



北京师范大学心理学部



Sino-Finnish  
Joint Learning Innovation Institute  
中芬联合学习创新研究院



未来教育高精尖创新中心  
Advanced Innovation Center for Future Education  
AICFE

# The 5<sup>th</sup> Virtual Conference of Sino-Finnish Joint Learning Innovation Institute

## AI in Learning

# AI

### Organizers:

Sino-Finnish Joint Learning Innovation Institute  
Faculty of Psychology of Beijing Normal University (BNU)  
Advanced Innovation Center for Future Education of BNU

NOV 24-25, 2020



## Organizer

### Sino-Finnish Joint Learning Innovation Institute

Beijing Normal University has established long term relationship with Finnish universities in collaboration of academic research, teacher training, education science and learning science. Based on the Memorandum of Cooperation between The Ministry of Education of the People's Republic of China and The Ministry of Education and Culture of The Republic of Finland on Strengthening Comprehensive Cooperation on Education signed in 2015, Beijing Normal University and the University of Helsinki as the national coordinating universities, enter into the agreement to establish the Sino-Finnish Joint Learning Innovation Institute (JoLii) and implement the concept of "Sino-Finnish Learning Garden". The Memorandum of Understanding Concerning the establishment of the Sino-Finnish Joint Learning Innovation Institute was signed on 16 November, 2015.



JoLii aims to co-create inclusive, student-oriented learning solutions for better fostering 21st century skills among students in China and Finland. The joint institute Jolii will involve the networks of the Chinese and Finnish universities & enterprises. JoLii has established six centers: Learning Research Innovation Center, Learning Garden Experience Center, Teacher Development Center, Education ICT Center, Dual Degree Center, Education Research Center. The committee of the JoLii covers the network of universities and enterprises in China and Finland. Finnish committee members include the University of Helsinki, the University of Alto, the University of Tampere, the University of Jyväskylä, the University of Oulu, the University of Eastern Finland, the University of Turku, the University of Lapland, the University Consortium of Pori, Åbo Akademi University and Educluster Finland Ltd. Chinese committee members include Beijing Normal University, Peking University, East China Normal University, Southwest University, Shaanxi Normal University, Northeast Normal University, Central China Normal University, the Chinese Society of Education, Netdragon Websoft Inc. and EduChina Group.



## Organizer

### Faculty of Psychology, Beijing Normal University

Beijing Normal University is a research-oriented comprehensive university focusing on teacher education, education science and basic learning. The Faculty of Psychology has been renowned for scientific research and aims to construct a world-leading psychology and the multidisciplinary science discipline with a pervasive commitment to serve the nation.

The Faculty is eminent in delivering an extraordinary education, carrying out leading researches and making significant contributions to the society.

The Faculty has the state-of-art teaching and research platforms, including the State Key Laboratory of Cognitive Neuroscience and Learning, the National Base of Basic Scientific Research and Teaching Talents Training Base of Science, National Key Developmental Psychology Research Base of the Ministry of Education, the Beijing Key Laboratory



of Applied and Experimental Psychology and the Beijing Demonstrative Experimental Teaching Center of Psychology. The Faculty has been granted doctoral degree in the first-level discipline of psychology and the post-doctoral station of psychology. In the discipline ranking of the Ministry of Education, Psychology ranked first in the country; “Psychiatry and Psychology” and “Neuroscience and Behavior Science” entered the top 1% of the ESI worldwide.

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»»» **Advanced Innovation Center  
for Future Education of Beijing  
Normal University**



## Organizer

### Advanced Innovation Center for Future Education of Beijing Normal University

Advanced Innovation Center for Future Education of Beijing Normal University (AICFE, BNU) was established as one among the first advanced innovation centers funded by Beijing Municipal Commission of Education in 2015. AICFE strives to promote public education service—shifting from digital to intelligent. Based on Internet and Artificial Intelligence to deepen comprehensive education reform and create new model of education in public service. Facing future education development needs of teachers and students in basic education in Beijing, we conduct interdisciplinary cutting-edge research in the field of Artificial Intelligence in Education, and develop a smart educational public service platform to collect data during the entire learning process, to construct model for knowledge and capability, to diagnose and solve learning problems, and to identify and enhance disciplinary advantages.



## Conference Agenda

**Nov 24**

Beijing Time: 15:00-20:00 Helsinki Time: 9:00-14:00

Host	Session	Beijing Time	Helsinki Time	Topic	Speaker
Beijing Normal University WANG Jun	Opening Ceremony	15:00-15:10	9:00-9:10	Opening Speech	BNU Vice President ZHOU Zuoyu
		15:10-15:20	9:10-9:20	Opening Speech	UH Vice Rector Hanna Snellman
		15:20-15:25	9:20-9:25	Opening Speech	Beijing Normal University QIAO Zhihong
		15:25-15:30	9:25-9:30	JoLII Signing Ceremony	ZHOU Zuoyu Hanna Snellman
Beijing Normal University LIU Baocun	Keynote Speech	15:30-16:00	9:30-10:00	Computational thinking as a core competency for education on AI	Tsinghua University LIU Jia
		16:00-16:30	10:00-10:30	AI in education and learning—equity and ethics as big challenges	University of Helsinki Hannele Niemi
		16:30-17:00	10:30-11:00	The collaboration patterns and levels of teacher + Artificial intelligence	Beijing Normal University YU Shengquan

The 5<sup>th</sup> Virtual Conference of  
Sino-Finnish Joint Learning Innovation Institute

# AI in Learning



## Nov 24

Beijing Time: 15:00-20:00 Helsinki Time: 9:00-14:00

Host	Session	Beijing Time	Helsinki Time	Topic	Speaker
Beijing Normal University	Keynote Speech	17:00-17:20	11:00-11:20	Question and Discussion	
LIU Baocun		17:20-18:00	11:20-12:00	Coffee break	
University of Turku Inkeri Ruokonen	Keynote Speech	18:00-18:30	12:00-12:30	How influences of AI to education sector is taken into account in national level teacher education strategy?	University of Helsinki Jari Lavonen
		18:30-19:00	12:30-13:00	Learning and practicing 21st century skills: a comparative study on student teachers between Finland and China	Beijing Normal University TENG Jun
		19:00-19:30	13:00-13:30	Joy of science for all through virtual LUMA science education	University of Helsinki Maija Aksela
		19:30-20:00	13:30-14:00	Question and Discussion	





## Nov 25

Beijing Time: 15:00-19:00 Helsinki Time: 9:00-13:00

Host	Session	Beijing Time	Helsinki Time	Topic	Speaker
University of Helsinki Päivi Koussa	Invited Talk	15:00-15:15	9:00-9:15	The use of new technology in creating music with children – two cases of Chrome Music lab -experiment	University of Turku Inkeri Ruokonen
		15:15-15:30	9:15-9:30	Analysis of classroom teaching based on Artificial Intelligence	Capital Normal University SUN Zhong
		15:30-15:45	9:30-9:45	Teaching and Learning 21st Century Competencies	University of Helsinki Shuanghong Jenny NIU
Beijing Normal University LIU Wei	Invited Talk	15:45-16:00	9:45-10:00	Application of Machine Learning Methods in Intelligent Tutoring Systems: Predicting Academic Performance from Online Learning Behaviors	Central China Normal University TANG Yun



## Nov 25

Beijing Time: 15:00-19:00 Helsinki Time: 9:00-13:00

Host	Session	Beijing Time	Helsinki Time	Topic	Speaker
Beijing Normal University LIU Wei	Invited Talk	16:00-16:15	10:00-10:15	Effect of game elements in intelligent game-based learning environments: A systematic literature review	University of Lapland SUN Liping
		16:15-16:30	10:15-10:30	How do learners evaluate AI supported foreign language learning software ?-- Take LAIX as an example	Central China Normal University XIE Han
University of Helsinki Shuang hong Jenny NIU	Invited Talk	16:30-16:45	10:30-10:45	Towards Emotion AI and Applications in Education	University of Oulu ZHAO Guoying
		16:45-17:00	10:45-11:00	Ethical dilemmas in AI based learning environments from the perspective of educational technology companies	University of Helsinki Päivi Koussa



**Nov 25**

Beijing Time: 15:00-19:00 Helsinki Time: 9:00-13:00

Host	Session	Beijing Time	Helsinki Time	Topic	Speaker
University of Helsinki  Shuang hong Jenny NIU	Invited Talk	17:00-17:15	11:00-11:15	Coaching Pedagogy for Synchronous Collaborative Online Learning: Experiences and Desires of Learners	University of Lapland  Päivi Timonen
		17:15-17:30	11:15-11:30	Efficacy of a Single Session Growth Mindset Intervention on Junior High School Students' Academic Achievement	Beijing Normal University  LIN Danhua
Beijing Normal University  LU Yu  University of Lapland  Heli Ruokamo	Dialogue between China and Finland	17:30-18:30	11:30-12:30	Empowering the Education in Finland and China with AI Technologies	<b>Finnish Representatives</b> 1. Hannele Niemi 2. Jari Lavonen 3. Maija Aksela <b>Chinese Representatives</b> 1. CHEN Annie 2. LIU Baocun 3. LIU Dejian 4. LIU Jia 5. LIU Ming 6. LIU Zitao 7. YU Shengquan
	Closing Ceremony	18:30-19:00	12:30-13:00	Closing Speech	Hannele Niemi LIU Jia

The 5<sup>th</sup> Virtual Conference of  
Sino-Finnish Joint Learning Innovation Institute

**AI in Learning**



## Biography

## Opening Ceremony



Speaker:

**ZHOU Zuoyu**

Beijing Normal University

Professor ZHOU is Vice President of Beijing Normal University where he is responsible for international communication, Hong Kong, Macao and Taiwan affairs, international Chinese learning and continuing education. Dr. Zhou specializes in higher education administration, higher education assessment and the research on leadership. He is active in educational research, especially international cooperation studies. His research covers foundations of education, higher education administration and leadership issues. He has published more than 60 papers and 5 books, including translated. He attaches great importance to lifelong education and university social responsibility as well, and takes a positively involvement in worldwide education activities.



## Opening Ceremony



Speaker:

**Hanna Snellman**

University of Helsinki

Hanna Snellman, DPhil, is Professor of Ethnology at the University of Helsinki since 2012. As a Vice-Rector, her responsibilities include international affairs, partnerships, public engagement, alumni cooperation and fundraising, particularly on the international stage, as well as the Finnish cultural heritage. Before being appointed Vice-Rector, she served as the dean of the Faculty of Arts at the University of Helsinki in 2017-2018 and as a vice-dean of the same faculty in 2014-2016.



## Opening Ceremony

Speaker:

**QIAO Zhihong**

Beijing Normal University

Professor QIAO Zhihong, Party Secretary of Faculty of Psychology of Beijing Normal University, Head of Clinical and Counseling Psychology Program, Director of Mental Health Service Center. His research field is mental health education, career development and counseling for college students. He is member of the Chinese Society of Education, member of the Expert Committee of the National Social Mental Health Service System, Deputy Director of Expert Committee of the Beijing Municipal Committee of Mental Health, and specially appointed expert of the Higher Education Career Center of Ministry of Education. He supervised more than 10 projects of Ministry of Education, including Philosophy and Social Sciences, National Social Science Foundation, and Beijing Municipal Education Commission, he published more than 30 articles in journals, including «Globalization and Health», «Acta Psychologica Sinica», «Psychological Development and Education», and «China Youth Study» .



## Opening Ceremony



Host:

**WANG Jun**

Beijing Normal University

Dr. WANG Jun is vice dean of the Faculty of Psychology, and deputy director of IDG/McGovern Institute for Brain Research at the National Key Laboratory of Cognitive Neuroscience and Learning, Beijing Normal University. She received her BS from Dalian Medical College, MS from the University of Science and Technology, and PhD degree in Bioengineering from the University of Illinois at Chicago. Her research mainly focuses on motor and cognitive rehabilitation after brain disorders, especially the structural and functional networks of the human brain using multi-modal imaging techniques in stroke, AD, MCI patients and aging people. She is currently involved in several national and international projects.



## Keynote Speech



Host:

**LIU Baocun**

Beijing Normal University

Dr. LIU Baocun is Professor of Comparative Education and the Director of the Institute of International and Comparative Education (IICE) at Beijing Normal University (BNU). He also serves as the President of Comparative Education Society of Asia, President of China Comparative Education Society. He has been involved in a wide range of national and international research and consultancy projects, and published more than 200 journal papers and 20 books.





## Keynote Speech



Speaker:

**LIU Jia**

Tsinghua University

Dr. LIU Jia is Chair Professor of Basic Sciences at Tsinghua University, Beijing, China. He obtained Bachelor and Master Degrees of Science majoring in Psychology at Beijing University, followed by a doctorate in Cognitive Neuroscience at MIT under the supervision of Prof. Nancy Kanwisher. His current interest is to combine cognitive science, neuroscience and computational science to understand the nature of intelligence and to develop human-like artificial intelligence.

**Title:** The Neural Correlates of Computational Thinking: Collaboration of Distinct Cognitive Components revealed by fMRI

**Abstract:** Recent technical advance attracts great attention to the promotion of programming skills in particular and computational thinking in general as a new intellectual competency. However, the



understanding of its cognitive substrates is limited. The present study used fMRI to examine the neural correlates of programming to understand the cognitive substrates of computational thinking. Specifically, MR signals were collected while the participants were mentally solving programming problems, and we found that programming recruited distributed cortical regions including the posterior parietal cortex, the medial frontal cortex and the left lateral frontal cortex. These regions showed extensive univariate and multivariate resemblance with arithmetic, reasoning and spatial cognition tasks. Based on the resemblance, clustering analyses revealed that cortical regions involved in programming can be divided into four components, suggesting that computational thinking consists of multiple cognitive processes. Further, we observed increased connectivity within the programming network constructed by these regions, and decreased functional connectivity between the programming network and cortical regions outside the network. In sum, our study suggests that computational thinking indexed by programming is not a simple sum of parallel cognitive processes, but relying on a composite cognitive process integrating a set of intellectual abilities, particularly those in the STEM domains.



## Keynote Speech



Speaker:

**Hannele Niemi**

University of Helsinki

Professor Hannele Niemi, Research Director in educational sciences (2016-), former Vice-Rector (2003-2009), and professor of education (1998-2016) at the University of Helsinki. She is a UNESCO Chair on Educational Ecosystems for Equity and Quality of Learning (2018-2021). Her main research interests are teachers' professional development, quality of education, moral education, and technology-based learning environments. She has been an author of over 390 publications. She has published several books on education in Finland and Finnish teacher education (Finnish Innovations and Technologies in Schools: Towards New Ecosystems of Learning, 2014; The Miracle of Education: The Principles and Practices of Teaching and Learning in Finnish



Schools, 2012, revised 2016; Research-Based Teacher Education in Finland, 2006; and Education as a Societal Contributor, 2007). She leads Finnish national research consortium Artificial Intelligence in Learning (2020-2021) that has active cooperation with Beijing Normal University, China and Stanford University, U.S.A. She has served as an invited expert to education in tens of countries.

**Title:** AI in education and learning - equity and ethics as big challenges

**Abstract:** In education, AI provides new opportunities to many existing challenges, such as access to education and opens new routes to life-long learning. However, serious issues are related to ethical questions, such as transparency including explainability and understandability, justice and fairness including equity and (non)bias, non-maleficence including security, safety and prevention, responsibility and privacy. Ownerships of data is also an urgent topic. In education many ethical challenges are extremely serious because in educational systems, billions young children do not



have capacity to assess transparency, privacy issues or security of systems. Even many adult end-users of educational services are in the same situation. Ethical issues are often also coming from biased algorithms, and they can cause dramatic consequences on people's life and future. The quality and relevance of data revert to data sources and algorithms. The biased assessments can also distort e.g. skill certifications if the data has not been relevant. Ethical issues set new demands to AI users including teachers and school leaders. Big questions are how AI promotes equity, and how quality of data and data management are ensured, and how decision makers can trust AI based knowledge.



## Keynote Speech



Speaker:

**YU Shengquan**

Beijing Normal University

Professor YU Shengquan, Director of Advanced Innovation Center for Future Education at Beijing Normal University, Director of the Joint Laboratory for Mobile Learning, Ministry of Education-China Mobile Communications Corporation. He was selected into the New Century Talent Support Program of the Ministry of Education and the National Talent Project of Millions of Talents, and was awarded the honorary title of "Young and Middle-aged Experts with Outstanding Contributions" by the Ministry of Human Resources and Social Security.

**Title:** The collaboration patterns and levels of teacher + Artificial intelligence

**Abstract:** Rapid increasing, huge volume and complex structure are features of information



under Internet environment which make it difficult for human teachers to master the changes of information. To adapt to these changes, it is necessary to involve in intelligent devices as outsourcing to help teachers. "AI+Teacher" as a cognitive outsourcing form will become normality. "AI+Teacher" realizes the connection of human teacher's internal cognition network and the outer cognition network supported by the intelligent devices. The connection contains four forms according to the level of intelligence: calculation, perception, cognition and socialization. With these forms of outsourcing connections, this paper proposes a framework for human-machine collaboration including: AI agent, AI assistant, AI teacher and AI collaborator. Based on this framework, the author makes a forecasting of the future collaboration of AI and Teachers and expects to provide reference for future studies.



## Keynote Speech



Host:

**Inkeri Ruokonen**

University of Turku

Professor of Early Childhood Education, Inkeri Ruokonen is working as a vice dean in Faculty of Education, University of Turku. She is a Doctor of Education (University of Helsinki, 2005), music teacher (Sibelius Academy 1987,) and a licentiate of music education (Sibelius Academy, 1998), she has a title of Docent in music education (University of Helsinki, 2010). She belongs as a vice director to the management team of National Network for development of assessment literacy (KAARO). In University of Turku she is developing the co-operation between Rauma Early Childhood and Teacher Education Centre (ECTEC) and early childhood teacher education. Inkeri Ruokonen has worked as a Director of Master Program in Educational Sciences





(2016-2019) in University of Helsinki, where she has worked as a teacher educator from 1995. She is a member of Helsinki University Teachers Academy. Her main research interests are early childhood education, music education, teacher education, arts pedagogy, learning environments, early giftedness, intercultural arts education and creative thinking. She has published over 180 scientific articles and edited several scientific journals and books.



Speaker:

**Jari Lavonen**  
University of Helsinki

Dr. Jari Lavonen is Professor of Science Education at the University of Helsinki, Finland. He is currently Director of the National Teacher Education Forum and Chair of the Finnish Matriculation Examination Board. He has been researching science and technology education for the last 31 years.



**Title:** How influences of AI to education sector is taken into account in national level teacher education strategy?

**Abstract:** International organisations, such as OECD and Unesco, and policy-makers in different countries are asking what kind of competences teachers need in a world where digital tools, especially AI, are used in various situations, instead of people. It is assumed that several current occupations, tasks and roles disappear, they change and, moreover, new tasks and roles appear, we do not yet know them. These changes in professions mean that teachers should be able continuously assess what and how they are teaching. In the presentation a collaborative planning process of a national teacher education strategy (development programme) and the strategy are introduced. Three strategic competence goals for teachers' pre- and in-service education and continuous life-long professional learning were set: a broad and solid knowledge base; competences for generating novel ideas and educational innovations; and competences for developing teachers' own expertise as well as and their schools.



## Keynote Speech



Speaker:

**TENG Jun**

Beijing Normal University

Professor TENG Jun, Vice Director of the Institute of International and Comparative Education, Beijing Normal University; Member of the Financial Committee of the World Council of Comparative Education Societies; Assistant Secretary General of Comparative Education Society for Asia; Secretary General of Chinese Comparative Education Society; Adjunct Associate Professor, Teachers College, Columbia University Short-term consultant to the World Bank, Global Partnership for Education; TENG has long been engaged in comparative education research. Her research topics cover international organization education policy, 21<sup>st</sup> century skills, global competence, global education governance, international education and development education. She maintains close exchanges and cooperation



with UNESCO, the World Bank, the United States, Finland and other countries. She led and participated in more than 20 national and provincial projects, and published more than 80 papers in "Education Research" , "International and Comparative Education Review" and other peer reviewed journal, as well as in newspapers such as "China Education Daily", "Guangming Daily" and etc.

**Topic:** Learning and practicing 21st century skills: a comparative study on student teachers between Finland and China

**Abstract:**

21<sup>st</sup> century skills is a worldwide keyword for education reform, especially with the rapid progress of new technology in current society. While the development of students' 21st century skills highly depends on the teachers. It is almost impossible to prepare students' 21<sup>st</sup> century skills when the teachers are not well trained. Finland is famous for the high-quality teacher education worldwide (Niemi, Toom, & Kallioniemi, 2016). In 2009, the excellent performance of Chinese students from Shanghai in



PISA also draws attention worldwide (Kong & Zhang, 2012). One of the secrets of Shanghai success also relies on teachers. With the rise of international communication between China and Finland since 2013, researchers from both countries cooperate to explore how to better prepare teachers with 21<sup>st</sup> century skills. This research is part of a Sino-Finish joint-project on teachers' 21<sup>st</sup> century skills, and it mainly focuses on pre-service teacher education, and try to investigate the following questions: 1) Are there differences between Chinese and Finland student teachers' 21<sup>st</sup> century skills? 2) Whether Chinese and Finland student teachers' 21<sup>st</sup> century skills differed in gender, grade, and teaching practice experience? 3) Whether teaching practice can predict student teachers' 21<sup>st</sup> century skill learning? And 4) what can we learn from each other?



## Keynote Speech



Speaker:

**Maija Aksela**  
University of Helsinki

Maija Aksela, Professor in Science Education, Director of Science Education Center at University of Helsinki; Director of LUMA Centre Finland; Director of LUMAT Research Science Forum; Director of international and national StarT LUMA project and chair of International Awards Jury; Chair of LUMA teacher education forum in Finland. Her research interests are chemistry education, teacher education and teachers' professional development, and science education.

**Title:** Joy of science for future makers through virtual LUMA science education

**Abstract:** The main aim of LUMA Centre Finland (a network of 11 universities; 13 centres) is to promote joy of math, science and technology learning



for all future makers. One of our goal is to make relevant student-centred solutions and actions using different forms of digitalization through design-based research. The relevance of science education can be evaluated on three different levels: individual, societal, and vocational relevance. In this presentation, it will be open our different novel forms of virtual LUMA science education, its co-design process and some results.

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»»» *Invited Talk*



## Invited Talk



Host:

**Päivi Kousa**

University of Helsinki

Päivi Kousa (Ph.D. Science Education) is a researcher and a project coordinator (AI in Learning) at the Faculty of Educational Sciences at the University of Helsinki. She has formerly been a teacher and student counsellor in the Unit of Chemistry Teacher Education at the University of Helsinki where she did research on science teacher professional development and school industry collaboration. Her current research interests are AI-related ethical issues concerning education and learning. The main aim of her research is to get deeper understanding how ethical challenges could be solved in order to support equity and lifelong learning in different levels of education as well as in working environments.





## Invited Talk

Speaker:

**Inkeri Ruokonen**

University of Turku

Inkeri Ruokonen, Professor of Early Childhood Education. She is working as a vice dean in Faculty of Education, University of Turku. She is a Doctor of Education, (University of Helsinki, 2005), music teacher (Sibelius Academy 1987,) and a licentiate of music education (Sibelius Academy, 1998), she has a title of Docent in music education (University of Helsinki, 2010). She belongs as a vice director to the management team of National Network for development of assessment literacy (KAARO). In University of Turku she is developing the co-operation between Rauma Early Childhood and Teacher Education Centre (ECTEC) and early childhood teacher education.

Inkeri Ruokonen has worked as a Director of Master Program in Educational Sciences (2016-2019) in University of Helsinki, where she has worked as a teacher educator from 1995. She is a member of Helsinki University Teachers Academy. Her main



research interests are early childhood education, music education, teacher education, arts pedagogy, learning environments, early giftedness, intercultural arts education and creative thinking. She has published over 180 scientific articles and edited several scientific journals and books.

**Title:** The use of new technology in creating music with children -two cases of Chrome Music lab -experiment

**Abstracts:** Computer-based technologies based on AI technology offers music education new approaches for pupils' creative production, composition and performance. In Finnish National Core Curriculum for Pre-primary Education (2014) and National Core Curriculum for Basic Education (2014), children are encouraged to play, experiment and improvise music. ICT and AI based music learning environments eases and 'democratizes' the creative process, enabling success for all, regardless of formal musical training (Ward 2009; Muhonen 2016) According to National Core Curriculum teachers should provide such learning environments where children are encouraged with experiences of creating music both in groups and individually.



This presentation is a case study in which one pre-primary schoolteacher and one primary school teacher were interviewed about their experiences in using Chrome Music lab as a tool in composing music with their pupils. The research questions were: 1) How Chrome Music lab was used as a tool in composing music with children and 2) How the composing pedagogy used was connected into other learning areas. The interview material was content analysed and discussed for developing the future music education at schools. The results of these two case studies tells that visualization help pupils' better learning about musical concepts e.g. frequency, duration, pitch, dynamics and form. Holistic and integrative way of teaching connects new technology to create music. In these cases, teachers integrated composing pedagogy into many transversal skills e.g. thinking and learning, interaction and self-expression as well as multiliteracy and communication technology skills. Interaction and integration connected into new technology learning environments of music seem to be necessary for future learning and creative production.



## Invited Talk



Speaker:

**SUN Zhong**

Capital Normal University

SUN Zhong is Professor in the School of Information Engineering, Vice Dean of Artificial Intelligence Education Research Institute at the Capital Normal University. Her main research area is technology enhanced teacher professional development. She had published over 60 articles, received several funding including the National Science Foundation, the Ministry of education's humanities and social sciences program, etc. She has received awards including the top SERVE Award of innovative educational program in China, K-12 Education Teaching Achievement Award in the Beijing, Outstanding Educator of Capital Normal University.

**Title:** Artificial Intelligence supported classroom teaching analysis

**Abstract:** Regularization and computability is one



of the preconditions for AI-supported classroom teaching analysis. Taking S-T behavior and FIAS speech interaction as the representative analysis methods, time coding is the main research perspective for quantifies classroom teaching analysis. Although it has made significant contributions to regularization and objective analysis, it has been plagued by the difficulties of time-consuming and inefficient, the failure to establish the relationship between quantitative structure and pedagogical meaning understanding, and the failure to promote teachers' professional development. Taking teaching events as the perspective of classroom teaching analysis, integrating the educational theories such as teacher and student double-centered teaching structure, as well some emerging AI technologies as computer vision and natural language understanding, the lecture proposed a TESTII (Teaching events, SPS, Time coding, Interpretation, Improvement) framework for AI-supported classroom teaching. It concludes teaching events identification, teaching phases division, Sequence of Pedagogy Structure, behavior and speech interaction analysis by time coding, evidence-based teaching interpretation and teaching improvement of human-computer cooperation.



## Invited Talk



Speaker:

**Shuanghong Jenny NIU**  
University of Helsinki

Shuanghong Jenny NIU is working in Faculty of Educational Sciences at University of Helsinki. She is dedicated in the research fields of school leadership and management; teachers' education and training; learning and teaching methods; and the development of 21st century skills. She provides teachings for school principals and teachers with the courses of School leadership and management, Phenomenon-based learning and Digital storytelling teaching and learning method. She has over 20 years rich working experience of various positions in several universities and international companies. Shuanghong Jenny Niu obtained her Master Degree and D.Sc. from Aalto University in Finland.



**Title:** Teaching and Learning 21st Century Competencies

**Abstract:** With the fast development, changing environment and facing global challenges in the 21st-century, there is increasing demands in preparing students' competencies for their lives and future work. Learning knowledge is not enough. The learning of competencies with knowledge, skills, attitudes and values become more and more important. How to teach and learn 21st century competencies become one of the vital focuses in education. The main goal is to investigate the main critical aspects in supporting the students' learning of competencies for the changing environment in the 21st century. There are three main aims. One aim is to identify what students' role is in acquiring 21st century competencies. Another aim is to examine what teachers' role is in supporting the students' learning. The third aim is to reflect what kind learning environments promoting students' competencies learning. Based on the study, three critical important aspects merged in supporting teaching and learning



of 21st century competencies. First, students must have active role in their learning with agency when they acquire these competencies. Second, teachers' role as mediators is making pedagogical decisions for facilitating, coaching and scaffolding the students' learning. The last, but not the least, is the socially supported learning environments with collaboration. Students learn from each other and learn with each other collaboratively in socially supported learning environments.

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▶▶▶ *Invited Talk*





## Invited Talk



Host:

**LIU Wei**

Beijing Normal University

Dr. Liu is an Associate Professor, Master of Applied Psychology (MAP) Director, UX Master Program Coordinator, Innovation Center for China-U.S. Youth Exchange Director, DELL-BNU VR Maker Studio Director, Center for Design Psychology Research (CDPR) Beijing Design Society, Beijing Association for Science and Technology Board Member.



## Invited Talk



Speaker:

**TANG Yun**

Central China Normal University

Dr. TANG Yun is Associate Professor at School of Psychology, Central China Normal University, and affiliated with Key Laboratory of Adolescent Cyberpsychology and Behavior, Ministry of Education. She received her Ph.D. in quantitative Psychology from the Ohio State University. Her research interests include educational data mining, self-regulated learning, and the self-determination theory.

**Title:** Application of Machine Learning Methods in Intelligent Tutoring Systems: Predicting Academic Performance from Online Learning Behaviors

**Abstract:** The coronavirus pandemic has prompted the development of online education. As one of the focus, artificial intelligence has attracted more and



more attention in its application in online learning environment. Using an unsupervised machine learning technique--the two-layer hidden Markov model (TL-HMM), the present study analyzed the learners' behavior log files from an intelligent tutoring system and examined the effectiveness of TL-HMM in predicting academic performance. The results demonstrated that TL-HMM can differentiate the learning behavior patterns of students with different academic performance, and showed a high accuracy in predicting students' academic performance based on the probability distributions derived from models. In practice, TL-HMM could be embedded in intelligent tutoring systems to monitor learning behaviors and learner status, so as to provide timely interventions and facilitate learning.



## Invited Talk

Speaker:

**SUN Liping**  
University of Lapland

She is researcher and Ph.D. candidate at University of Lapland, Finland. She is now working at Faculty of Education, Media Education Hub. The research interest includes game-based learning and teaching, primary education pedagogy, media education, collaborative learning (CL), and self-regulated learning (SRL).

**Title:** Effect of game elements in intelligent game-based learning environments: A systematic literature review

**Abstract:** As we know, intelligent game-based learning environments integrate commercial game technologies with AI methods from intelligent tutoring systems to intelligent narrative technologies (Lester et al., 2013). The results of recent empirical studies demonstrate that intelligent game-based learning environments have great potential to create dynamic learning experiences which are both effective and



engaging (Lester et al., 2013; Cruz, Arenas, Berba, & Palaoag, 2017). Previous studies indicate that the intelligent game-based learning environments is viewed as a tutoring framework for students from different levels of education (Min, Mott, & Lester, 2014). In these environment students can solve complex problems, receive adaptive hints, feedback, and scaffolding which help their learning processes, and increase their motivation and engagement (Magerko, 2009; Min et al., 2014). In intelligent game-based learning environments, the game elements may include devices such as performance rewards (e.g. currency), personalized agents (e.g. avatar), and navigational options (e.g. choice for turn left or right), which work as effective ways to enhance students' interest and maintain persistent interaction within the learning environments (Snow, Allen, Jackson, & McNamara, 2015; Cruz et al., 2017). The application of such interactive game elements within intelligent game-based learning environments increase students' motivation and engagement in their learning tasks (Snow et al., 2015; Cruz et al., 2017). In this study, we review existing literature in the field of the intelligent game-based learning environments in education, and



provide answers for the following research questions: 1) What kind of game elements are available in intelligent game-based learning environments? and 2) How students' learning activities are influenced by game elements in intelligent game-based learning environments? The systematic literature review (SLR) will be used as a method in this study. SLR is recognized as an appropriate way to search and analyse the large databases and literature (Borrego, Foster, & Floyd, 2014). It enables to gather all relevant data about game elements in intelligent game-based learning environments from datasets and large-scale literature, and analyses and makes fundamental contributions to provide evidence to answer these research questions (Borrego et al., 2014; Horvath & Pewsner, 2004). This research will produce new knowledge of effective game elements in intelligent game-based learning environments, that will improve students' performance and promote their learning achievements. Implications of this research will be beneficial for designers to find out appropriate approaches and techniques how to effectively apply game elements to intelligent game-based learning environments.



## Invited Talk



Speaker:

**XIE Han**

Central China Normal University

XIE Han, doctoral student in the School of Psychology, Central China Normal University. The main research field is interaction in online learning, including online peer feedback, computer supported collaborative learning, personalized learning, etc. Relevant researches have been published in Psychological Development and Education, Educational Research and Experiment and other academic journals.

**Title:** How do learners evaluate AI supported foreign language learning software?—Take LAIX as an example

**Abstract:** In the face of diversified AI intelligent learning scenarios, how to achieve user accumulation and capture market share has become a problem that many online education service



providers strive to solve. This study takes LAIX as an example to analyze the users' experience and feedback of AI foreign language learning software. By conducting interviews with 61 paying users who have been using the platform for more than 2 weeks, we found that the retained users pay more attention to the learning content (eg. high repetition of the learning content), interactive situations (eg. Small situational dialogue), auxiliary tools (eg. lack of Chinese translation) and performance feedback (eg. insufficient explanation of wrong questions). Based on the Technology Acceptance Model (TAM), this study intends to conduct in-depth analysis on the above user experience and feedback, to construct a theoretical model of the influencing factors of the continuous use behavior of AI foreign language learning software. This study provides corresponding optimization suggestions for AI+ Education software development, and a reference for AI intelligent software related user behavior research.





## Invited Talk



Host:

**Shuanghong Jenny NIU**  
University of Helsinki

Shuanghong Jenny NIU is working in Faculty of Educational Sciences at University of Helsinki. She is dedicated in the research fields of school leadership and management; teachers' education and training; learning and teaching methods; and the development of 21st century skills. She provides teachings for school principals and teachers with the courses of School leadership and management, Phenomenon-based learning and Digital storytelling teaching and learning method. She has over 20 years rich working experience of various positions in several universities and international companies. Shuanghong Jenny Niu obtained her Master Degree and D.Sc. from Aalto University in Finland.



## Invited Talk



Speaker:

**ZHAO Guoying**

University of Oulu

ZHAO Guoying is Fellow of International Association for Pattern Recognition and a Professor with the Center for Machine Vision and Signal Analysis, University of Oulu, Finland, Her current research interests include affective computing, computer vision and machine learning.

**Title:** Towards Emotion AI and Applications in Education

**Abstract:** This talk introduces the pioneering emotion AI research carried out in University of Oulu, including facial expression and micro-expression analysis, remote heart rate measure from facial video analysis and recent work on applying emotion AI to education study for collaborative learning.

## Invited Talk



Speaker:

**Päivi Kousa**

University of Helsinki

Päivi Kousa (PhD, Science Education) is a researcher and a project coordinator (AI in Learning) at the Faculty of Educational Sciences at the University of Helsinki. She has formerly been a teacher and student counsellor in the Unit of Chemistry Teacher Education at the University of Helsinki where she did research on science teacher professional development and school industry collaboration. Her current research interests are AI-related ethical issues concerning education and learning. The main aim of her research is to get deeper understanding how ethical challenges could be solved in order to support equity and lifelong learning in different levels of education as well as in working environments.



**Title:** Ethical dilemmas in AI based learning environments from the perspective of educational technology companies

**Abstract:** The purpose of the study was to find out what kind of ethical challenges companies have when they design and produce AI based products and services for different learning environments. The topic is even more important since the use of digital devices and distance learning have increased. Qualitative data were collected from seven representatives of four Finnish companies. They were interviewed, and the data was analyzed using inductive content analysis. The companies' challenges were related to four areas: ambivalence of regulations, inequalities in human learning in digital environments, ethical dilemmas in machine learning, and the lack of ability to assess consequences in society. All interviewees regarded that legal frameworks for ethical AI are unclear and difficult to apply in practice, especially in a global scale. Additionally, most interviewees were of the opinion that not everyone has equal access to AI



applications, both in national and global scale. Many people have also fear and unrealistic expectations about what AI is or what it can do and therefore, do not want to have AI based educational services. These things create inequality between people when thinking about, for example, the skills required in the future. Furthermore, companies have big worries related to machine learning such as how to safely collect, process, share and store data and avoid bias. When designing solutions for educational use, companies suggested that AI tools should be designed proactively to avoid algorithm bias. Furthermore, applications should be safe to use, understandable and equal. Sufficient and accessible education, global collaboration, multi-professional support and dialogue between different actors in society were highly emphasized.



## Invited Talk



Speaker:

**Päivi Timonen**

University of Lapland

Päivi Timonen, Ph.D. student at the University of Lapland, Faculty of Education, the Media Pedagogy Hub. I work as a senior lecturer and online learning specialist at one of the University of Applied Sciences (UAS) in Finland. My doctoral studies Coaching Pedagogy for Synchronous Collaborative Online Learning (CPSCOL), aim to establish an online learning pedagogical model basing learners and pedagogical staff's experiences concerning coaching pedagogy for synchronous collaborative online learning of the UAS in Finland. An article-based dissertation will apply the educational design-based research method.



**Title:** Coaching Pedagogy for Synchronous Collaborative Online Learning: Experiences and Desires of Learners

**Abstract:** This study involved developing synchronous collaborative online learning, which enables continuous learning in different life situations. A research gap was identified in synchronous coaching pedagogy with respect to education-based coaching (Timonen & Ruokamo, in press). For the research, learners from two different online bachelor's degrees at the University of Applied Sciences in Finland were examined ( $n = 276$ ). The COVID-19 pandemic emerged during the first week of the survey, making the need for these kinds of studies even more evident. # In this study, the quantitative and qualitative data were used to determine which things promote and prevent synchronous collaborative online learning according to learner opinions as a first research question. A mixed-methods (MM) research model was designed to capture learners' views and desires for coaching pedagogy while using synchronous collaborative online learning. A second



research question sought to examine learners' wishes and sense of perceived learning for webinar pedagogy. As a result of this study, the Preliminary Coaching Pedagogy Model for Synchronous Collaborative Online Learning (CPSCOL) (Timonen & Ruokamo, in press) will be further developed. # The theoretical framework for the coaching pedagogy for synchronous collaborative online learning is based on the community of inquiry (CoI) model (Garrison et al., 2000; Garrison, 2016; 2017), which was developed during the research by Timonen and Ruokamo (in press) for CPSCOL. The CoI model includes social, cognitive, and teaching presence, which, together, create an educational experience (Garrison, 2016). Versatile coaching methods can provide support and guidance to learners and facilitate learning in groups (Hagman & Wageman, 2005). In this study, different methodologies—a quantitative inquiry (survey) and narrative methodology with qualitative analysis—ensure trustworthiness and quality.





## Invited Talk



Speaker:

**LIN Danhua**

Beijing Normal University

Dr. LIN is professor of Faculty of Psychology, Beijing Normal University, who has been awarded with “New Century Excellent Talents Program” by Ministry of Education of China in 2013. She is also the vice director of the Commission of School, Chinese Psychological Society. Dr. Lin is a famous developmental psychologist and health psychologist in China, who has served as the PI of more than 10 research projects funded by Chinese National Social Science foundation, Chinese National Natural Science foundation, Beijing Excellent Scholar Award funding, Beijing Philosophical Social Science Foundation and American National Institute of Health. In the past decades, Dr. Lin has become known around the world for several field-defining research projects on the physical and mental health issues and positive development in the children and youth populations with a record of high-quality productivity.



Her research is marked by the integration of biological, psychological and social perspectives, and this work has broken new ground in integrating multiple academic disciplines in elucidating the unique context of Chinese culture. Dr. Lin also has been conducting intensive training for government staffs, parents, teachers, social workers and so on and has received broad social influence.

**Title:** Efficacy of a Single Session Growth Mindset Intervention on Junior High School Students' Academic Achievement

**Abstract:** Based on growth mindset theory and WISE intervention technique, growth mindset intervention is a scalable method to improve growth mindset, growth mindset related motivational factors (e.g., achievement goals), and low-performed students' achievement. However, due to the cultural barrier, less is known about the efficacy of growth-mindset intervention on Chinese junior high school students. Therefore, the purpose of the study is to test the efficacy of a cultural-adapted single session growth mindset intervention among Chinese junior high school students.



The study consists of two sub-studies. In Study 1, a cultural-adapted growth mindset intervention program was developed with a semi-structural interview among 225 junior high school students. In Study 2, 618 junior high school students from Xingtai, Hebei Province completed baseline survey, then randomly assigned into intervention group ( $n = 311$ ) and control group ( $n = 307$ ), and both groups include 7th, 8th, and 9th graders. The intervention group received the revised, single-session (i.e., 50 minutes) growth mindset intervention, which was expected to increase their growth mindset, growth mindset related motivational factors, and low-performed students' achievement; while the control group were on the waiting-list, and received the intervention after study. Study 2 collected 569 pieces of valid data from both groups in posttest survey, with a follow-up rate of 92.1% (569 of 618).

The results in Study 1 showed that several key factors, such as failure-is-enhancing mindset and learning strategy contents, adjusted self-persuasion questions, and empowering paragraphs, should be added into the intervention program to increase its efficacy in Chinese context. Study 2 shows that (1) the revised single-session growth mindset intervention is able to improve



growth mindset, academic self-efficacy and low-performed students' achievement, as well as reduce helpless attribution in intervention group compared to the control group; (2) Further analysis indicates that the intervention also contributes to protect failure-is-enhancing mindset, learning strategies, instrumental help-seeking, and suppress avoidance of help-seeking; (3) The intervention can exert a short-term follow-up effect (i.e., 3 months) even under academic challenge caused by COVID-19.

The findings of this study indicate the importance of cultivating growth mindset from culturally adaptive perspectives. Particularly, policy makers and educators need to consider that single session growth mindset intervention may be an effective, economical and scalable way in protecting students' achievement from the negative impacts caused by COVID-19.

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»»» *Dialogue between  
China and Finland*



## Dialogue between China and Finland

Host:

**LU Yu**

Beijing Normal University

LU Yu received the Ph.D. degree from National University of Singapore in computer engineering. He is currently an Associate Professor with the School of Educational Technology, Faculty of Education, Beijing Normal University (BNU), where he also serves as the director of the artificial intelligence lab (AI Lab) at the advanced innovation center for future education (AICFE). He has published more than 40 academic papers in the prestigious journals and conferences (e.g., IEEE TKDE, TMC, ICDM, AIED, CIKM, EDBT, IJCAI, ICDE), and currently serves as the PC member for multiple international conferences (e.g., AAI and AIED). Before joining BNU, he was a research scientist and principle investigator at the Institute for Infocomm Research (I2R), A\*STAR, Singapore. His current research interests sit at the intersection of artificial intelligence and educational technology, including learner modeling, educational robotics, intelligent tutoring system and educational data mining.



## Dialogue between China and Finland

Host:

**Heli Ruokamo**  
University of Lapland

Heli Ruokamo is Professor of Education, specialty media education, at University of Lapland in Rovaniemi, Finland. She is a research vice dean of the Faculty of Education and a director of the Media Education Hub. Ruokamo holds a title of adjunct professor of Media education in the faculty of behavioural sciences at University of Helsinki and a title of adjunct professor of Network-based Learning Environments in faculty of education at University of Turku, Finland. Ruokamo has been working for 3 years as a Visiting Scholar at Stanford University's School of Medicine, Centre for Immersive and Simulation-based Learning, and at H-STAR institute. She is a head and chair of the board of the Finnish Multidisciplinary Doctoral Training Network (FinEd), and a vice chair of the board of Finnish Educational Research Association (FERA). Ruokamo is a head of the Sino-Finnish JoLii



Teacher Training Center in Finland and member of the Finnish Board of the Directors of the Sino-Finnish Joint Learning Innovation Institute (JoLii). She is a member of the CICERO Learning Network Board of Members and Board of Directors. Ruokamo is a co-founder and a chairman of the board of Playful Learning Ltd., and a member of the Educational Advisory Board of the BrainQuake Inc.

## Finnish Representatives



**Hannele Niemi**  
University of Helsinki

Professor Hannele Niemi, Research Director in educational sciences (2016-), former Vice-Rector (2003-2009), and professor of education (1998-2016) at the University of Helsinki. She is a UNESCO Chair on Educational Ecosystems for Equity and Quality of Learning (2018-2021).



## Finnish Representatives



**Jari Lavonen**  
University of Helsinki

Dr. Jari Lavonen is Professor of Science Education at the University of Helsinki, Finland. He is currently a director of the National Teacher Education Forum and chair of the Finnish Matriculation Examination Board. He has been researching science and technology education for the last 31 years.



**Maija Aksela**  
University of Helsinki

Maija Aksela, Professor in Science Education, Director of Science Education Center at University of Helsinki; Director of LUMA Centre Finland; Director of LUMAT Research Science Forum; Director of international and national StarT LUMA project and chair of International Awards Jury; Chair of LUMA teacher education forum in Finland. Her research interests are chemistry education, teacher education and teachers' professional development, and science education.





## Chinese Representatives



**CHEN Annie**

YuanFuDao

Annie CHEN, Princeton University Class of 15. Tencent Merger & Acquisitions Team 15-18. Joined Yuanfudao in 2018, former head of Xiaoyuansouti and Yuantiku department. Currently leading strategy team of YuanFuDao.



**LIU Baocun**

Beijing Normal University

Dr. LIU Baocun is Professor of Comparative Education and the Director of the Institute of International and Comparative Education (IICE) at Beijing Normal University(BNU). He also serves as the president of Comparative Education Society of Asia, president of China Comparative Education Society. He has been involved in a wide range of national and international research and consultancy projects, and published more than 200 journal papers and 20 books.



## Chinese Representatives



**LIU Dejian**  
NetDragon Websoft

Professor LIU Dejian is Founder and Chairman of NetDragon Websoft Inc., Co-Dean of Smart Learning Institute of Beijing Normal University, and Co-Dean of Academy of Big Data Application in Chinese Education. His research fields include Internet Product Design, the Application of VR/AR, AI & Big Data in Education, Digital Education, etc. In recognition of the outstanding contributions in Engineering Technology, the Chinese government has awarded him the title of Special Allowance Expert of the State Council in 2015, enjoying national expert treatment.



## Chinese Representatives

### LIU Jia

Tsinghua University

Dr. LIU Jia is Chair Professor of Basic Sciences at Tsinghua University, Beijing, China. He obtained Bachelor and Master Degrees of Science majoring in Psychology at Beijing University, followed by a doctorate in Cognitive Neuroscience at MIT under the supervision of Prof. Nancy Kanwisher. His current interest is to combine cognitive science, neuroscience and computational science to understand the nature of intelligence and to develop human-like artificial intelligence.



### LIU Ming

Southwest University

LIU Ming is Professor of Artificial Intelligence in Education at the School of Educational Technology, Faculty of Education, Southwest University. He received his PhD in AIED from The University of Sydney, Australia in 2012. His research focuses on the development of advanced writing analytics and its integration into the classroom for collaborative learning and higher order competencies such as reflective and academic analytical writing. He is an active member of the learning analytics and AIED communities and has chaired multiple Writing Analytics workshops at LAK, LALN and ALASI.



## Chinese Representatives



**LIU Zitao**  
TAL Education Group

LIU Zitao is Head of Machine Learning at TAL Education Group (NYSE:TAL), one of the largest leading education and technology enterprises in China. He studies and develops AI approaches to tackle some of the hard-core problems in AIED, such as automatic short answer grading, knowledge tracing, dropout prediction, etc. He has published his research in highly ranked conference proceedings, such as AAAI, AIED, Ubicomp, etc. He starts the initiative of building an open AI ecosystem for education and creates the TAL AI Open Platform (<https://ai.100tal.com/>), which is the first open platform providing the AI solutions to the Edtech community. Before joining TAL, Zitao was a senior research scientist at Pinterest and received his Ph.D degree in Computer Science from University of Pittsburgh.



## Chinese Representatives



**YU Shengquan**  
Beijing Normal University

Professor YU Shengquan, Director of Advanced Innovation Center for Future Education at Beijing Normal University, Director of the Joint Laboratory for Mobile Learning, Ministry of Education-China Mobile Communications Corporation. He was selected into the New Century Talent Support Program of the Ministry of Education and the National Talent Project of Millions of Talents, and was awarded the honorary title of "Young and Middle-aged Experts with Outstanding Contributions" by the Ministry of Human Resources and Social Security.



北京师范大学心理学部



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Joint Learning Innovation Institute  
中芬联合学习创新研究院



未来教育高精尖创新中心  
Advanced Innovation Center for Future Education  
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