helsinki. There was also a set of official documents, Internet-pages, research reports and scientific articles in the data set that covered the attempts to develop the Peltosaari district.

Research on learning difficulties at the Niilo Mäki Institute (NMI) comprises the third case and, in addition to the four interviews that were carried out with researchers, a whole variety of documentary material (Internet-pages, research reports as well as scientific and professional articles) was used in the analysis. The focus in this case was on research-based tools as well as on the internet-based learning environment accessed by children with learning difficulties, as well as their parents and professionals.

REVITALIZATION OF MINORITY LANGUAGES IN FINNISH LAPLAND AND RUSSIAN KARELIA

Research in the Finno-Ugric and Baltic-Finnish languages has a history of nearly two hundred years in the pioneering work of M.A. Castrén, the first professor of Finnish language at the Imperial Alexander University (currently the University of Helsinki), in the 1840s. The research that thus began had two motives: First, by means of collecting data on Finno-Ugric languages and cultures the Russian government and the Russian Academy of Sciences sought to increase knowledge about the empire for various societal purposes. Second, the research on Finno-Ugric and Baltic-Finnish languages laid the ground for the Finnish nationalism that at the time was emerging in the Grand Duchy of Finland in Russia (Grünthal 2007). Research on the Finno-Ugric languages thus belonged to the key resources used in the nation building in Finland during the late nineteenth century.

By the turn of the twentieth century, at the inception of the research on Finno-Ugric and Baltic-Finnish Languages, the major form of interaction between academics and the society was scientific exploration among the Finno-Ugric cultures (Grünthal 2010). These systematic expeditions were organized and funded mostly by *the Finno-Ugrian Society*, a scientific organization established in 1883 by top-ranked individuals of the then Finnish society, including the Governor-General of Finland, several Senators and Members of Parliament as well as university professors and representatives of the economic life (Suhonen 2009). The total list of 113 founding members of the society indicates that the establishment was a significant societal undertaking of its time and that the forthcoming *expeditions* were regarded as ultimately important to the emerging nation state of

Finland. Between 1885 and 1917, dozens of expeditions were sent out to Russia with the aim of increasing systematic and comparative knowledge on the Finno-Ugric languages and cultures.

Because organizing expeditions was an expensive and time consuming activity, it was supplemented by *a network of correspondents* living in the areas under investigation as well as an *exchange of literature* and other sorts of printed matter. As a result of this work, an enormous amount of authentic and invaluable research material was collected. Organizing, analyzing and publishing this data took several decades and the work still remains partially unfinished. In addition to scientific results, the work contributed to the development of Finnish nationalism and cultural identity, for instance, through *publications* and *museum collections* (Grünthal 2010; Lehtinen 2010). It also formed a part of the ideological basis for some of the interwar cultural and political movements, such as the Academic Karelia Society, a nationalist and Finno-Ugric activist organization, which aimed for the growth and improvement of the state of Finland (Eskelinen 2004).

Side Effect of Nation Building: Endangering Small Languages

The downside of nation building was, however, linguistic and cultural unification of the emerging nation states in Finland and elsewhere. These processes were further intensified by industrialization and urbanization that emphasized differences between national, metropolitan languages and the peripheral minority languages. As a result of this, monolingual speakers of minority languages often transformed into monolingual speakers of majority languages within just a few generations, the end-result of that being a massive endangering of languages all over the globe (Nettle and Romaine 2000, pp. 126–136, 196).

To counteract the decline in the number of languages and cultures a language revitalization movement began in the 1970s. In the beginning, the emphasis was on language maintenance, and, in the 1990s, on last-ditch efforts to save minority languages from disappearing altogether (Hinton 2003, p. 45). As a part of this larger revitalization movement, the so-called language nests were initiated to save the Inari Sámi language in Finnish Lapland and the Karelian language in Russian Karelia. We will come back to these efforts later. Let us now take a look at the different forms of interaction between university research and society in the field of Finno-Ugric and Baltic-Finnish Languages.

New Efforts to Revitalize Lost Connections

As a result of the establishment of the Soviet Union in 1917 the field work among the Finno-Urgic cultures was in the doldrums until 1989. Triggered off by the collapse of the country, connections between university researchers, civic organizations and representatives of Finno-Ugrian cultures were re-established in the beginning of the 1990s. On a high political and administrative level, the Finnish parliament initiated the creation of the Kindred Peoples Program, the basis of which was set up in 1992 in two treaties between the Republic of Finland and the Russian Federation (Ministry of Education 1993; Grünthal 2005). The aim of this program was to support Finno-Ugric peoples and cultures in Russia.

To achieve this multiple measures have been taken some of which also involve Finnish universities. One of the prerequisites of the execution of the program was the building of a collaborative network in Russia including state authorities in the fields of culture and education. Among the most important measures taken by Finnish universities and researchers were, first, *training of professionals and researchers* in translation and writing as well as library and museum practices and, second, *bidirectional personnel exchange* involving the transfer of Finnish language teachers from Finland to universities operating in Finno-Ugric areas in Russia and doctoral students and young researchers from Russia going to study and work in Finnish universities (Grünthal 2005).

Language Nests as Part of Language Revitalization

From the point of view of the preservation of the Finno-Ugric languages, the most interesting method used in the interaction between university research and society is, however, the establishment of *language nests* and transfer of related know-how from the University of Helsinki to indigenous cultures living in Finnish Lapland (Inari) and Russian Karelia (Uhtua). According to a Finnish researcher and activist responsible for this work, a language nest "is a kindergarten for pre-school children who have little or no language proficiency in the minority language" (Pasanen 2004, p. 117).

The idea about language nests has a history dating back to the revitalization of the Maori language in the early 1980s in New Zealand. Later on, language nests were used in the revitalization of other native languages, such as Hawaiian (Romaine 2007). In Finland, the idea about language nests emerged in the early 1990s as Sámi activist Matti Morottaja picked it up from a lecture given by sociolinguist, Professor Tove Skutnabb-Kangas. The first language

nest was established in Finnish Lapland in 1997 to help speakers of Inari Sámi to preserve their mother tongue. Quite soon after this, the leader of the language nest, undergraduate student Annika Pasanen, was contacted by representatives of the Uhtua Society, a Finnish civic organization aiming at advancing cultural and economic well-being of people living in the Uhtua area in Russia. With the help of funds collected by the society two language nests in the Karelian language were started in 1999 under the supervision of Ms Pasanen (2003; 2004; 2006).

Different Outcomes in Finland and Russia

In language nests daily communication occurs in the minority language as a result of which children participating in the activity soon begin to understand the language and speak it by themselves. Despite the methodological similarities between the language nests in Lapland and Karelia, a striking difference in the societal impact of the activity occurred.

In Lapland, language nests were successful resulting in what Pasanen (2003) called "reverse language shift". In contrast to the typical pattern of language shift where speakers of the minority language change their language to the dominant one, language nests in Lapland elicited the use of the Inari Sámi language with children of native Finnish speakers. More precisely, the pattern of this reverse language shift consisted of three stages: 1) from the use of single Sámi words to 2) the use of two languages (Finnish and Inari Sámi) to 3) the use of the Sámi language only.

In addition to this promising result, the language nests in Inari elicited the establishment of two groups of children that, later on, received school education in the Inari Sámi language too. In summary, the Sámi language revitalization proved successful and resulted in the institutionalization of the minority language in the formal educational system in Finland (Pasanen 2003; 2004). According to Ms Pasanen:

> Inari Sámi is a language, which has definitely, unambiguously started to recover after the establishment of language nests in Inari in 1997.

The results of Karelian language nests in Russia were not equally successful, however. Despite the language nests the children did not start using the Karelian language in their everyday life due to several reasons. Among these was the fact that teachers in language nests used Russian in their mutual communication; the children thus heard other languages than just Karelian in the nest. The use of Russian also

continued at home where the parents often spoke Russian instead of Karelian. These were not the most important reasons for the partial failure of language nests in Karelia though (Pasanen 2003). The main reason was the fact that there were far too many children in the Karelian language nests in comparison to the amount of teachers. In addition to this, teaching in Russian kindergartens was organized around formal teaching moments guided by the official Russian-speaking curriculum, otherwise teachers' presence in the activities of the children was limited. As a result of this, there were simply too few occasions for children to learn and use Karelian language and thus they rather adhered to Russian. Furthermore, once the children moved from kindergarten to school the use of the Karelian language diminished radically as the school system was based on the Russian language only. It may thus be concluded that a language nest is a radical new concept in Russian society and it does not suit the local preschool and school systems without problems arising. Because of this, strong institutional effort and commitment from all actors are needed to make it work in Russian society (Pasanen 2003).

Table 1, presented below, outlines the societal developments and forms of interaction relevant to this case as well as the most important societal impacts.

Table 1
Societal Developments, Means of Interaction and Societal Impact of Research in the Field of Finno-Ugric and Baltic-Finnish Languages

Societal Developments	Forms and Means of Interaction	Societal Impact
Extinction of small languages and the resultant cultural impoverishment	*Traditional ones:* - scientific exploration and correspondent networks - training and education of academics and other professionals - exchange of literature - publications, museum collections - associations (e.g., the Finno-Ugric Society) *New ones:* - national action program (the Kindred Peoples Program) - language nests	- successful revitalization of the Inari Sámi language - institutionalization of the Inari Sami language in the Finnish educational system - Karelian language nests in Russia were less effective and their impacts remained mild

REFORMATION OF THE PROBLEM SUBURB IN THE CITY OF RIIHIMÄKI

As was the case with the Finno-Ugrian and Baltic-Finnish languages, the emergence and development of urban studies, too, has a close relationship to industrialization and the urbanization of European and North American societies from the late nineteenth century onwards. As a result of this economic change, people began to concentrate into large towns and cities. The new social environment that was developing throughout the Western world also aroused interest in academic research, which began to pay attention to the particularities of city life and its segregation into specific urban areas. One of the first studies in this line of research was made by the group of American sociologists later known as the Chicago School, a far-reaching research movement in urban sociology and criminology (Fisher and Strauss 1978).

In Finland, the large-scale industrialization and urbanization process took place later than in most European countries, that is, only after the Second World War. The research on urbanization was started, however, during the early 1930s by sociologist Heikki Waris (1973) who studied the characteristics of the workers' district in Helsinki, the capital of Finland. The major wave of urbanization in the country took place, however, as late as in the 1960s, with corresponding attention to the altering ways of life of those who had moved from the countryside to Helsinki Metropolitan Area (Kortteinen 1982).

A concrete example of the urbanization process in Finland was the birth of the Peltosaari district in Riihimäki, a small town some 70 kilometers north of Helsinki. During the late 1960s, it was assumed that the strong industrialization process in Riihimäki would continue so that the town's population would grow from 22 000 to 35 000 by the year 1990. To provide housing for the growing industrial labor force Riihimäki started to build numerous blocks of apartments in the fields nearby the city center thus creating the suburb of Peltosaari. The rather optimistic and ambitious plans came to grief during the early 1970s, however, as the industrialization stagnated because of the worldwide oil crisis and the related economic recession. As a result, the building of owner-occupied apartments diminished in the Peltosaari area and the focus of house production moved to rental apartments. The high unemployment rate and the change in the city's occupational structure from industrial to post-industrial jobs worsened the situation, with the end result being a massive concentration of social problems in the area (Vaattovaara, Kortteinen and Ratvio 2009). Before immersing ourselves in the particularities of the modes of interaction between university researchers and other societal actors in

the case of Peltosaari, let us take a brief look at the other forms of collaboration in the field of urban studies in the greater Helsinki region in southern Finland.

Linkages between Research and Urban Planning

Despite its early beginnings, urban studies institutionalized relatively late into the Finnish university system (Jauhiainen and Harvio 2008). It was only during the 1990s, that this incipient field of research gained momentum and shouldered its own niches in different disciplinary departments in universities operating in Finland. A major event in this respect was the establishment of nine *professorships* in urban studies in two major universities of the country, the University of Helsinki and the Helsinki University of Technology. These professorships represented a whole variety of specialties, including sociology, geography, history, ecology as well as others. The establishment of these posts was a result of a distinctive form of collaboration between the two universities, cities in the Helsinki metropolitan region as well as the Ministry of Education, each of which defrayed 30 percent of the total costs of the posts. In addition to this, the actors established an extensive advisory board for urban studies where all the parties were represented.

The strong effort made in building *interactional platforms* between the cities and universities in southern Finland was continued by the establishment of the Helsinki Education and Research Area HERA, which links universities and universities of applied sciences in a network with other regional actors, such as the cities, provincial associations as well as businesses and civic organizations to plan and implement projects promoting the vision and policy development for the greater Helsinki area (Kosonen 2008). In addition to these official interactional forums, an important mediating role in developing policies for the Helsinki metropolitan area was played by *private think-tanks* (e.g., Demos Helsinki), *consultancies* (e.g., Kaupunkitutkimus TA Oy) and *independent researchers* (e.g., Lectus Ky), each of which has found its distinctive role in mediating scientific research with regional development.

Studying the Problems of Peltosaari Suburb in a Research-Course

When it comes to the case of Peltosaari, the characteristic feature of the interaction between academics and the city of Riihimäki's officials was the strong involvement of undergraduate students in the process. Having begun to develop the idea and practices about a research course in urban studies in 2004 the professor

of urban geography, Mari Vaattovaara, and the professor of urban sociology, Matti Kortteinen, decided to get involved with the development of the Peltosaari district through the initiative of researchers from the VTT Technical Research Centre of Finland. In the context of the so-called *Peltosaari project*, a forceful effort to improve the area through a joint effort by VTT, Riihimäki, the Housing Finance and Development Centre of Finland (ARA) and the University of Helsinki was started. The specific contribution by students and professors in this context was to offer a wider social scientific perspective to complement the technical and economic point of view emphasized by the other actors involved. Referring to the report written by the professors and their undergraduate students (Vaattovaara, Kortteinen and Ratvio 2009), the Chief of Town Planning in Riihimäki, said:

> The socio-economic indicators published in that [report] got the decision-makers back up. The fact that we are at the worse end of the range in the [Helsinki] metropolitan area on many indicators – we wouldn't have guessed that, and wouldn't have dared to judge so, and nobody wouldn't have dared to pluck that out of the air that, really, this is the worst [suburb]. [If someone had done so] he or she would have been condemned. But having been supported by real knowledge [...] people listened to it [i.e., the presentation describing the findings published in the report] after all [and concluded] yes, it must be true. Something must be done. It created a feeling that something has to be done.

The societal perspective on the historical development and current characteristics of the Peltosaari district was a direct import from international social scientific discussions. In the European discussion on the development of suburbs, by the turn of the millennium emphasis was put, according to Vaattovaara, Kortteinen and Ratvio (2009), on the building of a comprehensive, socio-structural perspective where renovation of buildings was integrated with social issues and the operation of housing markets. In the case of Peltosaari, this perspective involved 1) seeing Riihimäki as a part of the wider Helsinki metropolitan region, 2) paying attention to the distinctive historical process through which Peltosaari became what it currently is, 3) understanding the present state of the area from the point of view of community planning, 4) analyzing the social structure of the population living in the area, 5) learning their particular perspectives on their living environment, and 6) getting to know the viewpoints of the municipal administration of the suburb.

During the research course led by the professors, the students were divided into small groups each addressing one of the above-mentioned topics on the basis of different source materials. For instance, students interviewed residents of Peltosaari as well as representatives of the municipal administration. They also made use of statistics and other forms of archival documents and data. On the basis of research questions defined by the professors, they then drafted thematic papers that were edited and put together in the form of a nearly 200-page report published by the Housing Finance and Development Centre of Finland (ARA) (Vaattovaara, Kortteinen and Ratvio 2009). From the point of view of Riihimäki, this report was a unique account of the state of things in Peltosaari and formed one of the starting points in the further development of the area. The preparation, drafting and publication of the report also formed structured forums (e.g., seminars, interviews) where interaction between the students, professors, city officials and residents took place.

Impact: Expertise in Urban Problems and Contribution to Urban Development

The usefulness of the course from the societal perspective was at least two-fold. First of all, the report substantiated the urgent need for a wider societal perspective in the planning and renewal of urban suburbs, in addition to the usual technical and economic viewpoint. This meant seeing the area under development as a part of the larger regional labor and housing markets as well as paying attention to its current modes of social life. The practical outcome of such consideration in the Peltosaari case was, at least for the time being, the radical renewal of the area through a development competition, which ended in 2011. The received 61 proposals provided a good starting point for Riihimäki to consider different options available for the further improvement of the area.

The second outcome from the research course was the development of students' understanding of urban problems and ways of solving them as well as their increased skills of conducting research. Several students regarded the course as one of the best learning experiences they had encountered during their study careers, especially because it provided them with an opportunity to form direct links between theoretical knowledge and practical urban development. In addition to this, the research course increased the students' abilities in managing project work and conducting empirical research, besides resulting in their first professional publication in the form of a joint report. When it comes to the scientific contribution, the course offered

a concrete setting for the incorporation of the newly developed international perspective into the Finnish urban studies literature. The further articulation of the results in international scientific contexts is currently going on with major emphasis on how sustainable urban regeneration processes might be developed (Vaattovaara 2010).

Table 2, presented below, summarizes the societal developments, forms of interaction and social impacts of university research in the field of urban studies.

Table 2
Societal Developments, Forms of Interaction and Societal Impact of Research in the Field of Urban Studies

Societal Developments	Forms and Means of Interaction	Societal Impact
Concentration of social problems in urban suburbs	*Traditional ones:* - training and education - publications - joint organizations (e.g., advisory board for urban studies) *New ones:* - joint professorships - research course for students (the Peltosaari project) with a report and seminars - think-tanks and consultancies	- a wider societal perspective in the planning and renewal of urban suburbs - development of the students' knowhow related to urban studies and urban development - contribution to the renovation plan of the Peltosaari area, that was implemented in 2011

THE PROBLEM OF LEARNING DIFFICULTIES IN A KNOWLEDGE SOCIETY

Learning difficulties have become an ever more important phenomenon during the twentieth century, because of the extension of the comprehensive public education systems and, more recently, because of the knowledge society development. We can distinguish between three generations of concepts of learning difficulties in Finland. First, from the early twentieth century until the 1960s learning difficulties were defined in psycho-medical terms. They were analyzed on the basis of the type of abnormality or handicap of a child within the context of rehabilitation in clinics and in special education schools or classes that were organized for "heterogeneous groups of

students labeled as 'subnormal'" (Graham and Jahnukainen 2011, p. 276).

Second, the establishment of the universal comprehensive school system gave rise to another concept of learning difficulties. During the 1970s, all the children of an age cohort were supposed to achieve the goals of the curriculum independently of their social background and their natural talents. In Finland a school committee outlined in 1972 the "principle of overcoming the learning difficulties" as a pedagogical ideology and organizing principle of the comprehensive school inspired by educational equality. Children who lagged behind the curriculum goals were supposed to get support in order to overcome the difficulties and to catch up others. The most common problems dealt with were mild reading and writing difficulties later characterized as dyslexia. Individual support was given either by teachers after the lessons or by special education teachers in small groups. Taken together, about one third of the pupils in the Finnish comprehensive school have enjoyed special education during their school career. This is the highest figure known in the international comparisons (Kivirauma and Ruoho 2007).

Third, the focus on reading and writing difficulties in the first grades of school has been one of the reasons for the exceptionally low comparison of weak readers among 15-year-old students in Finland. While the share of weak readers was in the first PISA study 19 percent in the OECD countries, it was 6 percent in Finland (OECD 2001). The interpretation of the significance of the PISA results gave rise to the third concept of learning difficulties. It has been shown that reading skills constitute a key foundation for school success, for lifelong learning as well as for the integration of an individual into the working life. The observers have suggested that the achievement of the satisfactory level in reading skills in the PISA tests can be regarded as the minimum skill required for full participation of a person in the current knowledge society (Istance 2008). In the 2006 PISA studies, 57 percent of students in the OECD countries achieved this level (OECD 2007). The corresponding figure in Finland was 79 percent. Very likely, persons belonging to the group of weak readers will be excluded from post-compulsory schooling and also from working life. Consequently, learning capabilities and skills, and the issue of overcoming learning difficulties has become a focal point for social, labor and even innovation policies of our age. The absorptive capabilities of firms have become one of the key conditions of innovativeness, and this capability is based on the expertise of individuals.

University Researchers as Producers of Knowledge and Tools

When it comes to the relationship between university research and society, several organizations contribute to the solving of learning difficulties in Finland. Among them are various vocational and civic associations (such as the Finnish Union of Speech Therapists and The Finnish Reading Association*),* special education teacher training institutions, the Finnish National Board of Education, municipalities as well as small firms specialized in providing diagnostic tests and teaching materials. Two university research units are instrumental in proving new knowledge, diagnostic and screening tools as well as learning materials for the special education system: Niilo Mäki Institute (NMI) and the Centre for Learning Research of the University of Turku. In the present analysis, we will focus on the former.

The Niilo Mäki Institute is named after Professor Niilo Mäki, a neuropsychologist and a pioneer in special education in Finland who held the first professorship of special education at the University of Jyväskylä from the 1940s onward. Mäki was inspired by Arnold Gesell's Yale Clinic of Child Development and Child Guidance where he worked in the 1930s. NMI was established in 1990 to recognize and understand neurocognitive dysfunctions and learning difficulties based on them and to find means of rehabilitation. In addition to research projects and the development of diagnostic tests, learning plays and materials, it sells tests, learning plays and materials as well as literature distributed to special education teachers and psychologists. NMI regards the interaction between university research and society as being vital for the further development of its activities thus it seeks actively to integrate scientific research through consultation, development of tests, education and publication.

The Various Forms and Means of Interaction between Research and Society

NMI has developed a variety of mechanisms through which it interacts with society and through which it contributes to the solving of learning problems in Finland and abroad. These mechanisms, listed below, are in our opinion a good outline of the different ways in which psychological and educational research typically contributes to the societal problem solving and development of public services in a welfare state.

First, NMI maintains together with the Child and Family Counseling unit of the City of Jyväskylä the *Child Research Clinic* for consultation. It studies and diagnoses learning disabilities in school-aged children and develops remediation techniques for the children in

question. In addition to direct help, the clinic provides advice and further knowledge about learning disabilities for psychologists.

Second, NMI develops *diagnostic and screening tests* as well as *learning materials and games*. In addition, it produces and distributes *guides and textbooks* for professionals (teachers, special education teachers, school psychologists) and parents. The new generation tests and games, exemplified by Graphogame described below, are often available through the Internet.

Third, NMI extensively *collaborates with schools* in developing and validating these tests and evaluating the effectiveness of learning materials developed. Teachers in real school environments always conduct these tests. The NMI also collaborates with schools to develop new pedagogical and organizational solutions and helps transmit these between schools.

Fourth, *further education* for professionals working with learning problems is another important means of interaction: The NMI holds about 50 courses a year for teachers, special education teachers and psychologists in 13 different localities in Finland.

Fifth, NMI functions as an *expert* and gives pronouncements concerning learning and learning difficulties. It participated, for instance, in the organization of a project funded by the Finnish National Board of Education, which prepared changes related to special education in the school law passed in 2010 in the Finnish Parliament.

The sixth and more recent means of interaction that NMI has begun to maintain is *LukiMat Internet-environment*, a *learning environment and information service* for professionals, parents and decision makers. It provides the latest knowledge on learning difficulties, services and tools. It also provides access to network tools developed by the NMI (such as Graphogame). There are 1 000 daily visits to LukiMat, a figure that suggests that the environment has become an important tool for the professionals operating in the field.

Lastly, related to the above mentioned means of interaction, NMI has initiated *developmental co-operation* that is comprised of further education for special education teachers in African countries (Zambia and Kenya), the development of tests and games (e.g., Graphogame) for African languages as well as the training of African students in developmental psychology at the University of Jyväskylä. The development projects by NMI have also led to the establishment of assessment centers for learning difficulties in Nairobi, Kenya, and Lusaka, Zambia.

Creating Possibilities for Early Intervention: Graphogame, a Web-based Tool for the Prevention of Reading Difficulties

We will next focus on a specific tool used in alleviating learning difficulties, called Graphogame. The development of Graphogame is an example of research-based tool design and of the societal impact of scientific research. In the Jyväskylä Longitudinal Study of Dyslexia, headed by Professor Heikki Lyytinen, the goal was to understand dyslexia by defining its precursors and to develop preventative training tools to overcome or at least minimize the consequences of dyslexia. In all, 107 children with a familial risk for dyslexia was followed for 13 years. The central cognitive bottleneck proved to be connected to speech perception, especially the perception of phonemes and the connection between sounds and letters. Low letter recognition at the age of four proved to be a strong predictor of dyslexia. The research group, therefore, decided to focus on phonetic differentiation in designing a preventative training tool, Graphogame. The research group (Lyytinen et al. 2009, p. 672) characterized Graphogame as follows:

> The game is available via the Internet (see http://www.lukimat.fi) to children who have parental permission. (...) We believe that children with familial risk and/or low letter knowledge during the few months preceding school entry benefit from preventive playing in terms of avoiding unwanted failure experiences during the early months of school instruction. Therefore, we have recommended to kindergartens where all children in Finland have their pre-school year just before school that the game should be used during the last two months (April–May) and preferably with massed practice. This means short 5–15 minute periods several times per day for as long as children require to learn the letter-sound connections (...). Today, more than 50,000 children in Finland have tried the game and very few have failed to benefit.

In conclusion, Graphogame richly illuminates the significance and possibilities of Internet-based tools for remedying learning difficulties. It is an artifact that helps children to learn a particular skill of reading and writing in a culture based on the Greek alphabet: the construction of the connection between letters and sounds. As a software artifact, it can be distributed extremely rapidly in the field of special education and was immediately and freely available to children, parents and teachers all over Finland. It shows the efficiency

of the Internet-based open source model of innovation in facilitating interaction between university research and societal practices. It also was integrated into the Finnish special education policy of early recognition and intervention by recommending that it be used in Finnish kindergartens. Graphogame thus functioned as a mediating artifact on individual, family and institutional levels, and acted as an instrument of special education policy making in contributing to the realization of the principle of early recognition and immediate intervention.

Table 3, presented below, summarizes the societal developments, forms of interaction and societal impact of research in the case of research on learning difficulties.

Table 3
Societal Developments, Forms of Interaction and Societal Impact of Research on Learning Difficulties

Societal developments	Forms and means of interaction	Societal impact
Learning difficulties as a challenge for universal education, equality and knowledge-society development	*Traditional ones:* - consultation - co-development of diagnostic tools - research clinic for children - learning materials, guides and textbooks - further education for professionals - expertise in special education policy making *New ones:* - LukiMat Internet-environment - Graphogame - developmental co-operation with Kenya and Zambia	- providing means for the Finnish special policy and professional practice based on early recognition of learning difficulties and immediate intervention - remedying individual learning difficulties in reading, writing and mathematics - exceptionally low percentage of weak readers in PISA tests

CONCLUSION

The national innovation systems approach gained a strong foothold in policy making in the 1990s. Since innovation policy promotes national competitiveness, universities are expected to engage

in collaboration with industry and strive for commercialization of their research results. At the same time this has provided a strong basis for understanding the university's third mission but its wider contribution to the society in terms of social equality, welfare and democracy has remained slender in the policy perspective.

In this article, our mission was to investigate the interaction between university research and society in the fields of Finno-Ugric languages, multidisciplinary urban studies and learning difficulties. Our first research question was to find out what societal developments and problems the studied researchers chose as their research objects. For an answer, we stressed that all the case examples were connected to large changes in Finnish society. Because of the late industrialization of Finland, most of these changes took place rapidly after the Second World War when people moved in masses from rural areas to cities in search of work. At the same time, the country experienced a rapid structural change and economic transformation. All the three disciplines studied here evolved in connection with these important societal developments that affected their respective research topics. The studies in Finno-Ugric languages, for example, became integrated in the nation building already during the late nineteenth century. Later on, the linguistic and cultural unification of Finland, which was intensified by the industrialization and urbanization, led to the diminishing of minority languages, such as that of Inari Sámi. In the 1990s, efforts began in terms of language nests to revitalize this and other endangered minority languages. Urban studies, too, aspired to explain the changing patterns of life in modern suburbs and alleviate social problems caused by urbanization and modernization. These aspirations became more intense during the 1990s as the economic downturn and knowledge society development increased social polarization in the Helsinki metropolitan area. The research course on the Peltosaari district in Riihimäki, for instance, sought to provide municipal officials with a new perspective for solving the problems related to urban housing. The transition of Finland from an agrarian to an industrial and, later, a knowledge society also gave rise to the Finnish comprehensive education system in which a whole generation was supposed to receive adequate schooling for the needs of the modern society. In Scandinavian countries, the public education system was strongly inspired by the ideal of educational equality. This created a need to take into account differences between students and to provide help for those suffering from learning difficulties. Early intervention for young children at risk for learning disabilities not only fostered the development of skills needed in working life but also prevented exclusion and enhanced their future participation in civil society and political life. Correspondingly, the challenge of

overcoming learning difficulties became an issue of labor and social policies.

Our second research question concerned the interaction between university researchers and societal stakeholders. We wanted to find out what kinds of forms and means of interaction the studied researchers had with other societal actors. Here, we made a distinction between older, more traditional forms of interaction and the new ones. The traditional forms of interaction usually included the following: training and educating professionals, publishing in books and journals, providing consultation and expertise and developing tools for better understanding certain phenomena. Examples of such means also included joint organizations that enabled collaboration between various stakeholders as well as learned societies established decades ago, such as that of the Finno-Ugric Society, which connected scientific exploration with nationalistic endeavors. The new means of interaction, in turn, were more recent and included new ways of doing things. Examples of these consist of, for instance, Internet-based learning environments, joint professorships, participative courses and language nests. In the case of learning difficulties, for example, the development of research-based tools went hand in hand with the advancement of scientific research, a process that eventually created technological means to overcome learning difficulties also in practice.

In our third research question, we sought to identify what kinds of societal impacts were achieved in the studied research fields. These will be summarized on a case-by-case basis. In learning difficulties, Graphogame that was at first developed for research purposes became a remedial tool for early childhood education. As a software, it combined the results of a longitudinal study of dyslexia and computer programming. The social impact of the research was largely materialized by means of freely distributing the game through the Internet. The software is a common good and the benefits would not have been materialized in such a widespread way if it was a patented product. The case thus shows how important social innovations are developed and distributed within public services and public domain. This differs from the central thesis of the traditional innovation policy where societal impact of research is usually based on patenting and commodification of research results.

The case of urban studies shows, in turn, how scientific research can be combined with urban development and university education. A group of undergraduate students participated in a research course organized by professors of urban studies. The course focused on the societal problems of housing and provided a larger viewpoint on the development and renewal of urban suburbs in Finland. The case demonstrated that in order to tackle the housing and

planning problems, the underlying structural developments and societal problems have to be taken into consideration. In this way the research not only widened the otherwise technical and economic view on urban development but increased the students' skills in conducting societally useful research, too.

Another example of the societal impact of the university research was provided by the case of Finno-Ugric languages. The revitalization movement of minority languages, which began in language research during the 1970s, gave rise to new forms of activities, such as language nests. An outcome that sprouted from the use of these nests in Finnish Lapland was the revival of the Inari Sámi language. This has, in turn, led to the institutionalization of the language use in the formal education system in Finland thus enhancing democracy and the rights of people to use their mother tongue in public authorities.

The cases investigated in this paper also show that social impact of research in the humanities and social sciences can be seen in historical processes that take years, even decades to unfold. In the case of minority languages, the revitalization of a language takes a long time, because in order to survive the language needs to be passed on through at least two generations. Even so, this does not assure the survival of the language. As the case example illustrates, the same activity of creating societal outcomes may work or fail depending on the surrounding societal context. Even though the researchers were able to point out the feasibility of language nests in Finland, they did not have control over the organizing principles of the Russian system of day care and schooling. Because of this, the language nests were not implemented properly, in the researchers' point of view, and the results remained less than optimal.

The measurability of the societal impacts sprouting from university research has to be considered, too. We argue that the impacts of the studied cases could not have been duly discovered by using indicators developed for the measurement of the third mission and societal impact of university research (Luoma et al. 2011, 87). The present indicators are still too fixed on commercialization of research results and the economic effects of research investments. Societal engagement is recognized as an important dimension of university activities but it is measured quantitatively as budgetary assignments on outreach activities or numbers of events open to general public (Final Report of Delphi Study 2011, p. 28). The majority of the indicators are thus designed to provide a basis for distributing funding to universities. Although some efforts have been made to include social innovation projects into the frameworks like these, the results have remained slender, as the third mission activities related to social

problems and culture are not well known (Laredo 2007, 448). The need for having interaction between scientific research and the related societal developments has been acknowledged, but huge difficulties lie in defining adequate indicators and understanding how dissemination of research results actually happens (Luoma et al. 2011, pp. 39, 115).

The case examples analyzed in this paper substantiate these challenges. Whereas some aspects of societal impacts are clearly measurable, like the number of people speaking a minority language, most of the outcomes sprouting from the research on Finno-Ugric languages can be realized only indirectly and after several years or even decades. The same holds for other research fields, too. Overcoming learning difficulties, for instance, forms the basis for further education and participation of individuals in the working life. This way it is the inclusion or exclusion of a person from the society that eventually matters. Finally, when it comes to the research on the Peltosaari suburb, the most important result of the research was the change in understanding of the societal phenomena of urban polarization, not so much the number of houses in need of renovation. Our cases suggest, therefore, that numeric indicators alone are an incomplete way of understanding the various contributions university research has on society. The societal impact of the research thus needs to be studied historically and qualitatively so as to take into account the multiple mediations and long time spans needed for the materialization of the outcomes. It is only through such studies that a broader discussion of and public awareness on the societal usefulness of academic research can eventually be achieved.

REFERENCES

Burawoy, Michael.   2005. "For Public Sociology." *American Sociological Review 70* (1), 4–28,

Cohen, Wesley S., Richard R. Nelson and John P. Walsh. 2003. "Links and Impacts: the Influence of Public Research on Industrial R&D." In *Science and Innovation: Rethinking the Rationales for Funding and Governance*, edited by Geuna, Aldo, Ammon J. Salter and W. Edward Steinmueller. Cheltenham: Edward Elgar, 109–146.

Eskelinen, Heikki 2004. Me tahdoimme suureksi Suomenmaan. Akateemisen Karjala-Seuran historia I. Tausta, organisaatio, aatteet ja asema yhteiskunnassa 1922–1939. Helsinki: WSOY.

Fagerberg, Jan and Bart Verspaagen. 2009. "Innovation Studies – The Emerging Structure of a New Scientific Field." *Research Policy 38* (2), 218–233.

Final Report of Delphi Study 2011. E3M Project – European Indicators and Ranking Methodology for University for University Third Mission. May 2011. Available online at: http://www.e3mproject.eu/docs/Delphi-study-E3M-project.pdf

Fisher, Berenice M. and J. Anselm Strauss. 1978. "Interactionism." In *A History of Sociological Analysis*, edited by Bottomore, Tom and Robert Nisbet. New York: Basic Books.

Freeman, Christopher. 1979. "The Determinants of Innovation. Market Demand, Technology and the Response to Social Problems." Futures (June), 206–215.

Galison, Peter and David J. Stump. 1996. *Disunity of Science: Boundaries, Contexts, and Power*. Stanford, CA: Stanford University Press.

Gibbons, Michael, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott and Martin Trow 1994. *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. London: Sage.

Godin, Benoît. 2009. "National Innovation System. The Systems Approach in Historical Perspective." *Science, Technology, & Human Values 34* (4), 476–501.

Graham, Linda J. and Markku Jahnukainen. 2011. "Wherefore Art Thou, Inclusion? Analysing the Development of Inclusive Education in New South Wales, Alberta and Finland." *Journal of Education Policy 26* (2), 261–286.

Grimaldi, Rosa, Martin Kenney, Donald S. Siegel and Mike Wright. 2011. "30 Years after Bayh-Dole: Reassessing Academic Entrepreneurship." *Research Policy 40* (8), 1045–1057.

Grünthal, Riho 2005. "Suomalais-ugrilaisten kielten tulevaisuuteen tähyämässä: Suomen sukukansaohjelma 10 vuotta." In Sukukansaohjelman arki: suomalais-ugrilainen perintö ja arkipäivä, edited by Kokkonen, Paula. Studia Fenno-Ugrica 21.9.-16.11.2004. Castrenianumin toimitteita 64. Helsinki: M. A. Castrénin Seura, 12–27.

––––. 2007. "Ajankohtaista: Suomalais-Ugrilainen Seura." *Elore 14* (2), 1–4. Available online at: http://www.elore.fi/arkisto/2_07/ gru2_07.pdf

––––. 2010. "Matkueita tai yksityisiä tutkijoita: Suomalais-Ugrilaisen Seuran keruuretkien tausta ja tavoitteet." In Kenttäretkistä tutkimustiedoksi, edited by Kokkonen, Paula and Anna Kurvinen. Uralica Helsingiensia 4. Helsinki: Suomalais-Ugrilainen Seura, 17–52.

Hinton, Leanna 2003. "Language Revitalization." *Annual Review of Applied Linguistics 23* (1), 44–57.

Howaldt, Jürgen and Michael Schwartz. 2010. Social Innovation: Concepts, Research Fields and International Trends. Sozialforschungsstelle Dortmund. Zentrale Wissenschaftliche Einrichtung der Technische Universität Dortmund. Available online at: http://www.internationalmonitoring.com/fileadmin/ Downloads/Trendstudien/IMO%20Trendstudie_Howaldt_englisch _Final%20ds.pdf

Istance, David. 2003. "Schooling and Lifelong Learning: Insights from OECD Analyses." *European Journal of Education 38* (1), 85–99.

Jauhiainen, Jussi S. and Susanna Harvio. 2008. "Suomalainen kaupunkitutkimus 2000-luvulla." Yhdyskuntasuunnittelu 45 (4), 6–19.

Kenney, Martin and Donald Patton. 2009. "Reconsidering the Bayh-Dole Act and The Current University Invention Ownership Model." *Research Policy 38* (9), 1407–1422.

Kivirauma, Joel and Kari Ruoho. 2007. "Excellence through Special Education? Lessons from the Finnish School Reform." *Review of Education 53* (3), 283–302.

Kleinman, Daniel Lee and Steven P. Vallas. 2006. "Contradiction in Convergence: Universities and Industry in the Biotechnology Field." In *The New Political Sociology of Science: Institutions, Networks, and Power*, edited by Frickel, Scott and Kelly Moore. Madison: The University of Wisconsin Press, 35–62.

Kortteinen, Matti. 1982. Lähiö. Tutkimus elämäntapojen muutoksesta. Helsinki: Otava.

Kosonen, Mauno. 2008. Kohti urbaania tulevaisuutta. Espoon juhlaviikon seminaari, Dipoli, Espoo, 26.8.2008.

Lacey, Hugh. 2004. *Is Science Value Free? Values and Scientific Understanding*. London: Routledge.

Laredo, Philippe. 2007. "Revisiting the Third Mission of Universities: Toward a Renewed Categorization of University Activities?" *Higher Education Policy 20* (4), 441–456.

Lehtinen, Ildikó. 2010. "Kalastuksesta kansanpukuihin–kansatieteilijät kentällä." In *Kenttäretkistä tutkimustiedoksi*, edited by Kokkonen, Paula and Anna Kurvinen. Uralica Helsingiensia 4. Helsinki: Suomalais-Ugrilainen Seura, 179–211.

Luoma, Päivi, Tuomas Raivio, Paula Tommila, Johan Lunabba, Kimmo Halme, Kimmo Viljamaa and Henri Lahtinen. 2011. Better Results, More Value. A Framework for Analysing the Societal Impact of Research and Innovation. *Tekes Review* 288/2011. Helsinki: Tekes.

Lyytinen, Heikki, Jane Erskine, Janne Kujala, Emma Ojanen and Ulla Richardson. 2009. "In Search of a Science-based Application: A

Learning Tool for Reading Acquisition." *Scandinavian Journal of Psychology 50* (6), 668–675.

Martin, Ben. 2003. "The Changing Social Contract for Science and the Evolution of the University." In *Science and Innovation: Rethinking the Rationales for Funding and Governance*, edited by Geuna, Aldo, Ammon J. Salter and W. Edward Steinmueller. Cheltenham: Edward Elgar.

Miettinen, Reijo. 2002. *National Innovation System. Scientific Concept or Political Rhetoric?* Helsinki: Edita.

Ministry of Education 1993. Toimenpideohjelma Venäjän suomensukuisten kansojen ja niiden kulttuurien tukemiseksi. Opetusministeriön työryhmien muistioita 1993: 6. Helsinki: Opetusministeriö.

Mowery, David C. and Bhaven N. Sampat. 2005. "The Bayh-Dole Act of 1980 and University-Industry Technology Transfer: A Model for Other OECD Governments?" *Journal of Technology Transfer 30* (1/2), 115–127.

Mytelka, Lynn K. and Keith Smith. 2002. "Policy Learning and Innovation Theory: An Interactive and Co-evolving Process." *Research Policy 31* (8-9), 1467-1479.

Nedeva, Maria. 2007. "New Tricks and Old Dogs? The 'Third Mission' and the Re-production of the University." In *The World Yearbook of Education 2008: Geographies of Knowledge/ Geometries of Power: Framing the Future of Higher Education*, edited by Epstein, Debbie, Rebecca Boden, Rosemary Deem, Fazal Rizvi and Susan Wright. New York: Routledge, 85–105.

Nelson, Richard R. 2001. "Observations on the Post-Bayh-Dole Rise of Patenting at American Universities." *Journal of Technology Transfer 26* (1–2), 13–19.

Nettle, Daniel and Suzanne Romaine. 2000. *Vanishing Voices. The Extinction of the World's Languages*. New York: Oxford University Press.

Nussbaum, Martha. 2010. *Not for Profit. Why Democracy Needs the Humanities*. Princeton, N.J.: Princeton University Press.

OECD 1980. *Technical Change and Economic Policy*. Paris: OECD.

——. 1992. *Technology and Economy: the Key Relationships*. Paris: OECD.

——. 1997. *National Innovation Systems*. Paris: OECD.

——. 2000. *A New Economy? The Changing Role of Innovation and Information Technology in Growth*. Paris: OECD.

——. 2001. *Knowledge and Skills for Life: First Results from PISA 2000*. Paris: OECD.

——. 2003. *Turning Science into Business. Patenting and Licensing at Public Research Organisations*. Paris: OECD.

——. 2007. *PISA 2006. Science Competencies for Tomorrow's World.* Paris: OECD.

Pasanen, Annika. 2003. Kielipesä ja revitalisaatio: karjalaisten ja inarinsaamelaisten kielipesätoiminta. Master's thesis. Department of Finnish, Finno-Ugrian and Scandinavian Studies, University of Helsinki.

——. 2004. "Inarinsaamelainen menestystarina: kielipesästä kaksikielisyyteen." In Äidinkieli ja toiset kielet: Pohjoismainen kaksikielisyystyöpaja Tampereella 18.-20.10.2002, edited by Latomaa, Sirkku. Tampere: Tampereen yliopisto.

——. 2006. "Karjalan kielen nykytila ja tulevaisuus." Suomalais-Ugrilaisen Seuran Aikakauskirja 91, 115–31.

Romaine, Suzanne 2007. "Preserving Endangered Languages." *Language and Linguistic Compass 1* (1-2), 115–32.

Science and Technology Policy Council of Finland. 1993. Towards an Innovative Society: A Development Strategy for Finland. Helsinki.

Sharif, Nauhabar. 2006. "Emergence and Development of National Innovation Systems Concept." *Research Policy 35* (5), 745–766.

Suhonen, Seppo. 2009. "Keitä olivat Suomalais-Ugrilaisen Seuran perustajat?" The Quasquicentennial of the Finno-Ugric Society 258, 263–71.

Tuunainen, Juha and Tarja Knuuttila. 2008. "Determining the Norms of Science: From Epistemological Criteria to Local Struggle on Organizational Rules?" In *Cultural Dimensions in Higher Education Studies*, edited by Ylijoki, Oili-Helena and Jussi Välimaa. Springer.

Vaattovaara, Mari. 2010. "How to Develop Sustainable Urban Regeneration Process." In *Bauhaus and the City: A Contest Heritage for a Challenging Future. Bauhaus Urban Studies 1.* Verlag Königshausen & Neumann.

Vaattovaara, Mari, Matti Kortteinen and Rami Ratvio, eds. 2009. Miten kehittää lähiötä? Tapaustutkimus Riihimäen Peltosaaresta, metropolin laidalta. Suomen ympäristö 46. Lahti: Asumisen rahoitus- ja kehittämiskeskus.

Waris, Heikki. 1973. Työläisyhteiskunnan syntyminen Helsingin Pitkänsillan pohjoispuolelle. Helsinki: Weilin & Göös.