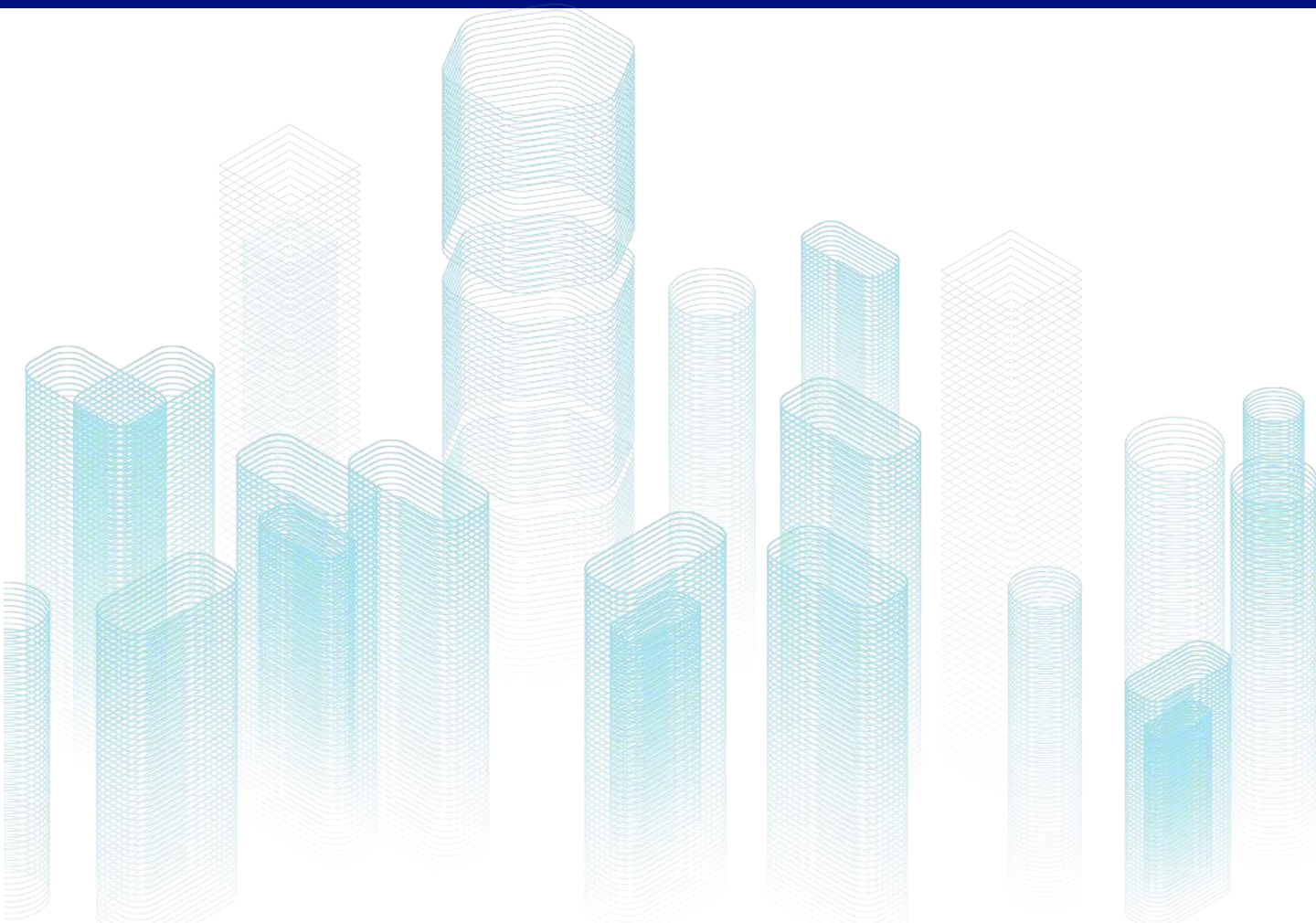




China and Central & Eastern European Countries Smart Education Academic Forum Report Collection 2021-2022

(Abstract Version)



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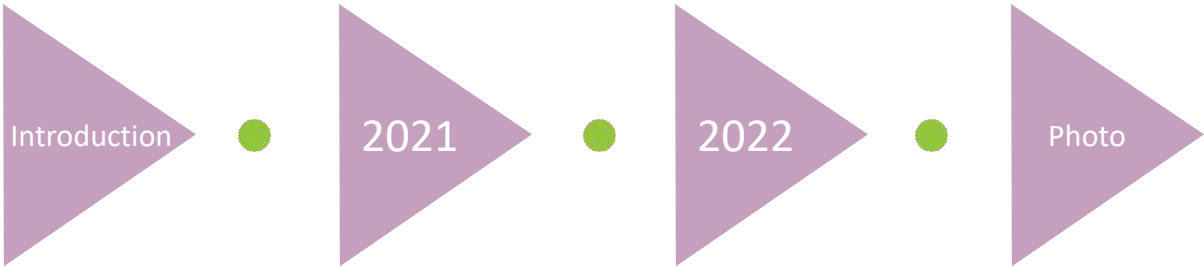
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FORUM INTRODUCTION

China-CEEC Smart Education Forum 2021

In response to UNESCO's call to promote multilateral academic research and technological innovation cooperation between China and Central & Eastern European Countries (CEEC) in education informatization, Beijing Normal University, Netdragon Websoft and Novi Sad University jointly established China and CEEC Joint Virtual Laboratory for Future Education in 2018, planning to establish a China-CEE academic community on smart education in universities, uniting the strengths of more universities in China and CEEC to re-envision the education future and address the challenges.

On December 20, 2021, the China and CEEC Smart Education Forum 2021 was successfully held online. In the forum, experts from China and CEEC shared the current situation and achievements of smart education development in their countries and discussed the construction plans for continued cooperation. The forum attracted researchers, teachers and students from Albania, Bulgaria, China, Croatia, Hungary, North Macedonia, Romania, Serbia and Slovenia, deepening academic exchanges and cooperation between China and CEEC in the field of smart education.

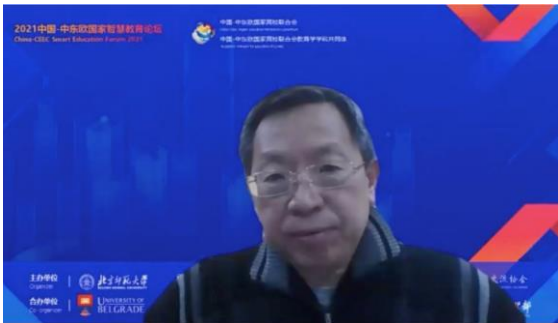
Global Smart Education Conference 2022—— Digital Literacy and Smart Learning Forum

On August 18, 2022, the Digital Literacy and Smart Learning Forum of the Global Smart Education Conference 2022 was held in Beijing.

The forum invited experts and scholars from China and abroad to analyze the application scenarios of sustainable smart education and to start a discussion on differentiated teaching and personalized learning under intelligent technology. The core topics covered digital literacy and skills, technology-enabled smart learning, teaching innovation and smart learning environment, which provided options and directions for countries to further improve citizens' digital literacy and promote smart learning practices.

OPENING CEREMONY

At the opening ceremony, Mr. Wang Yongli, Deputy President & Secretary-General, China Education Association for International Exchange, Prof. Zhou Zuoyu, Vice-Principal of Beijing Normal University and Prof. Vladan Đokić, Rector of the University of Belgrade delivered speeches. Prof. Zhu Xudong, Dean of Faculty of Education, Beijing Normal University, moderated the opening ceremony.



In the speech, Mr. Wang Yongli, expressed his congratulations on the forum, and introduced the background of the establishment of China-CEE Association of Universities, its purpose and working mechanism, as well as the expectation of the future cooperation of the Association of Universities.



Prof. Zhou Zuoyu expressed his affirmation of the cooperation between SLIBNU and the CEEC in the field of smart education in the early stage, and looked forward to strengthening the exchange and cooperation between China and CEEC in the field of education to address common challenges and promote the construction of a community of human destiny.



Prof. Vladan Dokic introduced the long history of the University of Belgrade, told about the cooperation project between the Serbian government and NetDragon Websoft, and expected further cooperation between the two countries in the field of educational technology in the future.

KEYNOTE SPEECH

Digital transformation of (open) educational resources in Chinese higher education: policy, infrastructure, quality, and change ——Prof. Jingjing Zhang

Focusing on the digital transformation of (O)ER in Chinese context, Prof. Jingjing Zhang has unfolded the topic from the perspective of policy, infrastructure, quality and change.

According to the Upper Limit Hypothesis by Robert, the reason we need digital transformation of our educational system is that our current educational system has already reached its full productivity, and it requires immerse investment if we want to make it full or a breakthrough, which means that students need to work harder and longer to improve a little.

Given that the current education situation, Chinese government has released a double reduction policy with a view to better assist students to work smarter rather than work harder and longer.

China, a huge country not only in terms of geography and population, but also its diversity in nature, has its considerable disparity in education opportunities, resources and qualities from one province to another. Whereas, education has always been taught on the priority of government at all levels with no effort spared to enhance the educational level of the whole population.

In this regard, since 1998, government has released a number of policies, action plans, or decisions to support this digital transformation at a national level. In 2021, scholars have tried to propose the framework of national smart education. Nowadays, China advocates the top-quality MOOCs. And also, China is encouraging the cutting-edge technologies, such AI, big data, block chain technology and smart devices. In the 21st century, digital transformation is now regarded as the national strategy for education.

Additionally, sharing the comparative studies of the digital transfer transformation and infrastructure for (O)ER in different countries from a macro and micro perspective, Prof. Zhang concludes that different universities and countries, their context and culture are very important.

In the world widely, a paradigm shift is required, that is to say, educational stakeholders are urged to change attitudes or shared vision from work harder and play harder to learn smarter and play smarter. In this case, China has gradually changed our mindset or our shared understanding towards technology, the use of technology education from the determinism, and holds a more critical theory view towards technology. China has actually led a group of researchers and policy makers from different countries to promote this kind of paradigm shift.

Meanwhile, when designing the smart learning environment, several aspects should be taken into account. On the one hand, Prof. Zhang mentions we need to think about from the attention economics. The cost of students' attention should be attached the attention to, which is the most important or most expensive cost of online learning. On the other hand, the openness of educational system, also referred as the digital divide, needs to be considered.

In a word, people are aiming at changing the current educational system and the approach to realize smart education is the digital transformation. Along this journey, Prof. Zhang appeals that we really need the open mind to change, and also the shared vision to shape the future. The government, education industry, higher education school teachers should come together, work together, work smarter to make our future better.

Teacher Training for Smart Education: Lessons from Croatian Reforms——Prof. Petar Jantrić

In this presentation, Prof. Petar Jantrić starts with an introduction to the digitalization project in Croatian schools, noting that it started with 150 pilots and went on to spread to more than 1,600 schools. Then he discusses the background from three perspectives: practical, theoretical, and post digital context, and explores how the digital reform in Croatian schools fits in with the philosophical dimension. Finally, he suggests what needs to be done in order to truly achieve smart education.

First of all, Prof. Petar Jantrić discusses how to adapt to the digital reform of Croatian schools from a philosophical level, covering human interest, knowledge and research methods, within which three main areas are divided. One is technical knowledge as a tool, the second is practical knowledge about understanding interpretation, and the third is emancipatory research about reflection, emancipation and social critique. These three aspects are based on three different determinisms that are presented for technology.

The first perspective is uses determinism, and that's the idea that technology is merely a tool. Then, the technological determinism is the idea that technology moves social progress. The third one, social determinism, is the idea that the society pushes kind of development. The Croatian reform incorporates all deterministic perspectives, and all these different determinisms help to cover the different areas of implementing educational technologies.



Prof. Petar Jantrić believes that these many factors should be well balanced to enable the right combination, because smart education does not mean using intelligent technology. Smart education means looking at education from an intelligent perspective. However, this balance is currently not achieved in any of the educational reforms in Croatia and globally.

Finally, Prof. Petar Jantrić discusses the things that need to be done to realize wisdom education from four aspects. One is the discipline or beyond the discipline. It is pointed out that knowledge should be organized around multiple and diverse fields, rather than around a single subject. The second is the problem of education. Education cannot replace politics. Only when people really do these things with other stakeholders in a certain way, can society benefit from them. Prof. Petar Jantrić also points out that Beijing Normal University has done a good job in organizing, not only involving universities and education schools, but also involving companies, technical departments, political departments, propaganda and policy formulation. Thirdly, consumption is production. Schools cannot be regarded as suppliers only and students as consumers. While producing, they are also consuming, just to varying degrees. The last one is "student experience". Prof. Petar Jantrić believes that it is not enough to only provide various types of student experience. In order to help students to become more productive producers and more successful consumers, what really needs to be done is to go beyond student experience.

Determination	Interest	Knowledge	Research methods
Uses Determination	Technical (prediction)	Instrumental (causal explanation)	Positivist sciences (empirical-analytic methods)
Technological Determination	Practical (interpretation and understanding)	Practical (understanding)	Interpretive research (hermeneutic methods)
Social Determination	Emancipatory (criticism and liberation)	Emancipation (reflection)	Critical social sciences (critical theory methods)

Jandrić, P. (2012). Curriculum Development for elearning: A conceptual Framework. *Problems of Education in the 21st Century*, 39(1), 62-70.

Making Education Smart with the Smart Use of Technology-based Assessment——Prof. Gyöngyvér Molnár

At the beginning, Prof. Molnár has emphasized one of the views of Prof. Zhang that technology is a tool that offers new possibilities and should not end in itself; that is, technology and the possibilities in smart education should be catalysts of change, but not determine the direction of change. She has unfolded the lecture from four aspects:

1) the huge gap between smart education, educational research, and development in smart and mass education; 2) the discussion of data driven personalized instruction, with the integration of theories and research results; 3) the challenges which should be overcoming smart education; 4) the best practices that smart implementation of technology-based assessment to make learning feasible.

First, Prof. Molnár indicates that although the smart education has gained significant attention and has become a new trend, everyday classroom practice was not able to follow the pace of advancements and adapt to this enormous research results connecting to the topic of smart education. For one reason, smart education should be evidence-based, but decisions are data driven at all levels and context; for another, smart education can have teachers to fit instruction, learning, goals, and materials to the individual needs of the students, and integrate results of several scientific discipline, therefore, the realization of smart education is very difficult and highly complex undertaking for education systems. People focus on smart education, hoping to use technology to reshape the methods of traditional teaching, maximize to increase learning effectiveness, support differentiated instruction, boost students' concentration, raise their limits of endurance and maintain their motivation.

Second, Prof. Molnár discusses the data driven personalized instruction with the combination of theories and research results. In this domain, she has mentioned for

example, Vygotsky's theory of learning, the zone of proximal development, the cognitive load theory, the cognitive theory of multimedia learning and the self-determination theory, pointing out that we should combine all these theories strongly connected to learning and identify evidence-based and theory-grounded principles for how best to adapt the affordances of technology to help people learn rather than to expect people to adapt to every new technologies that comes along.

However, the current situation of mass education is that schools typically teach the same content to all students at the same time, at the same age, but ignore the gap of knowledge and skill developments, and the large individual differences between students.

In this lecture, Prof. Molnár has shared some smart implementations of technology-based assessment by making learning smarter. For instance, the eDia kindergarten module which provides effective developmental integration of technology into educational work by making fragment screening and personalized training possibilities. In addition, taking the university of Szeged as example, Prof. Molnár has illustrated that it has mapped the initial competence level of university fresher scenario and using the results in course and program developments and in planning extra catchup courses, which indicates the directions of the high school and university transition.

To draw a conclusion, to improve students' learning with best use of technology and smart education, Prof. Molnár has emphasized that we should leave the fitting for all approach, integrating knowledge from different fields, learning sciences, psychology, assessment. Everything must be evidence-based, theory-grounded and rigorous experimental research is needed. We should use the advantage of diagnostic technology-based assessment to realize smart education and smart education for personalized learning.

Education Informatization Index (EII) and Educational Policy
——Assistant Prof. Ana Sekulovska Jovkovska

Ana Sekulovska Jovkovska, Assistant Prof. at the University of Tourism and Management, Skopje, Faculty of Informatics, North Macedonia, has delivered a speech on Education Informatization Index and Educational Policy. The presentation includes introduction, motivation and related work, informatization level assessment framework, conclusion and educational policy implications.

First, Prof. Jovkovska has briefly introduced the informatization index. Informatization refers to the degree by which an area, an economy or a society is becoming information-based, that is to say, the enlargement of its information labor force. Educational policy encompasses all the principles and policy-making in the educational domain, as well as a set of the laws and rules that manage the operation of educational systems. Prof. Jovkovska has emphasized the necessity of a complete and detailed analysis in policy making.

Next, Prof. Jovkovska has presented the motivation and related work. For instance, “Networked Readiness Index”, which is used to measure the readiness of countries to take the advantage of the opportunities offered by information and communication technologies (ICTs); “Global Network Readiness for Education”, which is a pilot research project to directly ask for user experience of ICTs in developing world schools; Framework of National Informatization Indices”, which have been established by East Asian countries (Republic of Korea and China, in particular).

And more importantly, Prof. Jovkovska has illustrated the informatization index, which is the primary point in this presentation. The Educational Informatization Index (EII) is a composite indicator made of two main categories (subindexes) and three individual indicators in each of them, listed in order from the most important to the least one.



Therefore, the EII can be calculated as a weighted sum of two subindexes and three individual indicators in each subindex, with appropriate weights and normalized values. By applying the “Rank-Order Centroid method”, the subindexes and the indicators are rank-ordered in descending order.

Concluded from the data changes in recent years, political instability delays educational development by producing uncertainties. In 2020, the Sustainable Development Goals Contribution has been reframed, so that each indicator is explicitly linked to a particular goal. The indicator of the Revised Education Informatization Index has been substituted with the same or potentially similar to those from 2016. Moreover, taking the Republic of North Macedonia and the Western Balkans as example, Prof. Jovkovska has interpreted the data of EII in 2020-2021.

And at the end, Prof. Jovkovska has given some conclusion and indicated educational policy implication. There are still open questions about the number of subindexes, the number of aggregation levels, the number of indicators, methods for weight assignment, feasibility for collecting reliable data and international comparability. Nevertheless, the presented methodology and the results can aid in making educated decisions or in establishing better commitment to incorporating ICT into the educational system. She has emphasized again that the policy planning process needs to integrate rules that ensure stability and continuity of implementation.

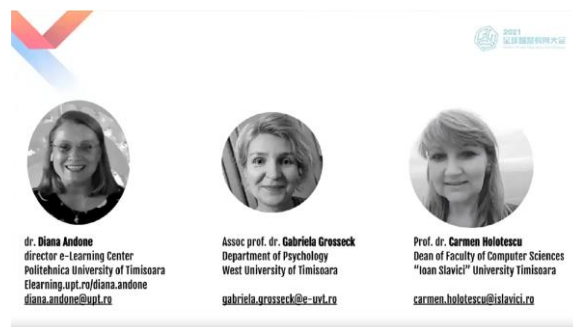
Insight into Smart Education in Romania——Prof. Gabriela Grosseck, Dr. Diana Andone (Prof. Carmen Holotescu)

This presentation was co-presented by Prof. Gabriela Grosseck and Dr. Diana Andone (Prof. Carmen Holotescu could not attend due to unsuitable time). What if the pandemic broke out 25 years ago when there was no google, no world wide web? At the beginning of the speech, by asking the thought-provoking question, Prof. Gabriela Grosseck has pointed out that at the end of 2021, how to create resilient education systems has become the biggest challenge in the context of the COVID-19 pandemic. In this regard, Prof. Gabriela Grosseck has shared the state of smart education in Romania, emphasized the necessity to be smart, especially how to build a smart education.

Prof. Gabriela Grosseck has stated that certain conditions are necessary for smart education to happen and technologies are the ones that represent the backbone of a smart education. Taking Romania as example, Romania was vastly unprepared for the digital learning transitions and lacking the necessary infrastructure, such as Internet connection and technical equipment, especially in rural environment and vulnerable communities. The main reason for the lack of investment in technology and digitalization in educations are maybe the outdated mentality and the lack of interest of the government.

So efforts are being made in Romania. In the terms of policies, there is a national strategy for the digitalization of education with six pillars, accessibility, connectivity, community, digital educational system, innovation, and sustainability. From the perspective of practices, there are best examples like Kinderpedia and Tinker that offer for virtual classroom or digital learning avatars based on Microsoft technology; a very solid platform for testing in education based on artificial intelligence, BRIO; the augmented reality for kindergarten and virtual games and gamification for little kids.

Additionally, there are many measures in



Romania, such as a project that implements smart labs with educational robots, 3D printers, scanners, VR glasses; providing communities, which is relevant curriculum, open education for all.

After Prof. Gabriela Grosseck's presentation, Dr. Diana Andone has probed the issue on how to build up community. According to her, a good technology which will allow personalized path is needed; the assessment, the evaluation method, and the validation need changing. In other word, a more interdisciplinary approach is needed in creating the smart environment with smart classrooms and smart teachers and smart students.


Moreover, Dr. Diana Andone has also presented the new theory on how to build up the entire system on digital education as well as the achievements in digitalization. From institutional levels, European level to the international level, Dr. Diana Andone has analyzed the effort needed in different levels to build a new, resilient and quality education.

To draw a conclusion, people has paid more attention on how to build up the open lifelong learning students of the 21st century society with a variety of methodologies like MOOCs, open educational courses and in the virtual campuses to learn and do things internationally valid, and to build up open educational resources as co-creator. Romania is on the way of exploring how to enable students with the open lifelong learning, which will help to learn independently and digitally for their entire life, to have the future skills that are more than the 21st century skills.

PANEL DISCUSSION & CLOSURE SPEECH

Panel Discussion

In the panel discussion, experts discussed the challenges faced by countries in education informatization, the directions and topics of interest in the field of smart education, as well as the support and cooperation opportunities that the future expert group can provide. For example, Prof. Danimir Mandic from Serbia proposed to inject high-tech technologies such as VR and AI into education to develop education-related applications; Prof. Siyka Chavdarova - Kostova from Bulgaria focused on teachers' use of innovative technologies and software to provide personalized tutoring for students; Prof. Kostova from Albania focused on teachers' use of innovative technologies and software to provide personalized tutoring for students. Professor Siyka Chavdarova - Kostova from Bulgaria focused on the use of innovative technologies and software by teachers to provide personalized tutoring to students; Professor Pranvera Kraja from Albania suggested that it would be possible to cooperate with the Expert Group on Smart Education on teacher training and other related projects to improve the information literacy of teachers in the country, as well as to co-organize international conferences and publish academic literature. Experts from all countries highly agreed on the importance of the smart education expert group and expressed their support for the future forum and conference. This session was moderated by Dr. Tingwen Chang from Beijing Normal University.



中国-中东欧国家高校联合会
China-CEECA Academic Network for Education
中国-中东欧国家高校联合会教育学科共同体
Academic Network for Education of CEECA

Panel Questions

- What are the obstacles to develop ICT in education or digital transformation in your country?
- Regarding smart education, what are the directions or topics that you and your team are interested in?
- In the future, what supports or opportunities you would like to have from the smart education expert group for better cooperation?



Closure Speech



In the closure speech, Prof. Ronghuai Huang expressed his gratitude to the participants. He hoped that the expert group could play a leading role in the future, based on the existing white paper project on smart education between China and CEEC, and unite more international partners from CEEC to promote the digital transformation of education in each country.

OPENING REMARK & PROJECT RELEASE

Opening Remark

Emerging smart technologies such as Artificial Intelligence (AI), Internet of Things (IoT) and Big Data continue to mature and permeate all areas of human activity, changing the way of production, life and learning. Especially since the outbreak of the epidemic, educational institutions around the world are facing the challenge of digital transformation.

In the speech, Mr. Wang Yongli, Deputy President & Secretary-General, China Education Association for International Exchange (CEAIE), expressed his expectation for inter-regional higher education interconnection and said that under the framework of China-CEE Association of Universities, CEAIE will fully support the international exchange and cooperation between Chinese universities and higher education institutions in Central and Eastern Europe to promote the high-quality development of global higher education.



Prof. Vladan Đokić, Rector of the University of Belgrade, delivered a speech for the forum and said that the University of Belgrade and Beijing Normal University have a broad basis of cooperation and close connection in the field of smart education, and he looked forward to a more in-depth cooperation.

Project Release

Professor Yu Kai, Vice Dean of Faculty of Education, Beijing Normal University, launched the initiative of Network for Education of CCHEIC to all participants and introduced the vision and action plan of the community. Professor Danimir Mandic from the University of Belgrade and Professor Demetrios Sampson from the University of Piraeus hoped to strengthen the exchanges between universities and research institutions of CEEC and Chinese universities in the field of education, promote the sharing of high-quality educational resources, deepen the practical cooperation in educational theoretical research and educational practice innovation, and make contributions to the building of the community of human destiny.



INVITED SPEECH

International Comparative Study on Smart Education Development——Associate Prof. Rongxia Zhuang

In this speech, Prof. Rongxia Zhuang mainly introduced an international comparative research on the development of smart education in China and CEEC, pointed out six key points to promote the development of smart education, and gave three suggestions for the development. Experts from 11 countries formed the research team that conducted this joint study, and in 2021, the research project receive sponsorship from Huawei.

Firstly, Prof. Zhuang explained the reasons for the research from the perspectives of the necessities, development status and deficiencies of smart education. The digital transformation of society has increased the public's demand for the quality of education. As a high-end form of the digital transformation of education, the gap between the development of smart technologies and the digital transformation maturity still exists in each country.

Regarding the understanding of smart education, the research team believes that smart education is a high-end form of ICT application in the field of education, which can help us achieve the 2030 agenda of Sustainable Development Goals for education. It has the characteristics of sustainability, flexibility and equity.

On this basis, the research team summarized six key points to promote the development of smart education by studying the situation and policies of ICT application in education and combining the best practice cases and national policies in various countries: (1) Improve the digital literacy of teachers and students; (2) Focus on innovative teaching methods; (3) Realize intelligent and digital education through digital technologies; (4) Establish a data-integrated teaching and learning support service environment; (5) Establish collaborative innovation mechanism; (6) Improve the

effectiveness of decision-making with the help of big data. And enumerate Albania, North Macedonia, Montenegro and other practical cases to demonstrate. For example, In Montenegro, the Ministry of Education has a portal school network, where one can look at all educational objects. Moreover, the latest service is a school-city portal, a portal created in cooperation with the UNICEF Office in Montenegro, a part of the project to prevent dropping off from education.

From the above six key points, the research team offered three suggestions for the development of smart education. First, a digital learning environment with learning devices and supports seamless connectivity, and ethical use of technology that promotes smart education. The second focuses on transformative teaching and learning enabled through technology, including developing student-centered pedagogy, applying imaged assessment and building a learner community. The third aspect comes to forward-looking governance and policy initiatives. Government leaders must make a strategy, long term commitment to developing the national vision and strategy for the efficient use of educational technology, as well as in our funding to assure the plans' successful, sustainable execution and ongoing development, and building infrastructure capacity and ensuring investments in human capacity is also required.

Finally, Prof. Zhuang stressed that it is essential to pay attention to rationales such as cooperation, inclusion, equity, quality, and green sustainability in promoting smart education. In a word, through the study, we confirm that smart education can be recognized as the advanced stage of ICT in education, we're all on the way toward smart education in different steps. And there will never be an end.

Towards Smart Education Slovenia——Dr. Borut Čampelj

In this lecture, Dr. Borut Čampelj talked about Slovenia's actions in smart education from the aspects of history, strategies, elements of smart education and highlighted some related examples.

Digital education in Slovenia has quite a long history. Since 1994, Computer Literacy Project has been launched. Later, Slovenia has formulated E-competent teacher standard and introduced semi-online assessment and self-evaluation mechanisms, which have made great contributions to education during the epidemic.

After that, Dr. Borut Čampelj introduced Slovenia's recent plans on smart education. For example, Slovenia has developed national Digital Education Action Plan and conducted fruitful cooperation with UNESCO, China, Europe and other parties in the field of smart education, with a view to forming a wider digital education hub.

In addition, in terms of smart education, Slovenia has put forward some unique guidelines, such as blended learning. In the future, a national digital hub will be established to set basic standards for related projects. On this basis, Slovenia will also popularize the basic knowledge of computer science, as well as develop a new level of teacher training. What's more, education in special circumstances and its protocols are in need of preparation. Now, Slovenia is introducing a comprehensive assessment of digital competences and this basic knowledge of computer science from kindergarten above.

Dr. Borut Čampelj emphasized that now



countries should develop some elements of smart education. All parties need to discuss, rethink and decide what society really needs from education and education systems. At the same time, we must focus on preparing a curriculum which is more future-oriented and less history-oriented, and definitely more problem-solving. Each school also should design its own teaching plan. In this era, smart education, smart learning and teaching environment is developing all the time. Thus, we need to create an innovative, safe environment that can use efficient tools and other resources, so as to respect each student's personality.

In the end, Dr. Borut Čampelj shared with us some experiences and cases about smart pedagogy supported by digital technology. He proposed that, first of all, we need to pay more attention to the comprehensive and multiple feedback of teachers and students, collect learning information, and conduct timely analysis and evaluation. Secondly, each teacher and student should have their own virtual comprehensive single-entry point to access the corresponding digital learning platforms and databases through different ports. Thirdly, besides personalized and reflective learning of students, we also need to provide personalized and effective teacher training. After that, Dr. Borut Čampelj also introduced how to cultivate students' transversal skills short learning cycles through team development and interdisciplinary lesson planning, implementation and evaluation.



Challenges of Albanian System Education in Systematic Integration of Technology and Education——Dr. Engjellushe Zenelaj

In the speech, Dr. Engjellushe Zenelaj, analyzed the challenges of the systematic integration of technology in the Albanian education system, as well as the causes of the problems, according to the results of a survey. In the final part of her lecture, she put forward the corresponding suggestions to settle the problems.

Due to the epidemic, education is affected in all countries. Through participating in this conference, Dr. Engjellushe Zenelaj would like to put scientific and academic knowledge into practice, so as to better serve the future and the world.

Her research is realized by a combination of several methods of study. Through further analysis of the research results, she finds that in recent years has increased the distribution of the internet in the family, especially a greater increase is observed during this year of pandemic. At the same time, however, there are three biggest difficulties of online teaching during the pandemic, namely, lack of training with technology, lack of adaptive technologies in schools and access to technology, and lack of the use of officially certified sources.

The survey shows that in most cases, children's learning task is only to search on the internet some information about one specific topic. It is believed that such an education system cannot cultivate students' comprehensive ability. At the same time, the low budget of the Albanian government for pre-university and university education is a fundamental factor that limits the integration of technology in the educational system. In the government budget, there are no specific items for digitalization or integration of technology in the education system. Another very important aspect is the lack of conversation about lifelong learning focused on teachers. In addition, Albania lacks a



concrete strategy for the integration of technology in the education system and its development with long-term projects extended in time to achieve the objectives of the strategy. Also, its public universities as the largest education institutions in the country lack their visions.

To cope with the above problems, Dr. Engjellushe Zenelaj put forward her own suggestions. She mentioned that education is a global challenge, so the orientations for the solution are also global. Faster implementation and integration of technology standards in the education system within a state should be the same in all educational institutions with the same level of education. In this regard, Albania currently has several efforts to integrate technology into the education system. At the same time, the budget for the pre-university education system should be increased and a national strategy for the integration of technology in the Albanian education system should be drafted. In addition, the national agency of society information needs to accredit the technological system in education, set standards, and implement them equally in all educational institutions. Finally, human capacity for staff involved in the education system in relation with technology should be comprehensively improved, so as to raise the educational standard of Albania.

Making Education Smart with the Smart Use of Technology-based Assessment: Hungarian Case Studies——Prof. Gyöngyvér Molnár

The topic of Prof. Gyöngyvér Molnár's lecture is making education smart with the smart use of technology-based assessment - Hungarian case studies. Taking Hungarian smart education as an example, she introduced the current situation of the application of smart technology to education and its methods.

Nowadays, technology can contribute to personalized education. During the pandemic, the school lockdowns in response to COVID-19 is having a massive impact on educational activity, which has called additional attention to the potential for digital tools in education, especially to the potential and need for smart education, and to the lack of its adaptation in real-life school practice in mass education.

But at the same time, Prof. Molnár pointed out that smart education and the digital transformation of education is about more than just technology and that there is a huge gap between research and practice. To achieve comprehensive smart education, we should integrate the results from a number of disciplines and fields of research to adapt these technologies to the human mind, including how we learn. The challenge on applying computer-based technology in education is to identify evidence-based and theory-grounded principles for how best to adapt affordance of technology to help people learn.

Countries should note that, since age does not determine skills and abilities, so



education should not be a one-size-fits-all approach. However, to achieve this, it is necessary to know how skilled our students are. The profile of assessment should also change the goals from a summative exclusively evaluation-based approach to a diagnostic, more learning-centered to use assessment to facilitate the learning.

Then, Prof. Molnár introduced us how the evaluation platform should be, taking Hungary's eDia system as an example. She pointed out that the evaluation platform should be learning-centered, easy-to-use platform and even offer possibilities for innovative elements. It should have an item-building-model which can administer for a second or third-generation task. This platform should administer both fixed and adaptive tests and administer the test at any device even by low-speed internet. It should provide prompt and fixed scoring and feedback to both students and teachers. And it should include embedded visualization techniques.

Finally, Prof. Molnár proposed a vision for the future of educational technology. She believes that one of the educational technologies of the future according to our view might be intelligent systems that incorporate sophisticated learner and teacher models, making contributions to personalized education by even predicting what type of tasks and activities will be most beneficial for different students.



Smart Education in the Republic of North Macedonia: National Education Profile——Assistant Prof. Ana Sekulovska Jovkovska

In this lecture, Prof. Ana Sekulovska Jovkovska introduced the application of technology in the smart education model in North Macedonia from multiple aspects.

First of all, education policies' formulation and implementation require infrastructure -- databases, mainly composed of data from the education system, university databases and independently operated pre-school education databases. But it also leads to problems such as a lack of quick and easy access to statistics and information to develop evidence-based policies. Vocational education and training centers in North Macedonia mainly help teachers to improve their skills and work efficiency, and improve students' learning results. In response to this positive phenomenon of teachers working hard to keep up with the digital pace, Prof. Ana Sekulovska Jovkovska made six recommendations in terms of national vision and planning: (1) Improving and harmonizing the legal basis for education; (2) Improving the statistical data collection system and Education and Informatization Management System (EMIS) ; (3) Ensuring the widespread use of ICTs in education, training and digital literacy; (4) Strengthening social partnerships and enhancing education policy dialogue; (5) Implementing the Macedonian qualification certification framework; (6) Improving the capacity of national institutions and providing monitoring and evaluation of educational strategies.

Second, innovative teaching methods and strategies, such as the application of content management systems. Prof. Ana Sekulovska Jovkovska also shared examples of practical advances in smart education, such as DEUINO system and EDUINO webinars. EDUINO is the portal owned by the Bureau for Development of Education, which offers digital content in support of the educational process in the country. EDUINO webinars are

interactive informal events, where participants have the opportunity to exchange their opinions.

Third, the policy and solution of open educational resources. North Macedonia currently has Open Educational Resources (OER) and skool.mk. Based on the proposal of UNESCO, OER provides multi-level, multi-lingual and multi-field educational services, aiming to enhance the academic community's understanding and ability to create and use open educational resources. The database can be reorganized according to different educational needs. In addition, North Macedonia has multiple locations, databases and websites.

Fourth, education governance. Progress has been made in the development of education management information systems, human resource management systems, and electronic grade books. In the implementation process of smart education, Prof. Ana Sekulovska Jovkovska introduced the Informatization Index, which is a composite of two main categories (sub-indexes) and three individual indicators in each of them, and enumerated the relevant data of different countries for comparison.

As a conclusion, Prof. Ana Sekulovska Jovkovska mentioned that the National Strategy for the Information Society of North Macedonia states that coherent policies should be developed to enable citizens to benefit from information technology and to participate in the decision-making of the state and society through ICTs. The first phase has been completed in North Macedonia - the state, social and educational sectors are covered by ICTs. Finally, Prof. Ana Sekulovska Jovkovska called on teachers, higher education institutions and others to work together to promote the digitalization of education in North Macedonia.

Digital Transformation of Education: Benefits and Challenges——Prof. Sandra Kucina Softic

In this lecture, Prof. Sandra has talked about Digital Transformation of Education- Benefits and Challenges from the perspective of European level. The topic of digital transformation has been present for a number of years, but the pandemic definitely emphasized the importance of digital transformation of education and use of digital technologies in the educational process. The pandemic raised even greater digital divide in society as it was more visible that people do not have the access to internet and digital technologies and more important they do not have digital skills.

First of all, Prof. Sandra has differentiated that the emergency remote teaching (ERT) we experienced during pandemic is not online education. Online education is planned and prepared from the beginning to be held online. The education before the pandemic was prepared dominantly for classroom teaching and just moved into an online environment. Online education maybe was the victim of the pandemic in a way that all the negative experience with emergency remote teaching during the pandemic were somehow accredited to the online education.

Next, the definition has been given to the digital transformation of education. The digital transformation in education requires teachers to adapt and adopt digital technologies, methodologies and thinking. The digital transformation in educational institutions is not about innovation or technology, but about culture. Through the digitalization of learning experiences, both teachers and students can improve their skills with a common goal: to create a more active and effective educational process.

The advantages of distance education are well recognized. Besides bringing the flexibility of time and space, easiness of communication, accessibility to a large population it has as well saved the education during pandemic. . Without going anywhere,



very quickly we can reach people on a global level, access numerous educational resources new one and actual but as well which are multimedia and interactive, also repositories, museums and digital libraries on the global level.

But, people also have to be aware of some issues not in a favor of digital education: students today have poor oral communication because of just communicating online; read fewer books; feel isolated. Focus should be on quality of teaching and learning and the quality of learning materials. Lack of digital skills of teachers and students is one of the biggest factors why they are reluctant to use digital technologies in the educational process.

No matter what way of teaching, people need to focus on the quality of education and be aware of the possibilities digital technologies can bring into the educational process in order to ensure the best student learning experience. According to Prof. Sandra, one of the biggest challenges in digital education is to have enough and efficient trained teachers.

To achieve the digital transformation of education, Prof. Sandra has emphasized that we need new visions, focusing on how to intentionally design academic courses in the ways that allow flexibility, engagement, and excellence; how to combine classroom and online teaching, ensuring the best learning experience; prepare students to be lifelong learners; cultivating skilled teachers who will be able to design such teaching and learning.

Digital Transformation in Greek Education and the Work for Enhancing Digital Skills and Competences for the Digital Age——Prof. Charalampos Karagiannidis

Prof. Charalampos Karagiannidis from the Department of Special Education, University of Thessaly, Volos, Greece, shared with us *Digital Transformation in Greek Education and the Work for Enhancing Digital Skills and Competences for the Digital Age*.

In recent years, the digital, green transformation of society and the impact of COVID-19 have accelerated the pace of change in education. In terms of digital education, Prof. Charalampos Karagiannidis made two points: first, we use a large number of digital technologies, applications, platforms and software to improve the quality of education and training; Second, we need to equip all learners with digital capabilities, knowledge, skills and attitudes. To help them learn, work and live in a digital society. To achieve this goal, new policies, actions, infrastructure, strategies and leadership, as well as upgrading the skills of teachers and students, and improving national and international frameworks are needed.

Prof. Charalampos Karagiannidis went on to cite statistics about Europe, such as wide regional disparities in Internet coverage, the fact that 40 percent of Europeans lack basic digital skills and that the vast majority of teachers are not digitally ready. However, the European Skills Agenda's target for 2025 is that 70% of citizens aged 16-74 should have at least the most basic digital skills. In this context, Greece has launched *the Greek Digital Transformation Bible from the years 2020 to 2025*, which aims to give all citizens access to safe, fast and reliable Internet connections and better digital services. At the European level, in order to adapt educational institutions to the demands of the digital age and benefit more people, the



team of Prof. Charalampos Karagiannidis has been actively developing MOOCs, including K-12 education and the development of digital competence of teachers and students. The feedback from students has been very positive.

Prof. Charalampos Karagiannidis and his team have also developed MOOCs to improve teachers' digital skills. Based on *the Conceptual Framework of the European Commission for Digital Competence for Educators* (DigCompEdu), the MOOCs synthesizes national and international efforts in this area to describe the specific digital competencies required by educators. In addition, based on the DigCompEdu, the team proposes a 6-level progression model and introduces "a self-reflection tool" (SELFIE) to help educators assess and develop their digital capabilities, identify their strengths and gaps, and further enhance digital capabilities.

Finally, Prof. Charalampos Karagiannidis showed us the ecosystem created by using SELFIE and the MOOCs designed by teachers using SELFIE. This also led to a report that gave feedback on personal digital abilities. The results showed that teachers could design their own professional learning component, practice digital abilities, and reflect on their professional growth and practice.

Digital Future University 2030——Dr. Diana Andone

Coming from the Polytechnic University of Timisoara, Romania, Dr. Diana Andone has discussed today on Digital Future Universities with a vision for 2030 and with the focus on micro credentials, as well as shared the ideas of what their university is doing.

To begin with, Dr. Diana Andone has briefly introduced the Polytechnic University of Timisoara. The Polytechnic University of Timisoara is a part of the famous European Universities' Alliances, and also a part of the EUDRES that Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions as a university alliance, with which the future universities idea is shared.

Next, according to Dr. Diana Andone, a framework has been illustrated, in which three main areas has been focused on. One is the vision of the leadership and of the governments; the other one is about how to build up the people, communities, and the stakeholders around this vision; and then the tools and the spaces and resources to support to this vision. To the fostering of the digital transformation where different scales and levels are needed, and the collaboration and the openness of all the stakeholders need to be empowered, as well as how to create that leadership, which will create the change, needs considering.

Digitization and the digitalization have been working on and now the digital transformation has been increasingly taken into account.



As mentioned, the digital transformation requires a strong academic culture change and to transform the learning. In this regard, taking the Unicampus as example, Dr. Diana Andone has talked about the micro credentials and how to involve the communities to create micro credentials.

Unicampus is an online course free for everybody in Romanian and different languages, supported by us and by the technical universities from Romania. For instance, *the Digital Culture Courses, the Open Virtual Mobility courses, and the Digital Skills for Education and Culture Workshop* and so forth. At the end of these courses, learners can get two different levels of accreditation or validation: open badge or the course certificate. Open badges can validate the micro-credit in informal learning, while a certificate can confirm one's competence and so on in the formal learning.

In conclusion, Dr. Diana Andone has stated that we focus so much on micro credentials, and emphasize formal and informal learning. We need to focus more on these universities' issued non-degree certificates and on the degree programs and accredited programs. To achieve this, Dr. Diana Andone emphasizes that we need to have a vision and take professional and structured measures to collaborate with partners or stakeholders, ensuring the validation, accreditation and transfer on any open badge certificate of micro credentials, making sure that the student and the future graduates will always have those potentials.



Smart Education: Bulgarian case——Prof. Siyka Chavdarova—Kostova

In this lecture, Prof. Kostova introduced a series of strategic documents related to digital transformation in Bulgaria. They have analyzed the composition of smart education and outlined its development prospects, which is an important basis for formulating relevant national programs. Prof. Kostova then listed the policies and practices related to digital transformation in Bulgaria.

Digital Transformation of Bulgaria for the Period 2021-2030 emphasizes education and training. The document lays the foundation for smart education by focusing on basic communication connections, paying attention to the creation and maintenance of cloud-based service learning environment, and emphasizing the importance of encouraging teachers to "acquire and improve digital skills and use innovative teaching methods".

National program, digital Bulgaria 2025 focuses on improving digital capabilities and skills. Its initiatives and objectives are as follows: First, providing a digital foundation for schools and to assess the digital capabilities of students who have completed the first stage of high school. Second, modernization of curriculum and teaching methods. Third, introducing computer modeling and training and introducing an overview of "hardware and software services" at an early stage. Fourth, improving teachers' skills. Fifth, strengthening cooperation among education, industry and non-governmental sectors.

The next document is *Strategic Framework for the Development of Education, Training and Learning in the Republic of Bulgaria (2021-2030)*. One of its priority areas is "educational innovation, digital transformation and sustainable development". Under the guidance, some practical activities with the theme of "Innovation in Educational Environment" were carried out. Furthermore, science, technology, engineering, and mathematics (STEM) was

adopted to carry out reforms in educational environment, curriculum system, teaching organization and school process management, experiment, and research.

The Ministry of Education and Science of Bulgaria provided financial and technical support for its practical activities in higher education, including smart education and digital training of teachers. They supported the popularization and training of digital technology for secondary education, the establishment of a positive STEM environment, and the creation of integrated learning space to enhance the natural science and mathematics capacity of schools. Meanwhile, they also supported the use of modern digital tools, helped to expand access to cloud information and communication technology (ICT) educational resources, and encouraged to purchase the hardware and software resources required for digitization.

In addition, the Ministry of Education and Science of Bulgaria conducted training for teachers in the field of information and communication technology. Through the creation of a portal site, a variety of resources for teachers to learn and share. At the same time, Bulgaria is using intelligent platforms in secondary and higher education, conducting distance education and training teachers in the proper use of platforms through cooperation with NGOs.

Finally, Prof. Kostova pointed out that the integration of ICT is a new trend in Bulgaria's education sector and that artificial intelligence has an important strategic position as a necessary part of Bulgaria's vision for digital transformation. In conclusion, the development of smart education in Bulgaria has its own foundation and promising prospects, which can improve the quality and efficiency of secondary and higher education.

Smart Education in Croatia——Ms. Maja Homen (PhD candidate)

In this lecture, Ms. Maja Homen introduces the situation of smart education in Croatia.

The first is the establishment of two basic institutions, CARNet and Srce, to support all educational participants and all educational technology development. Through them, the Loomen system which meets the needs of primary and secondary school teaching and the Merlin system which meets the needs of university teaching are put into use. In addition, teachers were trained in digital skills and informatics was included in the curriculum for the first grade of primary school.

Second, Croatian schools have high wireless coverage and have adopted newer educational technologies. As the next development level of the application of information and communication technology (ICT) in education, smart education has great significance at the three levels of teaching, technology and organization, which constitute an important part of the development of education in Croatia. These three dimensions are included in the concept of "a digitally mature school", that is, a school with a high level of ICT integration that systematically uses ICT in school operations and education. Develop a digitally mature school framework and define its defining elements to promote overall improvement and maturity. To achieve these visions, active student models are needed -- integrated into smart learning environments that support smart city education activities and contribute to the overall development of the city. At the same time, the development of student model can also help students interact with each other, obtain better learning outcomes, and promote the creation of smart learning environment.

Currently, Croatia has a series of digitization initiatives in the field of education, including: Srce high speed bandwidth infrastructure, HR-ZOO data Cloud, CroRIS



National Scientific Information System. In order to better integrate smart education into life, Croatia has set five strategic objectives from the educational, scientific and technical levels: (1) To establish a comprehensive system of individual abilities and potentials through lifelong and vocational mentoring services; (2) Improve quality and establish quality assurance system; (3) Develop appropriate processes and systems to recognize people's acquired knowledge and skills; (4) Improve the continuous professional development and train system for educational staff; (5) Encourage the use of ICTs in learning and education.

In the field of technology and information, Ms. Maja Homen introduced in detail the "School 20 Project", e-Islands project, e-book project, School e-Mine project, AAI@EduHr system, e-reading portal, e-lab, etc. carried out in Croatia from the aspects of content, application field and development status. The implementation of these projects can improve the quality of school education and the connection between schools, improve the quality of education in remote areas and enrich and develop smart education in Croatia.

Finally, Ms. Maja Homen looks to the future: With the rise of 5G and the development of digitalization, the application of ICT in education is not limited to basic digital education. In the future, there will be smart learning environments, smart learning through situational environments and adaptive devices.

Analysis and foresight of global smart education development in the context of digital transformation of education——Prof. Yunwu Wang

Nowadays, the digital transformation of education has attracted much attention in the whole world. In this lecture, Prof. Yunwu Wang introduced China's smart education with the theme of "Analysis and Foresight of Global Smart Education Development in the Context of Digital Education Transformation".

The COVID-19 epidemic has brought both challenges and opportunities to all countries in the field of education. According to the UNESCO report, students in many countries have shown varying degrees of decline in learning ability. But at the same time, the epidemic has also promoted the digital transformation of global education. In this era, countries are in urgent need of building a global education governance system with sustainable development together, and transforming education emergency governance into education normalization governance. At the decision-making level, it should also change from relying on past experience to a more diversified decision-making mode, such as scientific decision-making, data decision-making, smart decision-making and precise one.

The digital industry is becoming the fourth industry, and the digital economy is also showing explosive growth. In this context, as countries gradually enter the stage of popularization of higher education, education needs to achieve adaptive transformation and development oriented to digital economy and smart society. Therefore, Prof. Wang talked about his understanding of education's digital transformation and the current difficulties. He said that due to the triple impact of epidemic, intelligent technology and education attraction, education has started the digital transformation of all elements in all fields.

To achieve this goal, we need to solve all the obstacles which hinder the development of education informatization including the difficulties in cultivating innovative talents and information islands, and promote the digital transformation of education and its upgrading, so as to form a digital education ecological chain and ultimately achieve the high-level development of digital economy and smart society.

When it comes to China's current development trend of smart education, Prof. Wang pointed out that smart education is now highly valued by the central government, and even become a national strategy. In recent years, China has introduced many national policies related to smart education and launched a national smart education platform, which has raised smart education to a new height. At the same time, Beijing, Jiangsu, Shandong and other provinces have planned the development prospect of smart campus in advance, promoted the digital empowerment transformation of campus, and will carry out the smart education demonstration area construction program.

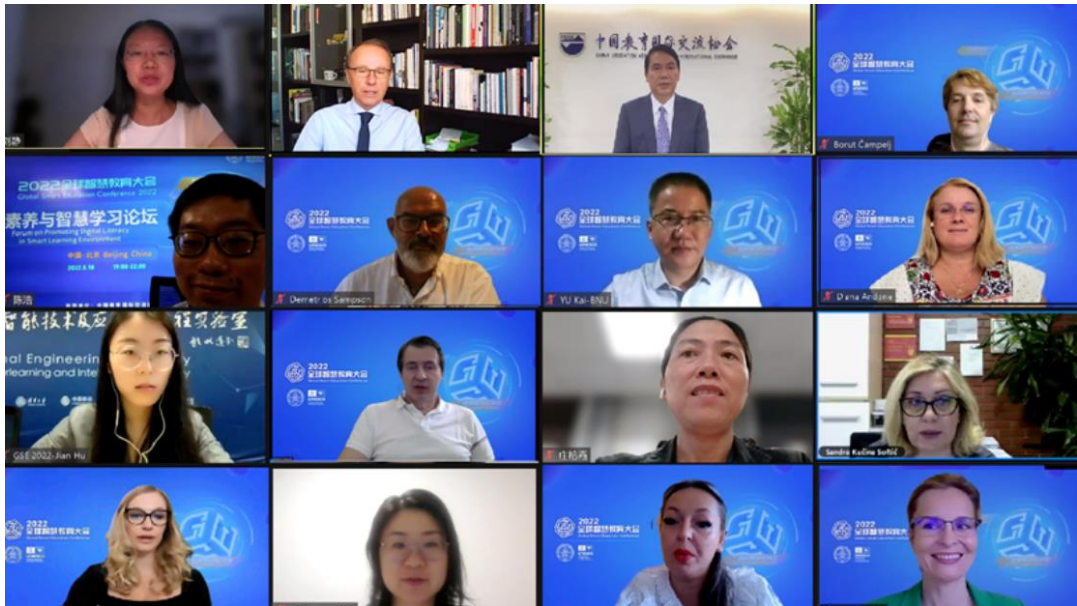
Finally, Prof. Wang believes that the current education is undergoing profound changes. AI enabled education, precise decision-making supported by big data, and Online-Merge-Offline smart campus are becoming the new directions of education reform. In the future, with the help of artificial intelligence, the intelligent civilization of "man-machine synergy" will change towards the smart civilization of "man-machine co-creation". The real campus, smart campus and Metaverse campus will also achieve integrated development.

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