



Vetenskapsrådet



**THE FUTURE OF SWEDISH RESEARCH!**

**OVERVIEW 2014  
EDUCATIONAL SCIENCES**

## THE FUTURE OF SWEDISH RESEARCH

The Swedish Research Council developed a series of overviews and analyses in 2014 which serve as the foundation for the Board's summary conclusions and recommendations on research policy choices to promote Swedish research in the coming 5 to 10 years. This project is designated "The future of research" and will be summarised in a final report in the summer of 2015. As a whole, the material serves as the foundation in the documentation the Swedish Research Council is compiling for the government's upcoming research bill in 2016.

Overviews have been put together for the following seven research domains:

- humanities and social sciences
- natural sciences and engineering sciences
- medicine and health
- educational sciences
- artistic research
- development research
- research infrastructure

THE FUTURE OF SWEDISH RESEARCH! OVERVIEW 2014 EDUCATIONAL SCIENCES

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# FOREWORD

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The Educational Sciences overview is part of the knowledge base that the Swedish Research Council has compiled to provide a basis for decisions in preparation for the government's upcoming research bill and to allow scientific councils, academic councils and committees to set priorities. It can also be used as reference material in the research sector.

In 2014, the Swedish Research Council's Committee for Educational Sciences drew up a thematic description of research in the educational sciences, divided into six overarching areas. For each of these areas a number of themes were formulated and described with regard to current research questions, strengths and weaknesses, and what can be said concerning future prerequisites and trends. The descriptions of the research were produced by the Committee for Educational Sciences based on material from a large number of prominent researchers in the educational sciences field, meetings with representatives of the higher education institutions (HEIs), and views given by researchers via a web forum. Statistics on contributions to research in the educational sciences between 2009 and 2013 were also included. Based on these status descriptions, the committee presented recommendations for the further development of the educational sciences field of research.

**Eva Björck**

Secretary General of the Committee for Educational Sciences

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# SAMMANFATTNING

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Även om den utbildningsvetenskapliga forskningen har etablerats och genomgått en stark utveckling under de senaste decennierna krävs en fortsatt uppbyggnad för att möta de samhällsliga utmaningar som vi står inför. Skolans utformning och utveckling är ifrågasatt med anledning av svenska elevers sjunkande resultat i internationella mätningar av grundläggande läs- och matematikfärdigheter, svagheter som följer med in i vuxenlivet. Likaså tycks segregation och behov av stöd till barn och unga i olika typer av svårigheter i skolan att öka. Forskning om den svenska utbildningen, dess innehåll, resultat och kvalitet i relation till internationella trender och utvecklingslinjer är därför av stor betydelse.

Den stora efterfrågan på forskningens resultat för att lösa skolans problem får dock inte leda till alltför kortsiktiga forskningssatsningar. Den grundläggande, teoretiskt solida och metodiskt rigorösa forskningen utgör en förutsättning för kritiskt granskande och praktiskt problemlösande forskning. För vidare uppbyggnad av den utbildningsvetenskapliga forskningen behövs därför i första hand medel till forskarinitierad grundläggande forskning. Satsningar på utveckling av starka forskningsmiljöer och forskarskolor är nödvändiga för att möjliggöra interdisciplinär samverkan, uppbyggnad av forskning inom eftersatta områden och för ökad nationell och internationell mobilitet. Samtidigt är de system som är under uppbyggnad för att tillgängliggöra forskningen i syfte att förbättra utbildningsresultaten i den svenska skolan mycket angelägna och bör bygga på samverkan mellan relevanta aktörer i forsknings- och utbildningssystemet. De nya planerade satsningarna på praktisk forskning inom utbildningsvetenskap måste omfattas av samma rigorösa krav på vetenskaplighet som annan forskning.

Svensk utbildningsvetenskaplig forskning har en styrka i den goda tillgången på nationella databaser och register. Samtidigt finns här ett utvecklingsbehov för att möjliggöra longitudinella och internationellt komparativa studier i större omfattning, främst avseende vilka uppgifter som samlas in från skolväsendet om elever, personal och resultat. Tillgången på forskare med kompetens att genomföra denna typ av kvantitativa studier måste också tillförsäkras genom satsningar på sådan forskarutbildning. Det finns också en stor potential i uppbyggnaden av infrastruktur som bygger på digital teknik samt virtuella laboratorier.

En strategiskt viktig forskningsinriktning gäller användningen av ny teknologi och digitala medier i undervisning samt deras implikationer för individers lärande. En viktig aspekt är den ökande globaliseringen av kunskap, vilket riktar fokus mot digitala medier för såväl produktion som distribution av kunskap. Svensk forskning har på senare år genomgått en snabb expansion på området och här finns goda utsikter för ett starkt internationellt genomslag.

## **Mot denna bakgrund ger Utbildningsvetenskapliga kommittén följande rekommendationer:**

- Öka stödet till grundläggande utbildningsvetenskaplig forskning.
- Tillförsäkra ett tydligt nationellt system för forskningsfinansiering och forskningsspridning.
- Tillförsäkra att kvalitetssäkring av nya satsningar på praktisk forskning sker på samma rigorösa sätt som annan forskning.
- Inrätta infrastruktur för informationsinsamling av nationellt och internationellt jämförbara data.
- Stöd till kohortstudie av svenska barns levnadsvillkor och lärande från födseln och framåt.

## **Utöver ovanstående strukturella rekommendationer föreslår Utbildningsvetenskapliga kommittén följande satsningar:**

- Nationella forskarskolor för
  - kvantitativt inriktad utbildningsvetenskaplig analys
  - ämnesdidaktik
  - tvärvetenskapliga studier av prevention och tidiga insatser
  - digitala teknologier i utbildning.

- Projektstöd och stöd för uppbyggnad av forskningsmiljöer och samverkan för
  - studier av bakomliggande faktorer på makro- och mikronivå till nedgången i svenska resultat på internationella kunskapsprov
  - effektstudier av pedagogiska interventioner inom samtliga skolformer
  - forskning om profession, samhällelig styrning och professionell praktik
  - forskning om flerspråkighet, likvärdighet och nyanlända i utbildningssystemet
  - klassrumsinriktad forskning med fokus på lärande och sociala aspekter av utbildning
  - forskning om digitala teknologier i utbildning: (i) den nya teknikens inflytande på barns och ungas lärande och utveckling av kunskaper, (ii) metodutveckling för användande av ny teknologi inom ämnesdidaktik, (iii) lärares hantering av den nya tekniken i undervisning.
- Stöd till internationalisering av forskningsmiljöer, riktat till såväl seniora som yngre forskare.

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## SUMMARY

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Even though educational science research has been established and has been on a strong developmental trend over the past decades, a continuing upgrade is required to meet the social challenges we face. The structure and development of schools is being called into question in light of the falling performance of Swedish students in international studies of basic reading and math skills – weaknesses which are carried over into adult life. At the same time segregation and need of support for children and youth with various types of difficulties in school tends to increase. Educational science research regarding contents, results and quality in relation to international trends and developments are of utmost importance.

However, the high demand for research findings to solve the problems of schools should not lead to research investments that are too short term. Fundamental, theoretically solid and methodologically rigorous research is a precondition for research characterized by critical scrutiny and practical problem-solving. Funding for researcher-initiated fundamental research is therefore above all needed in order to further upgrade the educational science research. Investments to develop strong research environments and graduate schools are necessary to facilitate interdisciplinary collaboration and the expansion of research in less developed areas as well as to increase national and international mobility. The systems that are developed to make research available, in order to improve educational performance in Swedish schools, are imperative and should build on collaboration between relevant entities in the research and education system. Investments in practice-oriented educational science research must be subject to the same rigorous scientific requirements as other forms of research.

Swedish educational science research has a strength in its solid access to national databases and registers. However, development is needed to enable larger scale longitudinal and international comparative studies, mainly with respect to the kind of information collected from the school system about students, staff and study results. Access to researchers skilled in performing this type of quantitative study must also be secured via investments in postgraduate education. There is also great potential in expanding infrastructure based on digital technology and in virtual laboratories.

One strategically important research specialization is the use of new technology and digital media in the classroom as well as their implications for the learning of individuals. One key aspect is the increasing globalisation of knowledge, which puts the focus on digital media for both the production and distribution of knowledge. Swedish research has recently undergone rapid expansion in this area and there are good prospects for a strong international breakthrough.

### **The Committee for Educational Sciences makes the following recommendations:**

- Increase support for fundamental educational science research
- Secure a clear national system for research funding and dissemination
- Ensure that quality assurance for new investments in practice-oriented research is applied in the same rigorous manner as for other types of research
- Set up infrastructure for the collection of nationally and internationally comparable data
- Support for cohort studies of the living conditions and learning of Swedish children from birth and on

### **In addition to the structural recommendations, the Committee for Educational Sciences proposes the following initiatives:**

- National graduate schools for
  - quantitative educational science analysis
  - subject didactics
  - interdisciplinary studies on prevention and early intervention
  - digital technologies in education

- Project support and support for upgrading research environments and collaboration on
  - studies of underlying factors on the macro and micro level with respect to the decline of Swedish performance on international knowledge tests
  - impact studies of pedagogical interventions in all school forms
  - research on professions, governance and professional practice
  - research on multilingualism, equality and the newly arrived students in the education system
  - classroom-oriented research with a focus on learning and the social aspects of education
  - digital technologies in education (i) the influence of new technology on the ability of children and youth to learn and develop knowledge, (ii) the development of methodology for the use of new technology and subject didactics, (iii) how teachers manage new technology in the classroom
  
- Support for the internationalisation of research environments, targeting both senior and young researchers

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# TOMORROW'S CHALLENGES

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## Increasing demands on the education sector

Educational Science is the knowledge base for the considerable part of Swedish society that the education sector comprises and concerns directly or indirectly a large part of the population. Children starting pre-school today will be adults in the mid-2030s and may be active in working life for another approximately 50 years. The knowledge and experience they gain in the pre-school and school years form the foundation for future learning, development and knowledge provision. There is, however, growing concern over the development of Swedish schools, not least in relation to the development in other countries, as it has been reflected in Swedish pupils' results in international surveys since the turn of the millennium<sup>1</sup>. These weak results have also proved to persist in a survey of young people's and adults' proficiency in reading and mathematics<sup>2</sup>. In 2013, almost 1.9 million children and young people were attending school, approximately one fifth of whom had a mother tongue other than Swedish. Pupils in pre-school, compulsory school and at upper secondary school make up more than 20% of the population. The number of teachers in pre-school, primary school and secondary school was at the same time approximately 260,000, making the school Sweden's largest workplace. Some 420,000 students study at universities and other higher education institutions and the total number of employees in the higher education sector is today 75,700, which is the highest figure ever. Teacher education is one of the country's largest and most important vocational training areas, since competent teachers are a fundamental prerequisite for quality in the Swedish educational system. Almost 12,000 students were admitted to teacher training programmes in Sweden in 2013. All in all, this shows the great importance of educational science research for society's development.

Through its close connection to children's and young people's learning, pedagogical practices, teachers' exercise of their profession and to the pre-school, primary school and secondary school structure, research in the educational sciences contributes to the creation of prerequisites for the development of the knowledge base for the society of the future. The research conducted in this field does however constitute a very small part of Swedish research today. More resources are needed to be able to meet the need for both basic research and practice-centred research that can contribute to a strong, knowledge-based societal development and economic growth that are sustainable in the long term.

One of the great challenges for schools is to give all children and young people a good start in life and an education that make them well-equipped to contribute to society's long-term development. This challenge is reinforced by the trend towards an increasing number of children and young people in pre-school, primary school and secondary school who are in need of support. More and more children and young people have difficulties with learning, concentrating, interacting and participating. Segregation is also increasing both in society and in school. The international surveys show that the proportion of pupils with poor reading and mathematical skills is increasing at the same time as the differences between schools and pupils are also increasing. At the same time, more and more newly arrived children and young people come from countries where war and poverty are rife and their social situation in Sweden may be very difficult. One great challenge for the Swedish school system is to receive them in the best possible way and create good opportunities for their learning and their participation in society. The challenge is to create a school for everyone, where every child's unique situation and need for support are taken into account in the day-to-day school activities, and to offer all children and young people an equally good education.

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<sup>1</sup> PISA: <http://www.oecd.org/pisa/pisaproducts/>; TIMSS and PIRLS: <http://timssandpirls.bc.edu/>

<sup>2</sup> PIAAC, Programme for International Assessment of Adult Competences, <http://www.oecd.org/site/piaac/>. Report: *Lära för livet? [Teaching for life?] Om skolans och arbetslivets avtryck i vuxnas färdigheter [On the impact of school and working life on adults' proficiencies]*, Jan-Eric Gustafsson, Patrik Lind, Erik Mellander och Mats Myrberg, SNS Förlag 2014.

New technology has led to great changes in society and influenced communication both inside and outside school. An important challenge for future research in the educational sciences is to understand the consequences of the new technology for the learning, participation and well-being of children, young people and adults, in a broader perspective, ranging from individual to society level. At the level of the individual, this is a matter of, for example, how cognition, learning and concentration are influenced by the constant access to information and how different skills develop in relation to the new technology. At the level of school, it is a matter of how the school handles different learning prerequisites and satisfies the need for digital tools and how the school environment is adapted to the new technology. It is also a matter of methodological development and of the teachers' abilities to handle new technology in their teaching. At the level of society, equal access to and use of the new technology is an important factor.

Life-long learning begins already in pre-school and is a matter that concerns education, research, the labour market, working life and everyday life. The number of adults studying is very high today, following the substantial expansion of higher education that has been going on for many years. Today's rapid societal changes mean that adults have a great need for recurrent education and skills development both in the education system, at the work place and in their everyday lives. This is a field of research, which must be given greater attention in the long-term perspective.

## Research capacity for internationally prominent research

There is a strong belief in the education system's possibilities to generate positive effects for society and the individual. In the Swedish National Audit Office's 2014 analysis<sup>3</sup> of future societal challenges, however, the Swedish education system is pointed out as a specific risk area. The analysis highlights areas such as the new technology's effects on learning and teaching, knowledge transfer, competence and competence losses, increased demand and competition for manpower, both in Sweden and around the world, as well as risks for debased quality in the education system. In the light of these risks, it is a matter of urgency to increase the understanding of the conditions for knowledge formation and learning conditions through educational science research.

In relation to the size of the education sector, research grants to the educational sciences are modest and amount to just under 4% of the research funding provided by the Swedish Research Council. It might seem self-evident that research grants in the areas of education and learning, which are preconditions for success in most areas, should be larger than they are today. Well established research exists in the educational sciences field, but in many respects the educational sciences are still an area that is being built up. In those contexts where educational research excels, it is a matter of research environments where senior researchers and young researchers work together, often in international collaboration, and share knowledge development. These settings have arisen through researchers joining forces in a field of research, or on a research methodology that is refined and applied in various themes relevant to the educational sciences. Building up such settings requires both basic funding from the higher education institutions and external research funding applied for in competition. Subject-didactic research, primarily in the natural sciences, is an example of research that has shown strong development since the establishment of the Committee for Educational Sciences in 2001, which dramatically increased the possibilities to obtain external funding for such research. In this respect, major investments in graduate schools have also contributed to the development of these research settings.

The great demand for usable knowledge on the part of the decision-makers and practitioners, from what is today a relatively small educational science research community, makes it important to safeguard the systems for scientific quality audits and the possibilities to conduct free, critical basic and practice-centred research. The requirement that research be utilisable must be balanced against possibilities for international orientation and collaboration. An expanded research base, with high-quality, internationally recognised research in relevant

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<sup>3</sup> The Swedish National Audit Office's audit plan for 2014/2015, RIR 2014

fields, is required in order to be able to meet the political demands for a school with a scientific basis. It can be described on the basis of the educational sciences' three basic tasks: an analytical, insight-seeking tasks where research seeks new knowledge, a critical task where research tests established truths and a constructive task where research resolves practical problems and promotes innovation. The first task – basic, theoretically sound and methodologically rigorous scientific analyses – constitute a precondition for the other two tasks, both critical scrutiny and practical problem-solving.

National infrastructures need to be established to improve, and in certain cases create new opportunities for, qualified research in many thematic areas of the educational sciences. Development of registers and other databases, that enable longitudinal studies and international comparisons to be made, are of utmost importance, as is the establishment of nationally accessible databases for audio and video recordings. Great potential also lies in the development of national infrastructure for data and equipment based on new technology, for example virtual laboratories with simulation capabilities.

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# EDUCATIONAL SCIENCE RESEARCH TODAY

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## A developing field of research

An education system that rests on a strong scientific foundation is fundamental for Sweden as a research nation and for Sweden to be able to take on the societal challenges of the future. Educational science research is about learning, knowledge formation, education, teaching and erudition. Educational science research in Sweden today is broad and multi-faceted with intensive knowledge production from macro- to micro-level and is pursued in both national and international contexts. The research is characterised by being thematic and integrative with contributions from different subjects and disciplines, even though pedagogics and didactics are the dominant subjects. By thematic research we here refer to research questions and research assignments that require expertise and methods from several disciplines and where the research findings contribute to expanding the knowledge in a specific field. One example of such research is research on equality in school, which may require input from the pedagogy, psychology and sociology field. By integrative research is meant that theories and methods from different disciplines are linked together. The results are expected to contribute to new theory and concept formation in several fields or the development of new subjects. One example of such integrative research is the subject of mathematical didactics, which has grown out of the interaction between didactics and mathematics.

Development at Sweden's universities has over recent decades moved towards faculties, departments, academies or larger educational science environments developing (both thematically and integratively). In recent years, the research has both increased and become differentiated thanks to the efforts of the Swedish Research Council, the higher education establishments, principals and other players – not least in connection with the building up of the new teacher education programmes, where a research basis is a major requirement. Extensive initiatives to promote subject-didactic graduate research schools on the part of the Swedish Research Council have led to a strengthening not only of post-graduate education but also of research at the HEIs that have collaborated on the graduate research schools. At the same time, the scientific foundation of the teacher training programmes has also been strengthened. Collaboration between researcher teams and the educational system on research and school development is also increasing, as is collaboration between other players in the educational science field and also other scientific fields.

The need to build up educational science research is however still considerable in many areas. The importance of strong educational science research has also been recognised at Nordic and European level. In 2012, the Nordic ministers of education initiated a major joint Nordic initiative in the educational sciences in the Nordic countries called “Education for Tomorrow”. At European level, both the European Commission and the OECD make comprehensive analyses of the European countries' educational systems and development needs, which at the same time point to some of the major research challenges of the future. These include among other things the introduction of new technology in schools, rapid global development with increased mobility and greater diversity, strong, knowledge-based societal development and economic growth, wider divides between various groups, greater awareness when it comes to sustainable development in a longer perspective and a healthy lifestyle.

## Funding of basic research

The Swedish Research Council's funding is of great importance for the educational science research in Sweden. In some areas, funding may also be obtained from other research funding providers, first and foremost from the Swedish foundation for Humanities and Social Sciences, administered by the Swedish central bank (Riksbanken), and The Swedish Research Council for Health, Working life and Welfare (Forte). These three funding providers awarded a total of 274 grants, amounting to SEK 1.3 billion, to educational science research between 2009 and 2013. The Swedish Research Council provided just over 90% of the funding, and the Committee for Educational Sciences decides on most of these grants. Almost 30% of the funds were been allocated to research on education policies, educational systems and educational organisation structures, 30% to

subject-didactic research, about 15% each to research on the social context of education and research in teaching, communication and learning, and 12% to research on professional groups and vocational training (Table 1).

In the field of subject-didactics research, the Swedish Research Council is essentially the sole funding provider and as such has been very important to the development of subject didactics. Here can be mentioned that almost 40% of the funds distributed to subject didactics went to graduate research schools. Subject-didactic research in mathematics and the natural sciences is well-established internationally today.

Out of the almost 30% of the funding that was allocated to research on educational policies, educational systems and education structures, a large part was awarded to research on equal opportunities, social reproduction and to educational policies and reforms thereof in basic education. Within these areas, topical, well-established research is being conducted, which relates to the state of Swedish schools and needs to be developed further. Research on inequalities in the area of education is a crossover between pedagogics (school) and sociology (stratification) and has increasingly come to include economics. It is also increasingly conducted in the form of international collaboration. Considering the current challenges for the Swedish school system and the state of Swedish schools, research in this area is highly relevant.

**Table 1: Funding to educational science research awarded by the Swedish Research Council (SRC), the Swedish foundation for Humanities and Social Sciences (Riksbanken) and Forte between 2009 and 2013. The amounts are presented in K SEK.**

Area	Forte	RJ	SRC	Total
1. Education policy, education system and organisation of education	26,190	24,693	310,830	361,713
2. Social aspects of education	6,339	4,374	186,275	196,988
3. Teaching, communication and learning	26,726		199,157	225,883
4. Subject didactics		7,436	352,059	359,495
5. Professions and professional education	12,565	3,625	135,668	151,858
<b>Total</b>	<b>71,820</b>	<b>40,128</b>	<b>1,197,996</b>	<b>1,309,944</b>

Research in the educational sciences is conducted at most of the higher education institutions and at all 28 HEIs<sup>4</sup> which offer teacher training programmes. Over the five-year period, 70% of the funding was allocated to the older universities, which host many of the major research environments. The research capacity and external funding situation may vary widely at the level of the smaller HEIs, but it is important, not least in view of the scientific foundation of the teacher training programmes, to emphasise the fact that smaller universities can also develop high-quality research in research settings in special niches, with both national and international collaboration. The smaller HEIs do however often lack regular and/or sufficient faculty grants, which are a basic precondition for continuous research and good quality education, including post-graduate education.

One important question for the future is to achieve the necessary balance between fixed research funding to the HEIs and research funding exposed to competition. A sufficiently large basic funding is needed to be able to develop strong research environments in the national and international competition. Providing the prerequisites to develop good research environments at large and small HEIs requires investments in both free project grants, targeted actions and graduate research schools. Graduate research schools in particular have

<sup>4</sup> The University of Dance and Circus, the Swedish School of Sport and Health Sciences, the University of Gothenburg, Dalarna University, the University of Borås, The University of Gävle, Halmstad University, Jönköping University, the University of Skövde, Kristianstad University, University West, Karlstad University, the University College of Arts, Crafts and Design, the Royal College of Music in Stockholm, the Royal Institute of Technology, Linköping University, Linnaeus University, Luleå University of Technology, Lund University, Malmö University, Mid Sweden University, Mälardalen University, Stockholm University of the Arts, Stockholm University, Södertörn University, Umeå University, Uppsala University Örebro University

proved to generate considerable spin-off effects in terms of development of national networks with collaborative research in a number of fields of research. Examples include pre-school research and subject didactics in mathematics and the natural sciences.

## International impact

Research in the educational sciences is carried on in many different disciplines, and the building-up of knowledge and the knowledge base that is created are important to the development in different areas. Internationally recognised educational science research environments, with different focuses, can mainly be found at the larger universities, but niched research of this kind can also be found at several of the smaller HEIs. One difficulty for these education establishments is to be able to conduct sufficiently good basic research in several subjects to guarantee the teacher training programmes' scientific foundation and at the same time develop internationally strong cutting-edge research.

Regarding educational science research, its international impact cannot at present be measured adequately with the aid of citation analyses, as is common in other fields. In a report from the Swedish Research Council published in 2010, an estimate was instead made of the degree of international orientation of educational science research, conducted at a few of the country's larger universities, by looking at which languages were used in the publications<sup>5</sup>. This showed that approximately half were written in English. There is, however, great variation between researchers that is in part related to the subject and the publishing traditions in the subject and in part to the publication target group, which may consist of researchers, practitioners or politicians. A greater degree of internationalisation of educational science research is desirable because of the quality-driving effects of such collaborations. At the same time, research findings need to be made available to those who can benefit from them, for example people who are active in various areas of teaching and people active in politics at various levels. In this respect, there is a risk of conflict due to the great demand for research findings among these players, and it is important to clarify the quality aspects of international collaboration and to promote such collaboration. One central challenge as regards research policy is to achieve a good balance between more short-term, problem-oriented research and more long-term, basic research. Short-term, problem-solving or problem-identification research, which does not relate to basic research, risks being trivialized.

## Publication and bibliometric data

The availability of bibliometric data that gives a good picture of research in the educational sciences is currently limited. One of the reasons is that the publication channels that are used in educational science research are not always represented in the databases that are used. Over the past thirty years, publications in many fields have taken the form of monographs, books and reports. The number of researchers who publish in international scientific journals is however increasing, as is the number of compilation theses containing scientific articles. This increases the field's representation in international scientific journals. One reason for the difficulty in finding good bibliometric information is the interdisciplinary nature of educational science research. Relevant research that is classified in the databases as research in disciplines other than educational sciences is excluded, which gives a skewed picture of the field.

In light of the varying publication patterns in different subject areas, it is very important that bibliometric instruments be developed to be able to handle publications made using different channels and to be able to handle thematically defined multi- and interdisciplinary research fairly. The ongoing development of the national database Swepub for analyses is particularly important to the educational sciences field and will in the long term provide better possibilities for follow-up and analysis.

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<sup>5</sup> The Swedish Research Council's report no. 2010:10, Forskningskommunikation och publiceringsmönster inom utbildningsvetenskap [Research communication and publication patterns in the educational sciences], Hansen, M. och Lindblad, S., 2010

## Infrastructure

There is a great need for international infrastructure and availability of data in the form of both registers and other databases. Knowledge of storage methods is required on several levels, as is access to and use of this data. Systems exist today but do not function too well in practice and there are too few studies build on earlier research findings due to the absence of access to and ignorance of existing databases.

There are, however, examples of large projects that build upon the idea of creating databases that are accessible to researchers. In collaboration with different research institutes, Statistics Sweden has been making follow-up studies in the school sector since the early 1960s. These studies were developed within the framework of the Individual Statistics (IS) project at the University of Gothenburg and the UGU project (Evaluation by following up pupils) at the Stockholm Institute of Education. In 1990, they were combined into a research project led by the University of Gothenburg called “Utvärdering Genom Uppföljning” [Evaluation by following up]. The follow-up studies are part of the national evaluation of Sweden’s schools and constitute a valuable resource within the field of educational science and social science. To date, nine follow-up studies have been conducted. The data is accessible to doctoral students and researchers at universities and higher education institutions in Sweden and other countries.

Development of infrastructure as regards data and equipment is needed, not least in the light of the opportunities offered by the new technology. Virtual laboratories with possibilities for simulations are increasingly common today in different subject areas and open up new research opportunities. A virtual environment can act as a platform for teaching and provide opportunities to study and experiment with learning. Resources for the development of web-based teaching are a matter of national importance that can be linked to new opportunities to use databases in research.

In the field of subject didactics, and in particular language didactics, no great development of the national infrastructure can be noted as regards data and equipment. The establishment of shared databases, particularly as regards qualitative data of the audio and video recording kind, and coding/tagging of this data would be a great help. Videolabs with possibilities for fast video processing as the starting point for analysis and methodical development open up new opportunities in a range of different areas.

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# RECOMMENDATIONS

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## Thematic recommendations

### The state of Swedish schools – why are Swedish pupils’ results deteriorating in international surveys?

The predominant issue in the educational policy field recently has been the weak results of Swedish pupils in the latest PISA study. This and other international comparative studies (PISA, TIMSS and PIRLS) indicate a severe deterioration in basic skills among Swedish school pupils, a trend which has moreover been going on for a long time. Qualified and persistent research is needed to be able to explain this alarming development, for example research on differences between countries, and analyses of the effects of the different characteristics of the countries’ educational systems. There is data at hand, which is eminently suitable to put the problems of the Swedish educational system in an international perspective and to try to understand the underlying factors at system level and over time. Active, high-quality research in this field is being conducted at an international level.

Beyond the general decline in results, the differences in performance and socio-economic and ethnic composition between municipalities, schools and pupils are also growing at a relatively high rate compared to other countries. There is a need for more research that monitors and analyses mechanisms and consequences of this development over time in a Swedish and internationally comparative perspective. Two main orientations can be distinguished in international research: macro-oriented studies, mainly on the importance of educational organisation structures in relation to inequality, and micro-oriented studies of school classes and schools. A growing proportion of the variation when it comes to performance at school and choice of school can be found at school and school class level, which might possibly be due to individual schools’ resources and organisation and on the teachers’ qualifications and how they exercise their profession. A Swedish initiative in this area should be characterised by an ambition to cover this complexity of factors.

The qualitatively oriented research in the area of educational policy and educational system needs to be complemented with more quantitatively oriented research to allow for analyses to be made of patterns and relationships of the kinds described above. The regrowth of researchers skilled in the analysis of large amounts of data in the educational science field is currently insufficient in relation to need. Action is required to increase the number of educational science researchers that are specialized in quantitative methods. A multidisciplinary national or Nordic graduate research school with such a focus should be set up in order to enable researchers in pedagogics, economics and sociology with quantitative methods to contribute to a greater degree to research on questions relevant to the educational sciences and the development of methods for such research.

#### **The Committee for Educational Sciences recommends research initiatives on**

- studies of underlying factors at macro and micro level behind the decline in Swedish results in international knowledge surveys
- a national graduate research school for qualitatively oriented educational science analysis.

### Subject-didactic research in all school subjects

Subject didactics should cover all school subjects. At present, there are significant shortcomings in several subjects. In social studies, aesthetic and practical subjects, there is a great need for fundamental research capacity to be able to satisfy the needs of the educational system and the teacher training programmes. Except in English, there is a great shortage of language-didactic research. Today, established research environments in the field of technology didactics exist only at a few of the larger higher education establishments. There is also insufficient research that focuses on younger children and pupils and on reading and writing development and multilingualism.

Among Sweden's areas of strength in the field of subject-didactic research, natural science didactics can be emphasised. Didactic research focusing on Swedish as a subject has generally also been a good research base that has also had an impact on schools' activities, often through the school authorities. The establishment of subject-didactic graduate research schools has been of crucial importance to the positive development of subject-didactic research in these areas. It might also explain the considerable increase in research in mathematics didactics. Much of the present research in subject didactics is conducted in, or in conjunction with, research environments that are linked to the graduate research schools. Over the past five years, the government has made considerable investments in post-graduate education up to a licentiate degree for active teachers. Even though such graduate research schools have generally had a positive impact on the research settings, they need to be complemented with education up to a PhD to contribute to the regrowth or growth of researchers in the subject-didactic fields.

**The Committee for Educational Sciences recommends research initiatives on**

- subject-didactic graduate research schools where a PhD can be obtained.

### Special pedagogics and the inclusive school

Today, Swedish research in special pedagogics primarily focuses on questions concerning development, learning, participation and attainment of knowledge goals for children and pupils in need of support. The research concerns reading and writing difficulties, difficulties in mathematics, learning and the school situation of children with various kinds of disabilities, children who do not attain the knowledge goals, the organisation of support activities/inclusive teaching and policy matters. Extensive research is being conducted on the subject of approach (e.g. that of teachers and principals) to inclusive teaching and studies on inclusiveness in the educational system. However, there is a lack of research on how schools and teachers work to make school more inclusive and able to satisfy all children's needs. There are also interdisciplinary research environments which include both teaching, behavioural and health science/medical research that primarily work with issues that concern the situation of children and young people with disabilities and can be classified as special pedagogics issues. At these research environments, complex problems relating to development, learning and participation are studied, which require knowledge in several different fields.

Regarding the research themes, no well-conducted impact studies or longitudinal studies exist. Only a small part concerns pedagogical interventions, which is relatively common in international research. The impact research is moreover almost exclusively focused on knowledge measurement and does not take other school and pre-school objectives into account. Didactic research is also lacking as regards teaching in schools for the intellectually disabled and special schools. There is very little research in the pre-school field regarding prevention and early intervention. Research focusing on upper secondary school is largely lacking, as is research with a child/pupil perspective on how to make school more inclusive for all pupils.

**The Committee for Educational Sciences recommends research initiatives on**

- impact studies of pedagogical interventions in all forms of school
- an interdisciplinary graduate research school focused on early intervention to satisfy all children's needs.

### The teaching profession and leadership

The teaching profession has often been the subject of policy reforms and changes that have affected the profession's conditions. Discussions on the effects of these changes are common in the public debate but the scientific foundation is still relatively insufficient. Important questions today include for example the governance effects on teachers' time use, accompanying stress factors, how teachers plan and organise their work when new tasks are introduced and studies of the moral stress that arises when teachers find themselves facing ethical dilemmas. One topical issue concerns the changed role of the teacher in the new media ecology with its increasing use of social media and digital technology in the teaching. Research on school leadership needs to be developed, as does research on teachers' leadership and impact analyses research on the effects of alternative organisational structures in schools, for example collegial learning and autonomous groups.

Research in this field would benefit from collaboration between several disciplines in order to shed light on the complex relationship between the profession, governance and professional practice. There is also great potential here for international collaborations and comparisons.

#### **The Committee for Educational Sciences recommends research initiatives on**

- collaborative research on the subjects of profession, governance and professional practice.

#### **Social aspects of education – democracy, equal treatment, multilingualism and newly arrived migrants**

Questions concerning multilingualism, learning and newly arrived migrants in the educational system are central scientific areas with long-term consequences for both the individual, the Swedish educational system and the Swedish society. Research in Sweden on multilingualism and learning is strong, but not sufficiently comprehensive in relation to the need for knowledge. More studies are needed for example on how the activities of pre-schools and leisure-time centres and the early school years affect children's learning and multilingualism, how multilingual parents are involved in the school work of newly arrived children, what role different ethnic/linguistic/social groups in the civil society may play in promoting diversity in a democratic school and the influence of independent schools and the freedom of choice. Studies that shed light on these issues at various levels of the education system may therefore already in the short term have great scientific and practical impact.

Equality, equal treatment and citizenship and democracy education are today established fields of research. There is however a great need for more classroom-oriented research focused on social processes, standards, equality and democracy education in the educational system. The same goes for the interplay between the view on democracy in schools and cultural and societal factors outside them. The specific problem concerns how teachers and pupils deal with the growth of anti-democratic tendencies in school and in the Swedish society as a whole. Other growing indications of the need for research on equality and democracy education can be found in the schools' work against bullying and in the occurrence of discrimination/abusive treatment among pupils. Unruly pupils and under-performing groups, primarily of boys, are a challenge, even to research. The way in which the educational system deals with and should deal with inter alia anti-democratic tendencies, racism, sexism and honour-related violence/abuse belongs here.

#### **The Committee for Educational Sciences recommends research initiatives on**

- multilingualism, equality and newly arrived migrants in the education system
- classroom-oriented research targeting social aspects of education.

#### **Digital technologies in education**

New digital technology is part of the school environment today. Understanding the consequences thereof for the knowledge formation and the development of the school and education of the future is a major challenge in educational science research. One strategically important line of research concerns the use of new technology and digital media in teaching and their implications for the individual's learning. Such research is conducted at several higher education establishments today. The increasing globalisation of knowledge puts a focus on digital media, both for the production and distribution of knowledge. New forms of knowledge development and reproduction are being created in society. An increasing part of everyday life in the home and in school is permeated by the new technology, which affects how we become thinking people. Today, children grow up in a digital society with constant access to information and possibilities for communication via digital media. This creates new conditions for learning and education. In order to understand and be able to take advantage of the new prerequisites, research on what the school and education of the future will look like is therefore needed.

Swedish research has in recent years undergone a rapid expansion in this area and there are good prospects for strong international impact. In this respect, it will be important in the future for research to take into account

how digital media and other new technology is used in different parts of the education sector, where for example upper secondary school, schools for the mentally disabled, special schools and leisure activities have been pushed into the background. The development of digital technology is also of central importance for subject-didactic research.

Modern technology comprising for example digital video technology and various forms of visualisation creates new opportunities for documentation of teaching, communication and learning activities, opening the door for new forms of data production for research purposes. New technology, however, brings with it not only solutions to problems, but raises important issues of research ethics and may sometimes lead to both methodological and theoretical difficulties that must be taken into account.

#### **The Committee for Educational Sciences recommends research initiatives on**

- research on the influence of the new technology on children's and young people's learning and knowledge development
- method development for subject didactics and teachers' handling of the new technology in their teaching
- graduate research schools targeting learning and new technology.

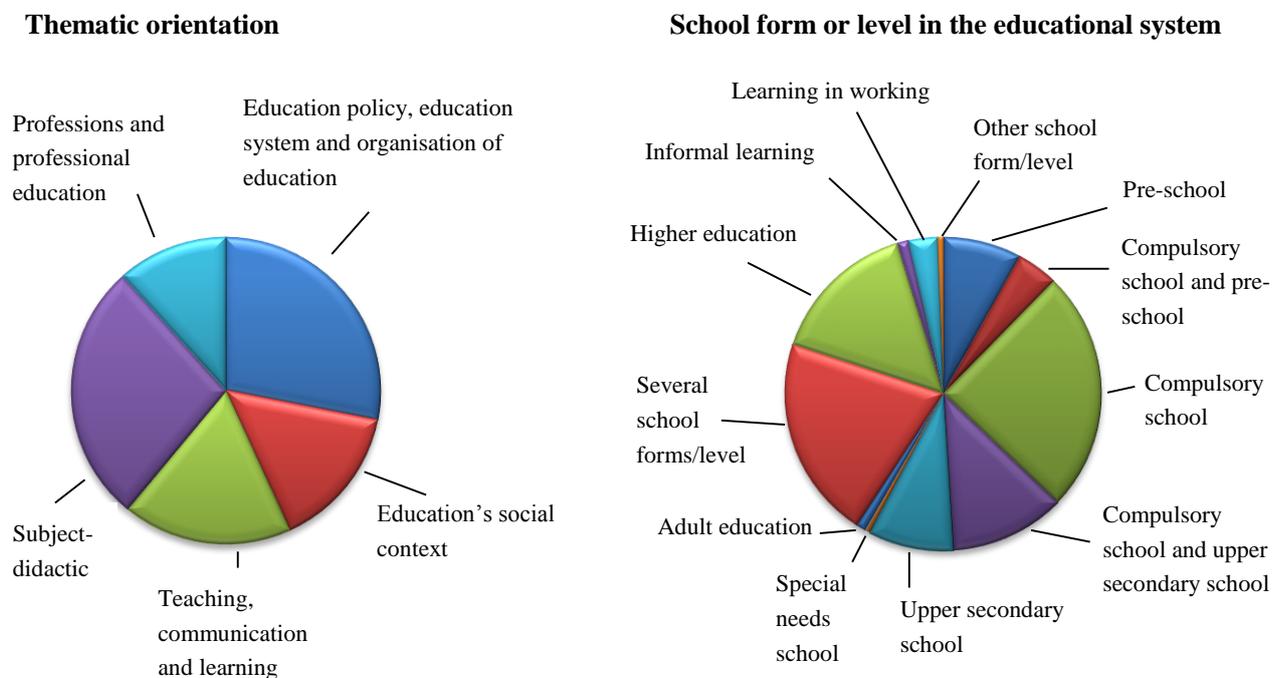
## Structural recommendations

### Scientific foundation in the education system

Perhaps the most important precondition for Swedish educational science research is the political directive that the educational system must have a scientific basis. In other words, Swedish teachers and school-leaders are expected to make decisions based on scientifically proven knowledge and work on the basis of what research has showed to work and to be good for the schools. A school with "a scientific basis" means that the content of school, the subject skills in all school subjects, are in line with the latest research findings. Secondly, it means that the overarching school organisation, management and pedagogical work are to build on research-based knowledge and be characterised by a systematic and scientific approach. The requirement has now been made more stringent with the creation of a new authority, the Swedish Centre for Educational Research, which shall "systematically weigh together and disseminate research findings that can contribute to increased knowledge of scientifically founded and effective methods and approaches in the school sector".

The ambition to ensure that teaching in Swedish schools rests on a scientific base is not new; it can be said to have been established already in the 1950s with the introduction of the 9-year comprehensive school. Research intended to support such a development had the backing of the former Royal Board of Education in Sweden and later the Swedish National Agency for Education. When the Swedish Research Council was formed in 2001, the Committee for Educational Sciences of the Swedish Research Council was also set up to promote development of educational science research. An important principle for the allocation of research funding from the Swedish Research Council is that all forms of research, both basic research and applied or practice-oriented research, shall be subject to the same rigorous scientific quality scrutiny as all other forms of publicly funded research.

**Figur 1. Thematic research orientation and targeted level. Grants awarded by the Swedish Research Council, the Swedish Research Council for Health, Working life and Welfare and the Swedish foundation for Humanities and Social Sciences between 2009 and 2013.**



Projects with thematic orientation towards subject-didactics, teaching, communication and learning, the social aspects of education and teacher training make up 70% of the educational science research funded by the Swedish Research Council.<sup>6</sup> The research projects are explicitly linked to one or more levels in the educational system; 60% of the research projects concern questions directly linked to pre-school, compulsory school and/or upper secondary school, and 16% to higher education, including teacher education. The remaining projects pertain to vocational education, special needs education, informal learning or education more generally.

The newly established Swedish Centre for Educational Research will play an important role in knowledge transfer between research and practice. This knowledge transfer can be organised in different ways and it is the firm belief of the Committee for Educational Sciences that the new authority should carry out its assignment in collaboration with the existing players, who support or conduct practice-oriented educational research. Schools, teacher training programmes and the Swedish Research Council are naturally the authority's major collaboration partners. The government's Budget Bill states that the Swedish Centre for Educational Research shall also "be able to initiate practice-oriented research". In this respect, the Committee for Educational Sciences would like to emphasize the importance of applying strict quality requirements to such research in the same way as for other kinds of research.

<sup>6</sup> Funding granted 2009–2013.

### **The Committee for Educational Sciences recommends**

- increased support for basic educational science research as a basis for practice-centred research
- a clear system for research funding and dissemination of research
- that quality assurance of practice-centred research in the educational sciences be done in the same rigorous manner as in other areas.

### **Building up strong multidisciplinary research environments and graduate research schools**

In large parts of the educational research field, research is conducted within several different disciplines. This is a considerable asset, which provides opportunities to bring together theories, analytical perspectives and methods from the different disciplines. In many cases, however, there is a lack of interaction or cohesive environments, which would allow this strength to be used. In many areas the researcher teams are also small and splintered, which contributes to the fragmentation of the research. Even if several subjects may be included in research projects, an interdisciplinary approach is often lacking. Better conditions are needed for collaborative research and coordination of competences and resources, both nationally and internationally.

A generation shift is taking place today that will lead to changes in the age structure, with a gap between senior and junior researchers. Nor are there sufficient numbers of teachers and researchers with a doctoral degree in many of the disciplines in the educational research field. Recruitment of junior researchers together with better, more distinct career paths and long-term planning is needed. Improved conditions are also needed in order to attract junior researchers to the field and retain senior researchers.

The very limited extent of metrically focused research constitutes an obstacle to further development in several areas. It is also desirable to bring qualitative and quantitative studies closer together, or to conduct more studies using “mixed methods”, since both kinds have explanatory values, even though different. Against the background of the increasing complexity of the quantitative methods, there is reason to believe that the lack of expertise will lead to metrically focused research continuing to be limited, unless special measures are taken to raise the level of expertise. A national graduate research school oriented towards measurement research and an approximation of qualitative and quantitative methods would promote the handling of the complex contexts in educational research. Different fields of research could be included in this post-graduate education.

Graduate research schools are a key to the coordination, the long-term approach to and the build-up of research in this area. This has not least manifested itself in subject-didactic research. Between 2001 and 2010, the Committee for Educational Sciences granted funding to build up 16 graduate research schools in a number of areas. Together with the government initiative on graduate research schools for working professionals (up to a licentiate degree), these graduate schools has had a stimulating effect on the build-up of the research. Within these schools, senior researchers, doctoral students and pre-schools/schools collaborate on didactic research and school development. They give rise to both national networks and to an internationalization. This gives dynamic effects that contribute to the development of a scientific foundation. National graduate research schools, having obtained funding for both educational costs and doctoral students’ salaries in prioritised areas, would benefit the postgraduate education and the research development. Multi- and interdisciplinary approaches are needed, and can be achieved through a concentration on national graduate research schools, which can contribute to promoting regrowth in research. Nordic and international graduate research schools are also an excellent instrument to develop research.

### **The Committee for Educational Sciences recommends research initiatives on**

- national graduate research schools in prioritised areas
- support for interdisciplinary collaboration.

### **Access to data of high quality**

Good access to high-quality data in the form of registers and surveys is an advantage in Swedish research. At the same time, there is a general lack of Swedish studies based on large samples where children are followed

from birth onwards. Such studies would give a holistic picture of children's learning and provide opportunities to study the effects of education on the basis of children's health in their early years, their experiences from pre-school and their early school years, continued studies and contextual circumstances and choice of education and profession. Since such research is being conducted in several countries there is a potential for comparative studies in this area.

One problem with existing registers is also that they do not generate certain internationally common outcome data, for example results of externally marked tests. Nor is there any register data on teaching and in-service training practice, wage determination models etc. and the possibilities for analyses are therefore limited. The lack of data on what actually goes on in Swedish schools is tangible. In spite of this, both teachers and school leaders feel that the documentation demands are considerable and that the surveys conducted by individual municipalities and other school authorities have little practical content. Qualitative data collections should also be able to provide information on how processes in schools work. Designing an infrastructure for the collection of comparable and useful information would be an important step. Collaboration with the Swedish National Agency for Education and the Schools Inspectorate on what information should and can be collected from schools would be valuable.

The Olive Tree project that was proposed in 2006, which was intended to provide a basis for world-leading Swedish longitudinal research, was never realized. The intention was to follow a cohort of children born in a particular year in Sweden from before they were born and throughout their entire lives. The social science and medical research would contribute to knowledge of why life is of such a varying nature for different individuals and create a foundation for a deeper understanding of how everyone can be given the opportunity to develop according to their own prerequisites. The intention was to include the basic material in a Swedish register and supplement it with data from surveys and interviews with children and parents. The follow-up would include later age groups. A major project of this nature, with the addition of school- and knowledge-related components, would favour the development of Sweden's schools from a holistic perspective over time.

**The Committee for Educational Sciences recommends research initiatives on**

- infrastructure for the collection of nationally and internationally comparable and useful data
- a cohort study of Swedish children's living conditions and learning from birth onwards.

## Internationalisation

For Sweden as an education and research country, it is important to continue to build up high quality educational research settings with developed international collaboration. International collaboration can take place on different levels. In well-developed fields of research, international collaboration is an integral part of the research work. Research is then included in the international collaboration on common research questions. Such collaboration is characterized by complementary competencies, regular contacts, joint publications and the gradual involvement of more researchers. New technology provides new opportunities for collaboration with virtual meetings and new ways of collecting and processing data, which are used frequently. In other fields, international collaboration may take place on a low level with individual researchers participating in conferences with the aim of learning about international research. The number of applications for international post-doc grants from the Swedish Research Council submitted by new graduates in the educational sciences is usually low. This may be due to a low degree of internationalisation in the environments, where the doctoral students were active, and thereby inadequate contact networks for the new graduates.

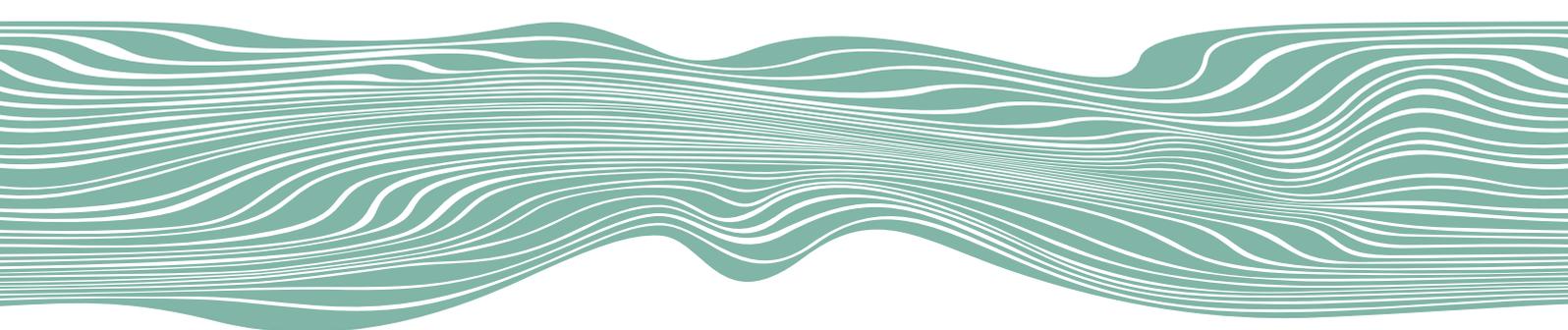
To develop the international collaboration in the field, continued development of the research environments is needed, where senior researchers involve junior researchers in research collaborations and networks from the very beginning of their post-graduate studies. International collaboration is dependent on mobility among researchers and good prerequisites are required for international mobility for both senior and junior researchers.

**The Committee for Educational Sciences recommends a focus on**

- support for the internationalisation of research settings, aimed at both senior and junior researchers.



The Swedish Research Council is a governmental agency under the Ministry of Education and Research. Within the Research Council there are separate decision-making bodies. In 2014 these scientific councils, advisory bodies and committees compiled overviews of trends and challenges in six different research domains and an overview of research infrastructures in particular. The initiatives taken within the scope of “The future of Swedish research” are part of the Swedish Research Council’s measures to support and strengthen researcher-initiated fundamental research, point out strategically important areas and promote an effective research system. These initiatives are taken on a recurring basis in the run-up to the Government’s Research Bills. The full versions of the overviews were published (in Swedish) in 2015. The final report from the project is called: Direction to the Future Swedish Research System: Goals and Recommendations.



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The Swedish Research Council has a leading role in developing Swedish research of the highest scientific quality, thereby contributing to the development of society. Besides research funding, the agency advises the government on research-related issues and participates actively in the discussions to create understanding of the long-term benefits of research.