THE FUTURE OF LEARNING, KNOWLEDGE AND SKILLS (TULOS)

RESEARCH PROGRAMME 2014–2017

Programme memorandum

1 BACKGROUND TO THE PROGRAMME

In line with revisions made to the Academy of Finland's research programme process in 2011, the Board of the Academy has moved to adopt a more strategic approach to searching for new programme themes, relying in this process on its own judgement and Research Councils' joint proposals. At its meeting on 6 June 2011, the Board of the Academy identified the following grand challenges that will be given substantial policy focus and research attention over the next few years: (1) the Northern Climate and Environment, (2) Sustainable Energy, (3) Dialogue of Cultures, (4) A Healthy Everyday Life for All, (5) Knowledge and Know-how in the Media Society, and (6) the Ageing Population and Individual. The research themes under these challenges and the related measures are incorporated in the Academy's strategy implementation document for 2013–2016. At its meeting on 24 May 2011, the forum for research programmes, composed of the Academy's Research Council Chairs, has addressed the issue of how the grand challenges are reflected in the Academy's long-term planning and in the start-up of research programmes.

The conditions and sources of learning, knowledge and skills are in intense flux in all societies that are adopting new communication media. New forms of communication and culture are shaping the way that people live and work at an unprecedented rate. Especially in the world of young people, new opportunities for mediated interaction and networking are strengthening some skills and at once undermining others. As yet we have only limited knowledge about how profoundly all this is impacting people's world views, their knowledge, skills and attitudes, their participation in society and, consequently, the very foundations of society and the economy. Relevant research issues range from brain development and function to the conditions for learning, communication media and contents, changing cultural values, the emergence of social groups, forms of social activity and the possibilities of information technology.

The research programme outlined in this memorandum ties in directly with challenge (5) Knowledge and Know-How in the Media Society, but also with the other grand challenges listed above, particularly the dialogue of cultures, a healthy everyday life, population ageing and supporting agency. Several recent Academy research programmes have covered similar themes; examples include *Life as Learning* 2002–2006 (LEARN), *Ubiquitous Computing and Diversity of Communication* 2009–2012 (MOTIVE) and *Human Mind* 2013–2016 (MIND).

2 AIMS

The *FinnSight 2015* report by the Academy of Finland and Tekes, the Finnish Funding Agency for Technology and Innovation, makes the case that in today's globalised and technology-driven world, life-long learning is increasingly important to all people and to all communities. Knowledge work is continuing to increase and expand, underlining the crucial importance of knowledge and skills. The aim of the *Research Programme on the Future of Learning, Knowledge and Skills* is to gain more in-depth and up-to-date research data about the mechanisms, preconditions, opportunities and threats to knowledge, skills and competencies in the global world. This will contribute to increasing our understanding of the new forms of learning and their distinctive characteristics, to developing more effective education solutions that make use of modern technologies, to shedding light on the role of the media in the individual's life and its different forms, and to unravelling the changes that have happened in social and societal interaction with the development of electronic communications.

The goal of the *Research Programme on the Future of Learning, Knowledge and Skills* is to obtain new and more advanced knowledge and understanding about the various themes covered by the programme. The programme underlines the importance of closer dialogue and exchange between the various disciplines represented by the Academy's Research Councils, and it will be aiming to promote such dialogue among other things by means of methodological integration and national and international networking. It particularly encourages projects based on interdisciplinary or multidisciplinary cooperation between disciplines using different methods and approaches. The programme also encourages the development of research methods and the more integrated use of these methods across different disciplines.

All research projects under the programme are multidisciplinary or interdisciplinary and are relevant to society. They are aligned with 21st century knowledge and skills needs in education and in the workplace as well as with the needs of future societies and the future global world.

3 RESEARCH THEMES

1 Demands arising from changes in society to learning, skills and teaching

Given the accelerating pace of change in society, the economy and the workplace, citizens are under pressure from increasing and ever-changing knowledge and skills demands. New communications networks have opened access to a wider range of information than ever before. Learning and other environments vary and provide a diversity of opportunities to improve and update skills and competencies. For these reasons, relations between stakeholders in the education field are inevitably going to change: the individual learner will not be confined to a single educational institution, but learning and the development of knowledge and skills will be driven by many different kinds of growth environments. Education systems are set to face significant new challenges from changes in society, the economy, communications, education policy and technologies. It is crucial that the life experience and social agency of young new generations is taken into account in designing and developing education systems and learning environments. Younger generations in particular now form their world views and pick up much of their knowledge and skills (including language skills) through the internet and social media. Apart from the cognitive aspects of learning, the emotional and social dimensions of collaborative practices are crucially important to learning and to individual growth. This opens up opportunities and imposes challenges concerning both education systems, pedagogics and social activities. How can the learning of critical media literacy be facilitated? How should differences between sets of values and cultures be dealt with? How do people learn to become producers and agents instead of just consumers in the digital world? How can the education system meet the challenges of society? Key research areas under this theme include:

- The future of education in changing society
- New learning styles, skills and competencies
- Collaborative creation of knowledge, skills and understanding
- Demands arising from socio-cultural changes to learning environments
- New pedagogical solutions and their effectiveness at different levels of the education system
- Relationship between education and the workplace
- Media competence and development as a networker
- New forms of social participation and engagement

- Professional growth and learning paths as life-long processes.

2 Learning analytics and multilevel assessment of learning

New methods and environments provide an excellent opportunity to gather information about learning processes in the context of learning resources and exercises. Learning no longer takes place only at school, but across various informal social communities, interest groups and networks. ICTs and the social media make it possible to trace and model these dispersed and networked learning processes. New learning environments open up new opportunities for the evaluation and self-assessment of skills and competencies as well as opportunities for development and reciprocal feedback in formal and informal learning environments. On the other hand, they also pose a challenge in terms of how best to use the information gathered in an ethically sustainable manner. The associated opportunities and challenges have not yet received sufficient attention in research, and it is important to develop new research methods. It is also necessary to consider how learning and teaching as well as knowledge and skills should be evaluated in future society. Key research areas under this theme include:

- Use of digital and mobile devices in monitoring, recording, analysing and developing teaching and learning processes, in making these processes visible to learners and in producing feedback, both in formal and informal learning environments
- The development of innovative research and evaluation methods in order to trace learning processes in formal and informal environments at the individual, group and network level
- Data security issues, ethical issues and challenges to privacy in knowledge-intensive learning and its evaluation
- Tools for the generation of automatic and personal feedback and for process steering in learning and education
- Methods for the evaluation of skills needed by citizens in knowledge society and other new competency areas.

3 Future learning environments and user-driven contents

Digitalisation, networking and other new technology trends are promoting future learning and learning methods. Modern learner-driven learning environments provide ample opportunities for interactivity and commitment to educational content. They can also support collaborative knowledge construction between various target groups and support thinking and action. Multimedia systems that make use of different senses can support teaching and learning in such a way that learners' needs and mental and physiological states are taken into account. The adoption of phenomena may be enhanced by new technological and content-related tools and forms of embodied learning. The research theme offers the possibility to integrate different educational contents and disciplines. Research can help to establish how complex subjects can be learned effectively and in an interesting way in different subject areas and learning contexts. Key research areas under this theme include:

- Sharing, creating, and using knowledge with others, informal learning, user-generated content, open learning resources, social and emotional viewpoints
- The role of new technological solutions in aiding and illustrating learning, teaching and evaluation: virtuality, augmented reality, video and simulation environments, and digital and 3D manufacturing technologies

- Diversity in learning spaces and interaction technologies: learning in physical, virtual, social and mobile learning spaces, gamification, and multisensory perception, e.g. by means of speech recognition, gestures, machine vision, tactile feedback, sound and images
- Development of exploratory learning, e.g. to verify and monitor phenomena occurring in the nature and environment.

4 Learning environments in developing societies

The Finnish education system is already well placed to offer solutions to the teaching and learning environments in developing countries. However, this is based primarily on resources that are generally available in developing countries, including teaching and study materials, equipment and expertise. In low-education societies there is a need to develop inexpensive teaching methods that can reach large numbers of students. Research is also needed into the socio-cultural challenges faced in education exports, such as the relationship between learning environments and local cultures. Key research areas under this theme include:

- The challenges and opportunities presented by socio-cultural contexts to learning and learning environments.
- Inexpensive, energy-efficient or energy-free teaching and note-taking materials
- Overcoming fundamental weaknesses in the prerequisites for learning (e.g. literacy)
- *e-learning* methods that are compatible across cultures
- Modifiable learning materials for different needs and cultural contexts.

5 Improving individual conditions for learning at different ages

Learning continues throughout life, but its distinctive features vary depending on age, the individual's characteristics and the learning situation. To take full advantage of the potential of brain plasticity in learning, all these factors must be taken into account. A particular challenge in this regard is the high rate of population ageing. How to support the adaptation of the oldest age groups to the high-speed information society and life-long learning? Problems in learning and competence can have adverse effects on the individual's life. The person often regresses in learning and suffers from poor self-esteem, and the development of independence and social agency may become affected. Identifying these shortfalls and their early prevention may mitigate the development of these problems. It is also important that comprehensive rehabilitation services are available for people with diagnosed learning difficulties. Learning difficulties can also have cultural and social reasons, which can be traced to the structures of education systems, and tackled by pedagogical means and by changing and developing models of interaction. Key research areas under this theme include:

- How does the brain process information overload at different ages (mechanisms and their utilisation, modelling, special challenges related to ageing)
- Role of emotional and social interaction in learning at different ages (mechanisms and their utilisation in identifying and preventing learning difficulties)
- Lifestyles, the brain and learning at different ages (e.g. physical exercise, sleep; mechanisms and their utilisation)
- Early identification of learning difficulties using different methods (including genetics, identification of brain markers, behavioural changes)

- Role of early learning environments in the prevention of learning difficulties (mechanisms and their utilisation, special needs groups)
- Taking advantage of central nervous system plasticity in enhancement of learning at different ages
- Development and use of technology-based intervention programmes for learning difficulties at different ages.

The five research themes outlined above are not mutually exclusive. Projects may cover areas from more than one theme or parts of them.

4 IMPACT OF RESEARCH PROGRAMME

The Future of Learning, Knowledge and Skills is a genuinely multidisciplinary research programme and therefore its scientific impact extends from cultural and social research to health and engineering research. The programme integrates behavioural research interests associated with learning and education (particularly pedagogics and psychology) and the development of teaching technologies and the search for software solutions. It also opens up wider opportunities to integrate contents from different subject areas. Furthermore, the programme addresses neuroscience research into learning and more generally research concerned with the well-being of children and young people. The programme also offers the opportunity to create new and inexpensive teaching and learning tools as well as technologies needed in developing countries.

The *FinnSight 2015* report observes that "The markets for skills and competencies are global. Expertise can be exported anywhere in the world, wherever it is in demand. On the other hand, experts can be recruited from any corner of the world." Finland is a world leader in the area of learning and education. Finnish learning and education solutions are in high demand around the world, and therefore the programme is well placed to produce not only new theoretical knowledge, but also significant systematic and technological export products.

In order to maintain our education system at a high level, it is necessary to constantly work at improving and developing it on a sound research basis. There are thus good grounds to argue that the *Research Programme on the Future of Learning, Knowledge and Skills* has great significance and current importance not only from a scientific, but also from a socio-economic point of view.

5 IMPLEMENTATION

The research programme aims at strengthening interdisciplinary research in the field represented by the programme. Its themes cut across several of the domains of the Academy's Research Councils. Besides the Academy Board, the Research Council for Culture and Society, the Research Council for Natural Sciences and Engineering and the Research Council for Health have all contributed to the preparation of the programme.

5.1 FUNDING

The Research Programme on the Future of Learning, Knowledge and Skills is primarily funded and coordinated by the Academy of Finland. The programme is scheduled to run for four years, with

funding provided from 2014 to 2017. Through the programme, funding is provided to multidisciplinary research conducted by research projects and consortia with a view to supporting national cooperation and networking. A research consortium is a collaboration of independent fixed-term projects working under a joint research plan by combining different methods and research fields with a view to achieving greater added value than is achieved by normal project collaboration. The first call announced under the programme will aim to reach 10–15 projects for funding, with a funding authority of EUR 10 million in 2013. The other funding agency within the programme is the Finnish Work Environment Fund, which will decide its funding contribution at a later stage. The Fund will fund projects whose focus and thematic areas fit in with its objectives. When making funding decisions, both funding agencies will use their own procedures and criteria. The projects to be funded will report on their research in line with the guidelines of the relevant funding agency.

The Finnish Work Environment Fund will fund research that improves working conditions and promotes safety, well-being and productivity at work. The scope of the Fund also covers work-related circumstances and innovations for solving problems and challenges related to work and well-being.

At the letter of intent stage, applicants fill in only the Academy of Finland online form with appendices. At the full application stage, applicants who apply for funding from the Finnish Work Environment Fund shall submit a separate application both to the Fund and to the Academy. When preparing their full applications, these applicants are advised to contact the Fund. The applications will be first reviewed by the Academy. The Finnish Work Environment Fund will make its own funding decisions on applications that have succeeded in the Academy's review and that have also been submitted to the Fund. Projects funded by the Fund will participate in the research programme in the same way as Academy-funded projects.

More information is available from Managing Director Kenneth Johansson (Finnish Work Environment Fund), tel. +358 9 6803 3310 and +358 43 824 1431, kenneth.johansson(at)tsr.fi, www.tsr.fi/en.

5.2 NATIONAL COOPERATION

The *Research Programme on the Future of Learning, Knowledge and Skills* is directly associated with the grand challenge Knowledge and Know-how in the Media Society, defined by the Academy Board as one of the areas that will be given priority focus in research. The programme also supports other grand challenges defined by the Board (Dialogue of Cultures, A Healthy Everyday Life for All, The Ageing Population and Individuals). The programme will also actively collaborate with other ongoing Academy research programmes, such as The Human Mind (MIND) and the Health and Welfare of Children and Young People (SKIDI-KIDS). Tekes' *Learning Solutions Programme* (2011–2015) and the *Future of Learning, Knowledge and Skills* programme will support and complement each other. Among the Strategic Centres for Science, Technology and Innovation, at least the strategic centre for health and well-being (SalWe Ltd) and the strategic centre for ICT and services (TIVIT Ltd) may have a role in research into learning, knowledge and skills. Potential for cooperation may also emerge with other strategic centres. Negotiations on funding cooperation are being considered with various Finnish foundations, for instance. In the programme preparations, Finpro's education export cluster *Future Learning Finland* (launched in January 2011) has also been taken into consideration.

5.3 INTERNATIONAL COOPERATION

Supporting research in education and learning currently plays a key role in the Academy of Finland's international funding cooperation. An excellent example is provided by the projects jointly funded by the US National Science Foundation (NSF), the Academy of Finland and Tekes, and the related *Science Across Virtual Institutes (SAVI) on Innovations in Learning and Education*, launched in early 2013. Some twenty Finnish and US research teams are involved in this cooperation and the activities of the virtual institute. This Finnish-US project collaboration will be used as a joint international forum for the *Future of Learning, Knowledge and Skills* programme and Tekes' *Learning Solutions Programme*. In the international activities of the *Future of Learning, Knowledge and Skills* programme, the multidisciplinary research programme *Education for Tomorrow*, launched by NordForsk for 2012–2016, will also be considered.

The research programme aims to selectively establish cooperation with research funding agencies in other countries that are committed to supporting leading-edge scientific research and that are recognised and attractive partners for Finnish research. In 2009, the Academy contributed to the funding of four three-year Finnish-Chilean joint projects in the field of learning and education together with the National Commission for Scientific and Technological Research in Chile (CONICYT). This cooperation will be taken into account in the planning of the international activities of the *Research Programme on the Future of Learning, Knowledge and Skills*.

5.4 TIMETABLE

Within the programme, funding will be provided to individual projects and consortium projects for a maximum of four years in 2014–2017. The funding period will start on 1 January 2014 and end on 31 December 2017. A detailed timetable for the call and the review of applications is described in Chapter 6. A kick-off seminar will be arranged in early spring 2014. The Academy will separately inform on the funding partners, thematic areas, timetables and application processes of any additional calls to be launched.

The evaluation of the programme will be carried out in 2018. For more information, see Chapter 5.7.

5.5 STEERING GROUP

The research programme is run by a steering group composed of members of the Academy's Research Councils and other expert members. Additional experts may also be invited to the group. The duties of the steering group are:

- to prepare the programme and submit the programme subcommittee a proposal on projects to be funded
- to make a proposal to Academy Research Councils and other funding bodies on any new calls and/or additional funding
- to manage and monitor the programme
- to steer and support programme coordination
- to be responsible for the final evaluation of the programme
- to promote the application of research results produced within the programme.

5.6 COORDINATION

The research programme strives to support and promote the development of the selected projects into a coherent and cohesive structure through cooperation and exchange of information. Programme coordination is the responsibility of the steering group and the programme managers and project officer appointed by the Academy. They are responsible for ensuring this development, and work closely with the projects to facilitate the attainment of the objectives set for the programme. The aim is to ensure that the projects reinforce each other and that the programme generates new multidisciplinary research knowledge. Consequently, the principal investigators of the projects selected to take part in the programme will be required to commit themselves to the programme objectives and to cooperate actively throughout the programme and during the programme evaluation upon its completion.

The principal investigators of the projects shall:

- assume responsibility for and report on the scientific progress of the project and on the use of the funds in accordance with the instructions of the programme manager and relevant funding bodies

- see to that the whole research team attends all meetings, seminars and workshops organised by the programme coordination, and facilitate cooperation and exchange of information between the research teams within the programme

- take part in producing reviews, syntheses and information material around the research programme, and actively disseminate information about the programme's progress and results on public and scientific forums.

During the course of the programme, the research projects will participate in events arranged together with end-users of research results and in any other activities designed to provide information to different stakeholders.

5.7 EVALUATION

The implementation and results of the research programme will be evaluated upon its completion. The implementation of the evaluation will be planned in detail as the programme progresses, but the evaluation will consider issues, such as

- attainment of the programme aims
- programme implementation (coordination, role of the steering group, programme participation)
- evidence of impacts pursued by the programme
- national and international cooperation
- publicity and visibility of research conducted within the programme.

The evaluation may be carried out as part of a more extensive evaluation of several Academy research programmes or other national programmes and in cooperation with other national and international actors.

The research teams receiving funding are required to report on the progress of their projects on an annual basis in accordance with the decision of the steering group and to submit a research report to the Academy of Finland upon project completion. The reports shall include information on, for

example, scientific publications produced and theses and doctoral dissertations completed within the programme.

6 APPLICATION GUIDELINES AND REVIEW CRITERIA

The *Research Programme on the Future of Learning, Knowledge and Skills* has a two-stage call. At the first stage, applicants submit letters of intent including short plans of intent (see guidelines in the Academy's April 2013 call for applications). **The deadline for letters of intent is 24 April 2013 at 16.15. The deadline is non-negotiable.** The steering group will make a proposal to the programme subcommittee appointed by the Academy Board on projects that, on the basis of the letters of intent, would best fit in with the programme aims. The projects selected to proceed to the second stage (to submit full applications) will be notified of the steering group's decision in June 2013.

Applicants requested to submit full applications shall prepare a complete research plan and submit it in the Academy's online services (and possibly to the Finnish Work Environment Fund) no later than 2 September 2013 at 16.15 (see guidelines in the Academy's April 2013 call for applications).The deadline is non-negotiable. On the basis of the scientific review of the applications and considering the programme aims, the steering group will prepare a proposal to the programme subcommittee on the projects to be funded. The programme subcommittee will make the funding decisions in December 2013 at the latest. Any additional calls will be carried out according to a timetable separately agreed on.

The letters of intent will be reviewed by an expert panel composed of members of the steering group and possible other experts. The full applications will be reviewed by an international expert panel. The applications are reviewed in line with the Academy's general review criteria for research programmes (see www.aka.fi/eng > Funding & Guidance > Review of applications). Besides these general review criteria, focus will also be placed on interdisciplinary and multidisciplinary approaches, as described in Chapter 2. This aspect will be considered under section "Relevance of the project to the research programme" on the review form.

7 MORE INFORMATION

This memorandum is available on the Academy's website at www.aka.fi/TULOS > English.

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