

Hybrid International Student Conference

Educational Innovation towards Industry 5.0: Fostering International Collaboration

Dates: March 7-8, 2024

Venue: Human Sciences Building B Room 523/524
and Zoom conference

Organizer:

Master's and Doctoral Programs in Education
Graduate School of Comprehensive Human Sciences
University of Tsukuba, Japan

Hybrid International Student Conference

“Educational Innovation towards Industry 5.0:Fostering International Collaboration”

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Foreword

Welcome esteemed participants to the Hybrid International Students Conference 2024! It is with immense pleasure that we convene this conference, uniting graduate students from eight leading global universities in the realm of education.

Originally conceived in 2021 as the Online International Student Conference amidst the challenges posed by the COVID-19 pandemic, this vital forum has persevered through 2022 and 2023, buoyed by the unwavering enthusiasm of all involved, the steadfast support of the University of Tsukuba, and the collaborative spirit of our seven partner institutions. This collective achievement is one we can all take pride in.

With the easing of restrictions across many nations, including Japan, we have embraced a new format for this year's gathering: the Hybrid International Student Conference, blending both online and face-to-face interactions.

In my capacity as Chair of Master's and Doctoral Programs in Education, I extend a warm welcome to the graduate students hailing from China, Korea, Poland, and Thailand, who have journeyed to Japan to partake in this conference. Equally deserving of gratitude are the graduate students who represent their universities remotely, without whom this Hybrid Conference would not be possible. I express my heartfelt appreciation to all participants, whether presenters or attendees, for coming together in this collaborative endeavor.

In the tradition of our previous Online Conferences, the core program for the first day (March 7) will feature presentations from representative teams of each university. However, on the second day (March 8), we embark on a new approach: two symposiums, comprising a total of 11 participants (7 graduate students from visiting universities and 4 from the University of Tsukuba), followed by group discussions.

The selection of respective symposium members, the curation of themes and content, and the preparation of presentation materials were accomplished through cross-national and cross-university collaboration, culminating in the dynamic discussions that will unfold during our conference.

The theme of this year's Hybrid Conference, "Educational Innovation toward Industry

5.0: Fostering International Collaboration," invites reflection on the profound impact of recent technological advancements, particularly in robotics and artificial intelligence, on our lives. While these innovations enhance convenience and transform communication and learning, they also raise concerns about automation's implications for employment and the exacerbation of social inequalities. Our hope is that this conference will illuminate both the promises and challenges posed by these advancements, sparking meaningful discourse on the future role of education in addressing these critical issues.

As we embark on this intellectual journey together, I eagerly anticipate the insightful discussions and innovative ideas that will emerge, shaping the trajectory of education and international collaboration.

A handwritten signature in black ink, reading "T. Fujita". The signature is fluid and cursive, with a long horizontal stroke extending from the end of the name.

Teruyuki FUJITA, Ph.D.

Chair, Master's and Doctoral Programs in Education,
Graduate School of Comprehensive Human Sciences;
Professor, Institute of Human Sciences,
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Programme

Educational Innovation Towards Industry 5.0: Fostering International Collaboration

Building on the success of the 2023 Online International Student Conference (OISC), where graduate students from eight universities shared insights into the future of education, the 2024 OISC seeks to explore the role of educational innovation in the context of Industry 5.0, emphasizing the importance of international collaboration. As stated in the Sustainable Development Goal (SDG) 9 “Industry, Innovation and Infrastructure,” this theme reflects the urgent need to develop educational strategies to respond to the rapidly advancing technological landscape of Industry 5.0. This year, we are transitioning the conference to a hybrid format, hosting some students from different universities at the University of Tsukuba for in-person discussions and presentations, while also connecting with online participants. The conference remains a platform where students from diverse backgrounds can share ideas, challenges, and strategies for educational issues. We hope to foster a network of young scholars and practitioners who can collaboratively envision and shape the future of education in an interconnected world.

- Dates: March 7th (Thursday) and 8th (Friday), 2024
- Time: 15:30-19:00 JST (15:30-19:00 in Cheongju, 14:30-18:00 in Changchun, 13:30-17:00 in Khon Kaen, 11:30-15:00 in Almaty, 09:30-13:00 in Moscow, 07:30-11:00 in Krakow, 19:30 – 23:00 in Christchurch)
- Venue: Hybrid (in person & zoom conference)
- Organizer: The University of Tsukuba, Graduate School of Comprehensive Human Sciences, Degree Programs in Education
- Support: University of Tsukuba, Center for Research on International Cooperation in Educational Development (CRICED)
- Participating universities: University of Tsukuba (Japan), Korea National University of Education (South Korea), Northeast Normal University (China), Khon Kaen University (Thailand), Abai Kazakh National Pedagogical University (Kazakhstan), Moscow City University (Russia), University of the National Education Commission, Krakow (Poland), University of Canterbury (New Zealand)

Day1 March 7th, 15:30-19:00 JST

Openings

15:30 - 15:35 Opening greetings from UT

15:35 - 15:40 Explanation of conference schedule, presentation rules

Presentations

15:40 - 18:15 Presentations by students from each university

--Presentation 15min, Q&A 5min, 20min in total per one

1. 15:40 - 16:00 University of Tsukuba (Japan)
2. 16:00 - 16:20 Korean National University of Education (South Korea)
3. 16:20 - 16:40 Northeast Normal University (China)
4. 16:40 - 17:00 University of Canterbury (New Zealand)
- 17:00-17:15 Break time
5. 17:15 - 17:35 Khon Kaen University (Thailand)
6. 17:35 - 17:55 Moscow City University (Russia)
7. 17:55 - 18:15 University of the National Education Commission, Krakow (Poland)
- 18:15-18:30 Break time

Wrap-up & Concluding Remarks

18:30 - 18:50 Wrap-up session

18:50 - 19:00 Concluding remarks by organizing side and explanation for the next day

Day 2 March 8th, 15:30 – 19:00 JST

15:30 - 15:35 Greetings from UT, explanation of today's schedule

Part I 15:35 - 17:05 Symposium (delivered by UT)

“Creating Educational Innovation towards Industry 5.0 through International Collaboration”

15:35 - 15:55 Lecture by Prof. Shingo Nahatame, Ph.D.

15:55 - 16:15 Group 1 presentation (by a mix of students participating face-to-face)

16:15 – 16:35 Group 2 presentation (by a mix of students participating face-to-face)

16:35 - 16:40 Discussant's comments (faculty member)

16:40 – 17:05 Discussion (comments and questions)

17:05 - 17:20 Break time

Part II Discussion in break-out sessions

17:20 - 17:50 Discussion 1 (discussion on the conference theme)

17:50 - 18:20 Discussion 2 (discussion on possible international collaboration & networking)

General discussion in the major meeting room

18:20 - 18:40 Sharing of discussion points from each session (3min each, 5 sessions)

18:40 - 18:50 Comments from faculty representatives of each university

18:50 - 19:00 Closing address from the organizing side

University of Tsukuba

**Japanese Educational Policies in Building Society 5.0:
Addressing the Challenges of an Increasingly Diverse Society**

HUANG, Chichun
ZHANG, Chuanbo
DOTEKUCHI, Shinya
WANG, Ziang

The Background of Society 5.0 in Japan

Our country and the world are in the midst of an upheaval. For example, Europe was embarking on a transition towards climate neutrality and digital leadership. Based on this background, the concept of Industry 5.0 was discussed across Europe in 2020 (Julian Müller, 2020). In recent years, Japan has already faced challenges such as a declining birthrate, an aging population, worsening natural disasters and declining international competitiveness in science and technology. In order to solve these problems, the creation of diverse knowledge as well as the redesign of existing society as a whole through the convergence of knowledge and the development of human resources are unavoidable (Cabinet Office 2021).

Based on this background, in Japan, there is a concept called Society 5.0, "a human-centered society that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space", proposed in the fifth Science and Technology Basic Plan in 2016 (Cabinet Office 2021). Because all of the above-mentioned challenges still exist today, it is necessary to materialize Society 5.0. In the Sixth Science, Technology, and Innovation Basic Plan, the vision for the future society of Society 5.0 was expressed that Japan should aim for as "a society that is sustainable and resilient, that secures the safety and security of the people, and that enables each and every one of them to realize diverse well-being " (Cabinet Office 2021). This is also in line with the SDGs. To achieve Society 5.0, the three following policy packages are promoted in the education field.

Policy 1 Promotion of Diverse Learning with Emphasis on Children's Characteristics

The first policy package focuses on diversifying learning with an emphasis on children's characteristics. Today, children's needs are becoming increasingly diverse, encompassing those with developmental disabilities, unique talents, and limited proficiency in Japanese spoken at home. As children's diversity grows, traditional paper-based, simultaneous classes are reaching their limits. Under these circumstances, the aim is to realize the diverse well-being of each

child and to maximize the potential of all children, by enhancing individualized optimal learning and collaborative learning (Central Council for Education 2021).

In promoting this policy, the introduction of ICT technology has been emphasized. With the spread use of tablets, children have begun to learn with one digital device in each of their hands. At school and at home, they are expanding their own world of information gathering, communication, and creative activities. In doing so, ICT can be used for diverse children to enrich individualized and collaborative learning in an integrated manner. In this context, it is considered essential for children to have digital citizenship (Cabinet Office 2022).

To enhance digital citizenship education, support will be provided to schools, including presenting curriculum standards, and providing training for teachers. Additionally, emphasis is also placed on promoting digital citizenship education in each subject area during the revision of the next Courses of Study. However, children of the digital native generation, who have grown up with the Internet as a natural part of their lives, are quickly outpacing adults in terms of digital skills. Facing this challenge, a practical guidebook for parents has been launched to assist them in nurturing their children's digital citizenship at home (Ministry of Internal Affairs and Communications 2023).

The issue of evaluation remains a challenge. Promoting individual optimization without revising the evaluation criteria may result in autonomous learning dictated by algorithms and AI (Cabinet office 2022). Yet, changing the evaluation criteria is not a simple task; it requires understanding not only from schools but also from society as a whole. Additionally, inquiry-based learning has not been adequately evaluated and this also poses a bottleneck in the qualitative transformation of education.

Policy 2 Establishment of an Ecosystem to Support Inquiry and STEAM Education throughout Society

The second policy package is "Establishment of an Ecosystem to Support Inquiry and STEAM Education throughout Society" (Cabinet Office 2022). The background is the current situation in which science and technology are rapidly developing and they are closely related to social issues. In other words, "comprehensive knowledge," learning across disciplines, is necessary to create new value toward the realization of Society 5.0. STEAM education, which is based on science and fosters interest in different fields, receptivity to diverse knowledge, and a sense of social context and social issues, is precisely the process of problem-solving and value creation, and the importance of cross-disciplinary learning and STEAM education from the elementary and secondary education stages is increasing. The definition of STEAM education (Science, Technology, Engineering, Arts, and Mathematics) varies internationally. Therefore,

it focuses on the aspect of STEAM education that is oriented toward the development of the qualities and abilities needed as citizens living in a modern society where the various STEAM disciplines are intricately related (MEXT 2021).

The MEXT's "Reiwa Japanese-style education" also shows STEAM education as a whole school education initiative. The goal is 1) to strengthen inquiry through curiosity-based learning with the participation of a diverse range of social actors, and 2) to help individuals discover what they want to do and continually refine their abilities and qualities to achieve it (MEXT 2021). Toward these goals, an ecosystem that supports schools and students' learning is required, not only in schools but in society as a whole. Specifically, the strategy is for curiosity-based learning that sparks questions in elementary school students and for authentic inquiry and STEAM learning at the high school level. At the high school level, it is expected that inquiry and STEAM education will be centered on subjects that have commonalities with the aims of STEAM education, such as "Period for Inquiry-Based Cross-Disciplinary Study" and "Inquiry-Based Study of Science and Mathematics" (MEXT 2021). Furthermore, elementary and middle schools are also expected to incorporate cross-curricular learning into their students' studies. At the same time, such students' learning should be supported not only by elementary, middle, and high schools, but also by universities, companies, researchers, boards of education, libraries, science museums, and the national government to create an ecosystem.

However, there is the challenge of the difficulties faced by gifted children. Needless to say, children are diverse, and many of them have outstanding motivation and ability in specific fields. As a result, they face the difficulty of having no options other than learning bound by grade level, regardless of their intentions, interests, and abilities. To deepen the understanding of gifted children and enable them to make use of their unique talents and abilities, it aims to create a highly individualized educational curriculum system and realize an environment in which society as a whole supports learning opportunities outside of school.

Policy 3 Breakaway from the humanities/science divide and closing the gender gap in science and mathematics learning

Despite surveys such as PISA placing science and mathematics literacy among Japan's primary and secondary school students in the global front row, the proportion of students choosing science courses at high school and bachelor's level remains at a low rate. In particular, the low rate of female students choosing science courses at the bachelor's level is considered as a problem, with only 7% of all girls entering university choosing science-related courses (Council for the Creation of Future Education 2022).

Many high schools now offer separate humanities and science courses, and students are usually forced to choose between science and humanities at an early stage, especially in high schools where a large proportion of students wish to go on to university. On the other hand, there is a tendency for an increasing number of students to feel that they do not like science and mathematics and that they do not have an image of a science-related career (Cabinet Office 2021). Furthermore, an increasing number of primary school teachers also feel unconfident in science and mathematics classes, especially in the upper grades. The existence of an unfounded bias that girls are not suited to science has also led to a decline in the number of girls choosing science (Tanabe 2023), and the low proportion of females in the science and engineering workforce is also a problem. Factors such as concerns about harassment and difficulties in life-work balance are also disincentives for women to pursue a career as a science researcher with a doctor's degree (Cabinet Office 2022). A further problem is that both men and women do not choose to pursue doctoral studies due to economic factors.

The policy package offers policy directions including strengthening cooperation with parents, schools, and society, to remove biases and spread information that encourages people to choose a career in science (Cabinet Office 2022). Specific examples of role models, such as women working as researchers, should be offered from academia and companies through SNS and other means. Policies are under discussion to encourage doctoral degree holders and researchers in science and mathematics to teach in primary schools. At the high school level, promote curriculum development that promotes inquiry-based learning and cross-discipline education. In university entrance examinations, promote the evaluations of the results of inquiry-based learning and multifaceted and comprehensive evaluations that emphasize actual problem-solving skills. Promote a breakaway from the division of humanities and sciences at universities and other institutions, for example by ensuring double majors and balanced humanities and sciences education. Emphasize the creation of diverse knowledge and the significance of comprehensive knowledge, no matter in humanities or sciences. To encourage the advancement of master's and doctor's courses and the career development of female researchers, promote the thorough prevention of harassment, develop a research environment that is compatible with life events, and foster a research environment in which women can safely choose the path to becoming researchers.

However, even though the package emphasizes the importance of the integration of humanities and science, policies still put more emphasis on the development of science-related discipline. How humanities can be devoted to the development of Society 5.0 remains unclear in the current policy package.

Discussion Points

What is the main challenge that your country is trying to address in the Industry 5.0 era? What role does educational research play in this context? How can educational research contribute to addressing the challenges of Industry 5.0?

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**Korea National University
of Education**

**Korea's Educational Innovation:
A Good Influence on the World**

Gwak, Eun young
Kim, Su rim
Hyeong, Kyung min

Introduction

Technological advances such as Artificial Intelligence are bringing rapid and widespread changes to modern society. These changes are affecting not only the field of education but also society as a whole, and countries around the world are making various efforts to respond to them. In particular, in the Korean education field, advanced technologies, including artificial intelligence, are being actively introduced into education to innovate learning experiences and educational methods. Accordingly, AI-based educational tools such as 'AI digital textbooks' are being actively developed, and they are contributing to the diversification of educational methods and the improvement of efficiency.

Since the COVID-19 pandemic, the importance of remote education and online learning has emerged, and efforts to innovate and improve accessibility are increasing through the development of artificial intelligence and technology worldwide. Many countries are creating a digital education environment, establishing online learning platforms to improve the accessibility and quality of education, and formulating and implementing policies for it.

Moreover, Korea ranked 7th in the world and 3rd among Asian countries in the AI country ranking in 2023. The Republic of Korea became the first donor in the world from an aid recipient country to a donor and is currently demonstrating Korea's talent to developing countries. As will be introduced in detail in the main text, the Republic of Korea is making efforts for 'international cooperation' by establishing public enterprises such as Korea International Cooperation Agency (KOICA) and the Economic Development Cooperative Fund (EDCF) to transfer education that combines information and communication technology and education to developing countries. In this presentation, I would like to comprehensively look at the current application of technology, such as artificial intelligence, in the Korean education field and cases of support for developing countries in promoting educational innovation and international cooperation.

AI Digital Textbooks in Korea

Pioneering the Future of Education

In 2023, South Korea Ministry of Education released "Realizing Personalized Education for All: Digital-based Education Innovation Plan". According to the plan, South Korea plans to deploy AI digital textbooks in schools starting in 2025. AI digital textbooks are "textbooks equipped with various learning materials and learning support functions using intelligent information and communication technologies, including AI, to support various customized learning opportunities that meet students' individual abilities and levels" (MOE, 2023). The widespread use of these new textbooks means that educational innovation will go one step further than the digital education that has been actively discussed and practiced in the past.

Personalized Learning: Tailored to Every student

AI digital textbooks are different from the simple book-type digital textbooks that have been distributed in Korea since 2007. Take math as an example. Before starting a new unit, students are asked to solve problems to make sure they know the basic concepts needed to learn the unit. If students are unsure of the underlying concepts, video lessons or explanations are provided to help them learn on their own. Teachers can also use peer tutors or provide their own guidance. After learning the unit together as a class, students take different levels of questions that the AI provides based on their learning data. The results are automatically graded, and the AI provides information about what each student understands well and where they need additional guidance.

One of the best features of AI digital textbooks is that they analyze each student's learning interests and characteristics to support personalized learning opportunities that are appropriate to their abilities and goals. This has three benefits. First, it allows students to personalize their learning at their own pace, which increases their engagement. Second, it gives teachers the opportunity to efficiently identify the level and extent of learning of all students and design lessons accordingly. Third, parents can easily access objective information about their children.

Until now, math classes have been faced with many challenges in education, such as different levels of students and the need for unified instruction in limited class time. In 'Math Expedition,' one of the AI courseware, the principle of gamification is applied to the math curriculum to arouse students' interest and enable them to deepen and supplement their own learning. It also provides various learning contents, assessment materials, and digital learning aids which brought math learning aids into the virtual world, so that students can easily learn at home without being restricted by space.

In English class, 'AI Pengtalk' is gaining popularity. 'AI Pengtalk' was developed to provide elementary school students with a rich English-speaking environment to help them improve their basic communication skills. It utilizes speech recognition and natural language processing technology to provide one-on-one conversation practice between AI and students. It allows students to freely practice words, sentences, and dialogues included in the elementary school English curriculum, and also provides pronunciation correction services. It is structured to motivate students to achieve through a game-like learning method that rewards them according to their learning, and provides teachers and parents with student-specific learning situations, learning outcome analysis, and content.

Implementation and Expansion Plan

South Korea plans to introduce AI digital textbooks in some subjects (math, English, information, and Korean language (special education)) in March 2025 and gradually expand to other subjects by 2028. It is currently being piloted and used in some digital pioneer schools. The construction of a gigabit wireless network in each school was completed in May 2022, and the distribution of student smart devices is being expanded with the goal of providing one device per student. In addition, teacher training on digital textbooks and edu-tech is being actively conducted in each province, and the number of AI and digital-related teacher learning communities is growing. The Ministry of Education is prioritizing teachers with a strong interest in digital-based education transformation as a leading teacher corps and actively utilizing them for peer training and policy formulation.

Korea's Efforts for International Collaboration

Widening Disparities and Threats to Quality Education

The United Nations has identified the Sustainable Development Goals (SDGs) with sub-goals aimed at expanding educational opportunities and improving the quality of education, especially in developing countries. However, the education gap in many developing countries persists due to underdeveloped infrastructure and a lack of qualified teachers. Despite receiving support from non-regular organizations for school construction and learning equipment, developing countries have not been able to bridge the education gap completely.

Unfortunately, the COVID-19 pandemic has only widened the education gap between countries with non-face-to-face educational environments and those that do not have such facilities. This

has put the future of education at risk in developing countries, where students are already struggling to acquire quality education.

South Korea is widely recognized as a leader in the ICT field. The government, along with the Ministry of Education and the Ministry of Science and ICT, introduced an innovative ICT service called the EBS online class, immediately after the outbreak of the COVID-19 pandemic. This software provided customized functions according to the stages of use of each teacher and student. It is a platform where errors were constantly improved, and efficiency was enhanced. This allowed students to check and complete courses and tasks selected by teachers, while teachers were able to induce and manage learning by checking students' learning process.

Korean schools have continued to use this service even after the start of school and are now using it in a more advanced form for mixed learning and data on learning processes. This has helped Korean students to keep up with their studies even during the pandemic, and the country's education system has continued to function without any major disruptions.

South Korea's Educational Aid Initiatives

Korea has been making significant strides in providing aid to developing countries in the field of education. Over the last five years, Korea has provided around \$300 million in aid to countries such as Vietnam, India, Pakistan, Ethiopia, and Kenya. The aid has been primarily focused on several areas of education, including general education, basic education, secondary education, university education, and vocational college education.

One of the strengths of Korea lies in its information and communication technology (ICT) sector, and it has been receiving requests for technology transfer for digital-based remote education from developing countries. In response to these requests, the Korean government has announced its support through the International Development Cooperation Committee for the establishment of a customized remote education system for developing countries. The government has already initiated the project with utmost earnestness.

As part of the project, the "Enuma School" program, which is Korea's digital content, has been adopted as a digital learning initiative for children in Pakistani public schools. The program provides tablet-based digital learning opportunities for English and mathematics. Additionally, the project has been expanded through "KitKit School", a free educational application that helps with basic learning.

The "Rwanda Teacher and Pre-Teacher ICT Education Capacity Enhancement Project" is

another example of how Korea is supporting incumbent teachers' instructional plans using computers and supporting their ability to perform education using ICT by subject.

Digital education offers equal access to education for all, irrespective of gender, disability, or class. In the wake of the COVID-19 pandemic, securing high-quality learning opportunities and strengthening digital capabilities through digital education can act as a beacon of hope for the future of developing countries.

Through the utilization of Korea's excellent information and communication technology, the educational gap between countries can be bridged, and the accessibility and quality of education can be improved through distance education and the distribution of digital teaching and learning materials. Furthermore, beyond solving the problem of the education gap, it will play a more important role in cultivating human resources and reorganizing social structures necessary for the upcoming knowledge and information society.

Conclusion

The introduction of AI digital textbooks marks a significant step towards personalized education and educational innovation. The implementation of such technology not only addresses the challenges faced in traditional education settings but also provides valuable insights for teachers and parents regarding students' learning progress. However, some people raise concerns about excessive use of digital devices leading to over-immersion or addiction. To mitigate these risks, it is essential to establish clear guidelines and teachers should ensure a balanced approach to technology integration.

In the Sustainable Development Goals (SDGs), the UN has set sub-goals to expand educational opportunities and improve the quality of education in developing countries in the field of education. However, through the COVID-19 pandemic, many developing countries have been suspended from school for about two years due to a lack of electronic devices and infrastructure. For "international cooperation" and "world development," "educational innovation" is inevitable, which has an organic correlation. To live up to its reputation as the world's first donor country as an aid beneficiary, the Republic of Korea will strive for international development and cooperation and will achieve good results through our strengths, "education" and "information and communication technology (ICT)."

This suggests that Korea also needs to come up with a plan to support ODA in the field of education throughout its life in order to achieve the common goals of the international

community. In addition, even if projects in the basic education sector are increased, software should be provided together beyond simple hardware support such as school construction and equipment provision. It is expected that if online education such as EBS online classes is actively used for investment in expanding basic education, and if we appropriately apply AI-based digital education which is planned to be applied to public education in Korea, to overseas education support projects, it will create a more significant and rapid effect.

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**Northeast Normal
University**

**Facilitating the Digital Transformation of Teacher Education
through International Collaboration in Industry 5.0**

Huang, Jing

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Keywords: Industry 5.0, teacher education, digital transformation, international collaboration, TPACK, digital literacy.

1. Rethinking teacher education at the age of Industry 5.0

Throughout history, successive industrial revolutions have reshaped societies, economies, and education systems. Each wave of technological advancement has brought about significant changes in production processes, labor markets, and the skills required of the workforce. Unlike the predominantly automated processes of Industry 4.0, Industry 5.0 emphasizes the integration of advanced digital technologies with human-centric approaches to production, and promotes a collaborative relationship between humans and machines, recognizing the unique strengths and contributions of both. With these background circumstances, education, as an indispensable pillar and an indispensable force for the advancement of nations, it continually adapts in reflection of shifts in culture and commerce, nurturing adept and knowledgeable individuals essential for the prosperity of enterprises to meet the demands of these changing landscapes.

In Industry 4.0, education placed emphasis on technology while minimizing human intervention, favoring the utilization of machinery. However, with the advent of Industry 5.0, the aim is to strike a harmonious equilibrium between autonomous machinery and human involvement. This fusion of cutting-edge technology and well-trained professionals fosters more efficient, sustainable, and secure production processes. In adapting to the manpower requisites of Industry 5.0, there arises a need for a teaching and learning ecosystem that is more human-centered, purpose-driven, inclusive, learner-centric, collaborative, and environmentally sustainable. This necessitates a transformation in the roles of educators within this novel ecosystem,

empowering them to facilitate learners in effectively attaining their educational objectives. And teacher education plays a crucial role in preparing educators to effectively navigate and adapt to new paradigms. In this context, the digital transformation of teacher education assumes heightened importance as educators are tasked with preparing students for an increasingly technology-driven and interconnected world.

2. Digital transformation of teacher education is needed in Industry 5.0

Historically, each industrial revolution has posed unique challenges and opportunities for teacher education. The transition from agrarian societies to industrialized economies during the First Industrial Revolution underscored the need for basic literacy and numeracy skills among educators to meet the demands of a rapidly changing workforce. Similarly, the advent of mass production techniques in the Second Industrial Revolution necessitated the development of specialized vocational training programs to equip workers with the skills required for employment in factories and manufacturing facilities. The introduction of computers and automation technologies in the Third Industrial Revolution brought about significant changes in educational practices, prompting educators to incorporate digital literacy and computer skills into curricula. The Fourth Industrial Revolution, characterized by the pervasive use of information technology and the internet, further accelerated the digitization of education, giving rise to e-learning platforms, online resources, and digital teaching tools.

Now, as we stand on the cusp of Industry 5.0, the imperative for digital transformation in teacher education has never been more pressing. The integration of advanced technologies such as robotics and artificial intelligence into educational practices necessitates educators to acquire new skills and competencies to effectively navigate this evolving landscape. International collaboration emerges as a key strategy in this endeavor, enabling educators to share best practices, leverage emerging technologies, and adapt pedagogical approaches to meet the evolving needs of Industry 5.0.

3. Digital transformation of teacher education through international collaboration in Industry 5.0

First and foremost, the paper advocates for the promotion and establishment of international partnerships and networks among educational institutions and

stakeholders. Collaborative endeavors, such as joint research ventures and faculty exchanges, hold immense potential to cultivate knowledge sharing and expedite the adoption of exemplary practices in digital pedagogy. Through the synergy of diverse global partners' expertise and resources, educators stand to glean valuable insights into cutting-edge pedagogical approaches and emerging technologies pertinent to the dynamics of Industry 5.0. Initiatives like the Global Teacher Education Networks (GTEN) exemplify the tangible benefits of such collaborative frameworks. The formation of these global networks not only serves as a conduit for knowledge dissemination but also as a platform for educators to engage in Continuous Professional Development (CPD) through vibrant online learning communities. These networks afford educators access to a rich tapestry of teaching methodologies and technological innovations, ensuring that they remain abreast of the latest educational advancements. Facilitating cross-cultural exchanges and collaborative projects, these networks further fortify the digital literacy and pedagogical acumen of educators, empowering them to navigate the complexities of the digital landscape with confidence and efficacy.

Secondly, the paper underscores the paramount importance of integrating Technological Pedagogical Content Knowledge (TPACK) into teacher education curricula. TPACK frameworks, customized to meet the evolving demands of the digital age, empower educators with the requisite skills to adeptly harness digital tools and resources in their instructional practices. Emphasizing experiential learning and real-world case studies can further bolster educators' proficiency in seamlessly integrating technology across a myriad of educational settings. Moreover, fostering international collaboration through Curriculum Harmonization initiatives can yield significant benefits by aligning teacher education curricula with global standards of digital competencies. This entails the development of collaborative courses, modules, and assessment frameworks that seamlessly incorporate Industry 5.0 technologies and competencies such as data analytics, artificial intelligence, and the Internet of Things (IoT). By harmonizing curricula in this manner, educators are better equipped to impart relevant and cutting-edge knowledge to their students, preparing them for success in the digital age.

Furthermore, the paper underlines the critical importance of targeted professional development initiatives aimed at bolstering digital literacy among educators. In response to the ever-evolving digital landscape, workshops, seminars, and online courses focusing on digital literacy skills, data literacy, and cybersecurity are

imperative to empower educators with the necessary skills to navigate this complex terrain with confidence. Elevating educators' digital competencies has become an indispensable prerequisite for envisioning, designing, and implementing instructional formats, as well as for fostering and perpetuating effective learning frameworks. It is essential for evaluating student progress and promoting active student engagement within the dynamic realm of an expanding digital milieu. Additionally, enhancing digital literacy and language teaching competencies among teachers is paramount for success in a multilingual and multicultural digital environment. International collaboration presents valuable opportunities for educators to develop these proficiencies through language exchange programs, digital literacy workshops, and online language courses. In addition, cultivating a culture of continuous learning and experimentation is instrumental in encouraging educators to embrace emerging technologies and innovative teaching methodologies. By fostering an environment conducive to ongoing professional growth and exploration, educators are better equipped to adapt to the evolving demands of Industry 5.0 and effectively prepare students for success in the digital age.

Moreover, the paper highlights the importance of policy support and infrastructure investments to facilitate the digitization of teacher education. Governments and educational institutions must prioritize funding for technology infrastructure upgrades, digital resources, and faculty training programs. Policy frameworks play a pivotal role in providing guidance, direction, and incentives for educational institutions to embark on comprehensive digitization initiatives. They serve as the foundation upon which strategic plans and implementation strategies are formulated, ensuring coherence and alignment with broader national and educational objectives. Effective policies not only articulate the vision and goals for digitization but also delineate the responsibilities, roles, and expectations of various stakeholders. Governments and educational authorities must prioritize investments in technology infrastructure, digital tools and resources, and professional development programs for educators. Adequate funding ensures that educational institutions have the necessary resources to acquire and maintain state-of-the-art technology infrastructure, such as high-speed internet connectivity, computing devices, and digital learning platforms. Infrastructure investments are essential to address existing gaps and disparities in access to technology and digital resources among educational institutions and underserved communities. By investing in technology infrastructure upgrades, governments can bridge the digital divide and ensure equitable access to digital

learning opportunities for all learners and educators. In general, robust policy support and infrastructure investments are indispensable enablers of the digitization of teacher education. They provide the necessary framework, resources, and incentives to drive systemic change and foster innovation in preparing educators for the challenges and opportunities of Industry 5.0. By prioritizing policy support and infrastructure investments, governments can create an enabling environment conducive to transformative change and sustainable development in teacher education.

4. Conclusion

This paper delineates a comprehensive array of strategic recommendations aimed at steering the digitization of teacher education through collaborative efforts on the global stage amidst the advent of Industry 5.0. Through the cultivation of robust partnerships, the seamless integration of Technological Pedagogical Content Knowledge (TPACK) into educational curricula, the proactive promotion of digital literacy among educators, and the unwavering assurance of policy support, stakeholders stand poised to collectively equip educators with the requisite skills and competencies needed to adeptly navigate the digital transformation landscape. By embracing these strategic imperatives, stakeholders can collectively prepare educators to effectively navigate the digital transformation and shape the future of education.

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**Bringing People Together:
Three Case Studies of Social Identity Theory**

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Introduction

Identity in its simplest form answers the question 'who am I' (MacInnes, 2004), yet the answer to the question is complex and dynamic. The 'self' is made up of multiple identities (Hogg, 1995) that are fluid by nature (Stets & Serpe, 2013), ever-changing and evolving along with our social interactions. Social identity is "that part of an individual's self-concept which derives from his/her knowledge of his/her membership of a social group (or groups) together with the emotional significance attached to that membership" (Tajfel, 1974). Social identity theory posits that through participation in a social group a social identity is formed, and when one starts to identify as part of the social group, their behaviour changes to positively align with the social group they identify as being a part of (Tajfel & Turner, 2004).

The social identity approach encompasses both social identity theory and self-categorisation theory, where self-categorisation explains the process of people placing themselves into a particular group (Turner et al., 1987). During this self-categorisation process, people compare themselves to others, in a process known as self-comparison and placing the 'others' into categories. Others who are deemed to be most like the self, are categorised as part of the 'in-group' and those who are perceived to be different from the self are categorised into the 'out-group', thus creating the perceived otherness that social identity is built on (Hogg, 1995). Once the self is categorised as being part of the in-group, to enhance self-esteem, people will alter their behaviour in a way that results in the in-group being judged positively (Burke, 2000). The multiple identities that make up the self, have different strengths (Hogg, 2003). The salience of a social identity determines to what extent behaviour is changed to align with the in-group and the likelihood of one remaining within the group (Khare, 2015).

Social identity theory is widely used to investigate inter- and intra-group behaviour, with a plethora of literature demonstrating its importance in developing pro-social behaviour (Nezlek & Forestell, 2020; Smith & Woodworth, 2012; Sparkman et al., 2022). In the field of education, social identity is frequently used as a theoretical lens to analyse and understand the social dynamics of the school community (Kim et al., 2018; Koni et al., 2019; Rushton & Reiss, 2020). The three projects that follow, each take a social identity approach to understanding group behaviour and the potential to nurture social identity through promoting shared norms and values. Project one aims to understand the role social identity plays in community food project participation and how that knowledge can be applied to educational practices. Project two investigates how social identity influences school leaders'

understanding of their schools' mission and values, and in turn, how the mission and values of the school are enacted. Lastly, project three examines how social identity can be seen to shape behaviour and motivations of key advancement actors' in educational fundraising in a post disaster context.

Social Identity and Community Food Project Participation

Amelia Threadgould

Social identity theory posits that social identity develops through the social groups we see ourselves as a part of and that through this identity our behaviour changes to become more in keeping with the behaviour of the group. Psychologists and social scientists have long accepted that our social identity has a direct influence on our behaviour (Fielding et al., 2008; Tajfel, 1974). In short 'If I see myself as a food grower, I become a food grower'. Behaviour change is widely accepted as an essential process of transitioning to a more sustainable food system, needed to combat the negative effects of anthropologically driven climate change (Hoek et al., 2021; Pearson et al., 2014; Reisch, 2021). Natural disasters, which are predicted to increase with the changing climate, disrupt food supply chains and worsen food insecurity (Masozera et al., 2007; Smith & Lawrence, 2015; van Aalst, 2006). Community food projects, with their shorter supply chains and strong community cohesion, have demonstrated greater resilience compared to supermarkets in the face of natural disasters (MacMahon et al., 2015; Smith & Lawrence, 2015). Therefore, community food projects play an important role in both sustainability and food resilience. Bartels and Hoogendam (2011) investigated the relationship between salient identification with environmental consciousness and organic consumer identities. Finding that a stronger environmentally conscious identity, led to a stronger organic consumer identity. Similarly, Fielding and Hornsey (2016) found through a review of environmental identity literature that a pro-environmental social identity can promote pro-environmental behaviours. Furthermore, when investigating social environmental identity formation through environmental education programs, Williams and Chawla (2015) found that direct contact with nature during childhood is linked to having a stronger and more enduring environmental identity into adulthood. Specifically, participants retained a salient environmental identity up to 40 years after participating in hands-on environmental education programs as children.

This research comprises three distinct studies, each examining a crucial stakeholder in community-based food projects: pre-service teachers and school gardens, social entrepreneurs and food-based business, and community gardeners and community gardens. The first study applies a mixed method approach of surveys, interviews and reflective journals to explore the evolution of pre-service teachers' food growing identities through their participation in community garden workshops and how, if at all, their food-identities influence their teaching practice. The second study adopts a grounded theory approach to unravel the influence of social identity on social entrepreneurial identity and social enterprise orientation. While the third study takes an ethnographic approach to understanding how food-growing identities form and evolve through the social process of community gardening. Collectively, the three studies will enhance our comprehension of the influence of social identity on engagement in community food projects. This insight has the potential to reveal strategies for encouraging environmentally sustainable behaviour change, fostering increased involvement in

community food projects, and identifying educational strategies to nurture food-growing identities.

Social Identity Theory in Schools' Purposes

Julian Adamson

In Aotearoa New Zealand, schools are afforded the freedom and responsibility through legislation to create and promote their own vision, mission and purpose statements. These form a key part of a school's charter and influence, to more or less a degree the culture, decision making and systems that operate within the school. Such culture and systems impact the social identity of the members of schools and can be used to influence the behavioural norms of those who identify as belonging to the school. In some secondary schools, there has been a low emphasis on maintaining and promoting the vision and purpose of the school and this has resulted in a number of schools using the national standardised assessments as a form of default curriculum (Education Review Office, 2018). Assessment has therefore become the driver of learning for students, to the detriment of other important aspects of schooling. This research examines the vision and purpose of special-character secondary schools in New Zealand using a qualitative thematic analysis of data gathered with a group of school principals and then follow-up interviews within one particular special-character school. Through a thematic analysis of schools' vision and mission statements and a series of focus group and individual interviews, this work seeks to investigate how school leaders in Aotearoa New Zealand understand and promote the purpose of their schools.

Social Identity theory posits that an individual can self-conceptualise as belonging to a social group and that they derive some emotional and value benefit from membership in the group (Tajfel, 1979). Such individuals feel pride and self-esteem from the groups to which they feel they belong. This has a direct correlation with the creation of a sense of belonging within a school, a common and widely-aspired goal of many school vision statements. Stemler and Bebbel in their wide-ranging analysis of more than 400 schools in the United States, found that 45% of middle schools and 20% of public high schools state that the creation of a safe environment, where students feel a sense of belonging, is a component of the school vision or mission statement (Stemler & Bebell, 2012).

The preliminary findings from this research are from a focus group conducted with a group of Principals from South Island special-character schools. A special-character school is a state school that teaches the New Zealand curriculum but also has developed a set of aims, purposes and objectives that reflect a particular philosophy, culture or set of values (Ministry of Education, 2024). There are a range of aims, purposes and values reported as important by these principals in forming their school vision and mission statements. The initial findings from the group of school principals suggests that there are a number of common purposes across schools, some of which are deliberately designed to help students feel a sense of belonging and safety. Other purposes are more diverse and can act to differentiate one school from another or one group of schools within the national school system.

Social Identity Theory and a Favourable Advancement Environment

Naomi Wilde

In Christchurch New Zealand, many educational institutions and organisations were severely impacted by the devastating earthquakes of 2010-2011. The rebuilding and strengthening of campus buildings led to a funding gap which in some cases needed to be met through philanthropic support. Advancement – alumni engagement and fundraising for an educational institution (Daly, 2013; Langley, 2020; Williamson, Leat, & Philips, 2023)– is an activity that involves four main actors: the educational leader (e.g. Principal, Vice-Chancellor), advancement practitioner (fundraiser), educational governor (board or foundation chair) and donor. All four advancement actors are working towards a common goal, that of growing philanthropic support and building a sustainable future for their educational institution. However, on closer examination each actor may have slightly different motivations for supporting their institution and/or multiple motivations.

Educational fundraising is deeply entwined with alumni engagement - the fostering of a sense of belonging with one's alma mater. Brand recognition, trust and loyalty are important aspects of alumni engagement. Social identity theory is a 'theory of group membership and behaviour' (Korte, 2007, p. 168), and it can be argued that social identity theory may provide theoretical causality for advancement actors' sense of connection with their educational institution. Abrams and Hogg (1990) write that social identity theory explains 'a sense of involvement, concern and pride can be derived from one's knowledge of sharing a social category membership with others, even without necessarily having close personal relationships with, knowing or having any material personal interest in their outcomes' (Abrams & Hogg, 1990, p. 3).

It can be seen that social identity theory is helpful in providing an explanation for advancement behaviour and a lens through which to understand the actors' motivations, attachment and sense of belonging to the institution. In addition, theories such as social capital and actor network theory can also help us to understand why and how advancement actors are motivated to be involved in philanthropically supporting an educational institution particularly in a post disaster context (Aldrich, 2014; Jones & Faas, 2017; Putman, 2000).

This doctoral research examines the experience of the four main advancement actors following the Canterbury earthquakes and their experience of philanthropy as a response to the disaster. Critical Incident analysis will be used as a tool for highlighting important aspects of the actors' experiences. It is hoped this research will provide greater understanding of the roles of the main actors and provide knowledge and learnings for educational leaders and institutions preparing for future disasters.

Summary

Across the three research projects, the value and significance of social identity theory as an explanatory theory for group membership and behaviour is evident and while this research is situated in a New Zealand context, the challenges examined are globally significant. The projects apply a social identity theory lens to community engagement in local food initiatives, developing purpose in educational institutions, and investigating advancement in a post disaster context, that extend far beyond New Zealand.

It is suggested that social identity can be nurtured by bringing individuals and groups together through innovative strategies and projects. This research has the potential to reconceptualise the respective areas of education, relative to the specific projects and their fields of inquiry, while building on social identity theory research more broadly. By contributing to the broader body of research on social identity theory across these educational domains, this research has the potential to inform international collaboration and innovative strategies worldwide.

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Khon Kaen University

An Exploring of Students' Computational Thinking through Unplugged Activities

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Pantawat Sundara
Chanatip Nakarangsua
Narumon Changsri

Abstract

The purpose of this study was to explore the students' computational thinking while solving the problem in classroom using Thailand Lesson Study incorporated Open Approach (TLSOA) through unplugged activities. The target group consisted of grade 11 – grade 12 students from 3 provinces in the Northeast of Thailand. The research method was qualitative research. Researchers had been collecting data by using 1) 2 unplugged lesson plans, 2) classroom observation forms, 3) student work sheets, and 4) post lesson reports. Data were analyzed according to the framework of Computational thinking of Anderson (2016).

The results found that students' computational thinking occurred at 5 steps as follows: 1) Decomposition, students analyzed the problem situation and identified sub-problems to solve problem more efficiently. 2) Pattern recognition, students saw the beauty in the pattern of increasing numbers of faces related to a geometric sequence. 3) Abstraction, according to seeing the beauty in pattern, students could represent the number of faces and generate the formula to solve similar problems. 4) Algorithm design, students created instructions to other groups of students solve problems to achieve their goals. 5) Evaluation, students predicted the solution of the instructions, evaluated whether the other groups can solve the problems according to the goals or not and adjusted the instructions to be clear.

1. Introduction

Industry 5.0 is the fifth industrial revolution (started from 2020), characterized by advanced technologies. It builds on the foundation of previous industrial revolutions, but it also introduces new technologies and concepts that are changing the way we produce goods and services (Martinez, 2023). Industry 5.0 emphasize that human-robot co-working (Cobot). Then people have to develop the abilities of personnel to a higher level until being able to work with robots. Humans and robots will work together more. where humans are responsible for the work that uses creativity, while work that requires physical energy is risky and that is repetitive the robot will be responsible.

According to the results of the PISA 2022 assessment, it was reported that on average in OECD member countries, top 20% quintiles (Index of economic, social, and cultural status) students had an average mathematics score of 93 points higher than bottom 20% quintiles students. And when considering the mathematics abilities of Thai students by school group, it was found that 99% of students in the science and mathematics focused school group had abilities from level 2 and above, while 80% of students in the Demonstration School group.

Meanwhile, students from other school groups have about 15%-39% of students with high levels of ability. In the group of schools emphasizing science and mathematics, there are 37%. In the group of demonstration schools, there are 10%, while other groups of students have about 1%, or some groups of schools have almost no students with this level of ability.

Currently, schools in Thailand are faced of the problem of inequality. From the budget allocation that seems unfair to schools in remote areas by calculating a lump sum payment per head. As a result, large schools with many children will receive a large amount of the overall budget. But if it is a small school with no more than 120 children, it will receive a reduced budget. according to student proportion including school supplies and utilities. is also decreasing (Thai PBS, 2020). Currently, Thailand has 4.3 million youths who lack better educational opportunities (Phattharawat, 2021).

TLSOA (Thailand LS incorporated OA) model is a systematic approach to teacher professional development (PD) that combines the ideas of Japanese Lesson Study (LS) and Open Approach (OA). It aims to adapt and sustain LS and OA in the local context of Thailand. The TLSOA model involves active engagement of teachers in collaborative lesson planning, observation, and reflection to improve teaching practices, collegiality, and professional self-identification. It also focuses on creating a student-centered and active learning-based school culture, promoting teachers' beliefs for innovation. The model has been found to have a positive impact on teachers' teaching practices and students' learning behaviors. The TLSOA model is seen as a way to ensure teachers are well-trained and possess the necessary skills for whole-school improvement. It has been advocated by leaders, educators, and policymakers at various levels, including the national, APEC, and CLMV regional levels. (Inprasitha, 2022)

In particular, Applied and Computational Mathematics provide many tools to solve some of the world's most pressing and challenging problems, thereby playing an important role in achieving the Sustainable Development Goal (SDG9) set by the United Nations (2015). As emphasize by Araya et al. (2019) CT is key for Society 5.0 Everybody ought to work together with increasingly smart systems. World organizations such as UNESCO, countries, and scholars are increasingly proposing that CT is a critical cognitive disposition that students need to adopt and use it efficiently to solve the challenges of the digital society (Araya & Isoda, 2021). Tin Lam (2020) asks whether CT should be a subject taught in school or to be incorporated in an existing subject. Ulep (2020) proposes that the goal of the K to 12 mathematics Curriculum is the development of learners' problem solving and critical thinking skills. CT moves students beyond technology literacy, it presents endless possibilities for creatively solving problems (Nguyen Chi Thanh).

Isoda & Roberto (2018) defined that CT is a way of thinking, not necessary to use computer. Although students need to cultivate CT literacy, but coding is not suitable for all students (Wing, 2008) instead of using computer, students can experience and cooperate with each other, solve problems, think creatively, can make concrete and simple. The unplugged approach is effective for the development of CT (Brackman et al. 2017 as cited in Wei-Chen Kuo, 2020).

The CT approach consists of 5 major steps, each of which is a fundamental skill that is useful for research design (Csizmadia et al., 2015 as cited in Anderson, 2016). The first step, decomposition involves taking the overall problem and breaking it down into a series of manageable steps. The second step, pattern recognition, requires the problem solver to look for repetitive patterns in the problem that can be used to design a solution more efficiently. Patterns are then abstracted in the third step, so that they are then represented in a generalized form. The

fourth step involves algorithm design, where the problem solver designs the solution to the problem in a systematic way. Finally, the problem solver needs to evaluate the algorithm to ensure that all the necessary steps are included for a comprehensive solution. If these steps are followed systematically, this will yield a rigorous solution that is optimized for efficiency (Anderson, 2016).

2. Method

2.1 Data Collection

The target group consisted of 238 students from grade 11 – grade 12 who study in a public school which using TLSOA from 3 provinces in the Northeast of Thailand. The tools used in this study were 1) 2 unplugged lesson plans by using open approach 2) classroom observation forms 3) student work sheets and 4) post lesson reports.

2.2 Data Analysis

This study was qualitative research. Researcher used unplugged activities that applied from Colorea Ideas Coloring Book of Araya (2019) in classroom using TLSOA. CT data were analyzed according to the framework of Computational thinking of Anderson (2016) consisted of 5 steps as follows: 1) Decomposition, 2) Pattern Recognition, 3) Abstraction 4) Algorithm, and 5) Evaluation.

3. Result

The results of the study found that students' computational thinking through unplugged activities in classroom using TLSOA occurred at 5 steps as follows:

1. Decomposition found that the students analyzed the problem situation step-by-step, they looked overall of the problem situations and then identified sub-problems that could be handled more efficiently. They started to define the face's components and solve the problem by starting to paint red from the small picture to the big picture in order did not against the rule.

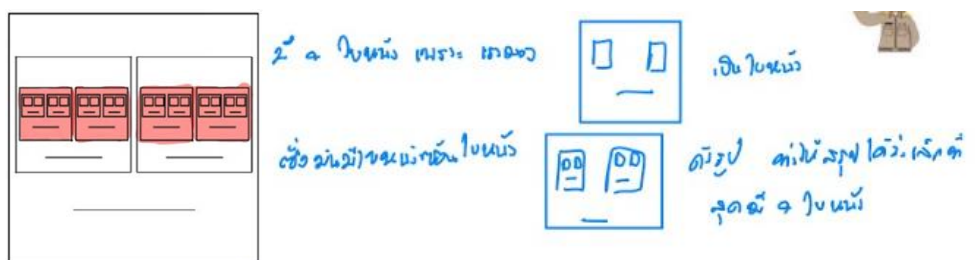
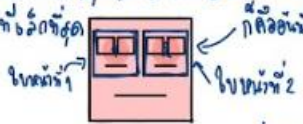


Figure 1: Student concept illustrating decomposition.

2. Pattern Recognition found that during problem solving, students saw the beauty in the pattern of increasing numbers of faces forming a geometric sequence. And seeing the beauty of this model allows students to develop into problem solving of their own.

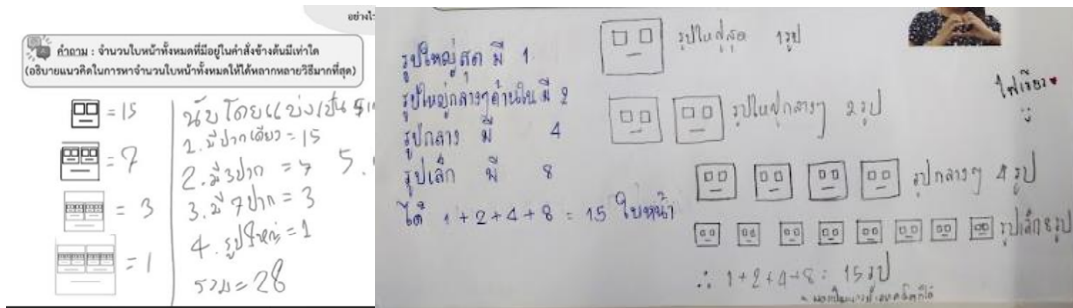
หน้าได้ 4 ใบหน้า

1. ตัดทูลให้จากรูปภาพที่บอกไว้ใบหน้าที่เห็นที่สุดที่ประกอบไปด้วย 2 ใบหน้า
 ๒. เมื่อรวมที่เห็นที่สุดไม่ได้ประกอบไปด้วย 2 ใบหน้า จึงเลือกอันที่ใหญ่ขึ้นและประกอบ
 ไปด้วย อันที่เห็นที่สุด



ก็คืออันนี้

2. บอกรูปหน้าว่ามีกี่หน้าเท่ากันหรือมีกี่อัน หรือมี 4 ใบหน้าที่ตรวจคำตอบ



คำถาม : จำนวนใบหน้าที่เห็นทั้งหมดในคำสั่งข้างต้นมีเท่าใด
 (อธิบายแนวคิดในการหาจำนวนใบหน้าที่เห็นเพื่อให้หลากหลายวิธีมากที่สุด)

$\square\square = 15$
 $\square\square\square = 7$
 $\square\square\square\square = 3$
 $\square\square\square\square\square = 1$

นับโดยแบ่งเป็น 4 รูป

- มีปากเดียว = 15
- มี 2 ปาก = 7
- มี 3 ปาก = 3
- มี 4 ปาก = 1

$15 + 7 + 3 + 1 = 26$

รูปเห็นที่สุด มี 1 รูป

รูปใหญ่กลางๆ ด้านบน มี 2 รูป

รูปกลาง มี 4 รูป

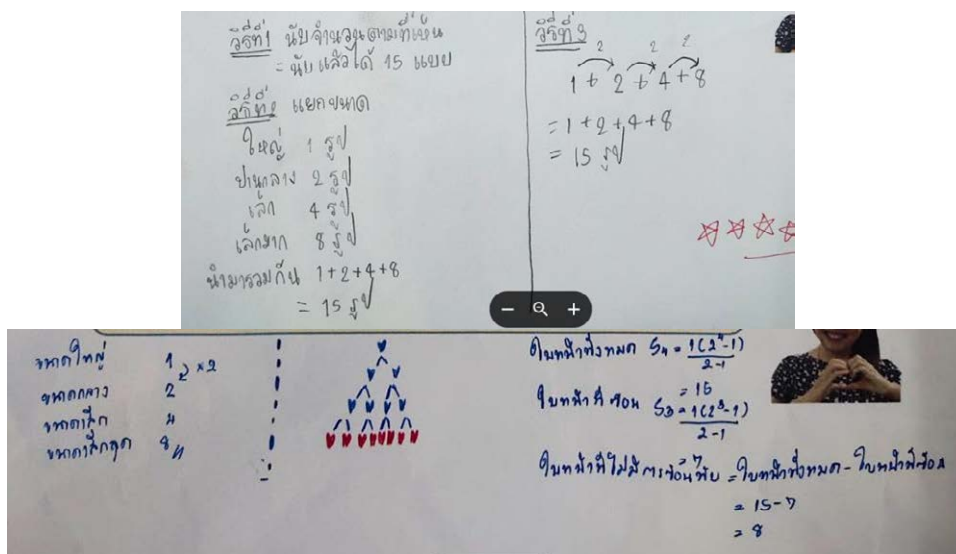
รูปเล็ก มี 8 รูป

๖๓ $1 + 2 + 4 + 8 = 15$ ใบหน้า

$\therefore 1 + 2 + 4 + 8 = 15$ รูป

Figure 2: Student concept illustrating pattern recognition.

3. Abstraction found that discovering the beauty of form during problem solving. This allows students to solve problems and lead to the formulation of abstract formulas that are general in form. In this problem situation, students discovered the difficulty of counting faces by directly observing the faces first. This then leads to a number substitution to indicate the total number of faces, and they could generate the formula to solve similar problems.



สรุป! นับจำนวนหน้าทั้งหมด
 = นับ แล้วได้ 15 แบบ

สรุป! แยกขนาด

ใหญ่ 1 รูป
 ปกกลาง 2 รูป
 เล็ก 4 รูป
 เล็กมาก 8 รูป

นำมารวมกัน $1 + 2 + 4 + 8 = 15$ รูป

รูปหน้าทั้งหมด $S_n = \frac{1(2^n - 1)}{2 - 1}$

รูปหน้าทั้งหมด $S_4 = \frac{1(2^4 - 1)}{2 - 1} = 15$

รูปหน้าที่ไม่ใช่ปากทั้งหมด = รูปหน้าทั้งหมด - รูปหน้าที่มีปาก
 $= 15 - 7 = 8$

Figure 3: Student concept illustrating abstraction

4. Algorithm Design found that students were able to create new, clear instructions so that other groups of students could solve problems to achieve their goals. For example, students defined problem situations using the conditions of adding a mouth to the original picture for clarity from the instructions given. They did it in Worksheet 1, where students saw that the original

instructions could be understood in many different directions. Therefore, it was added. But there can still be misunderstandings.

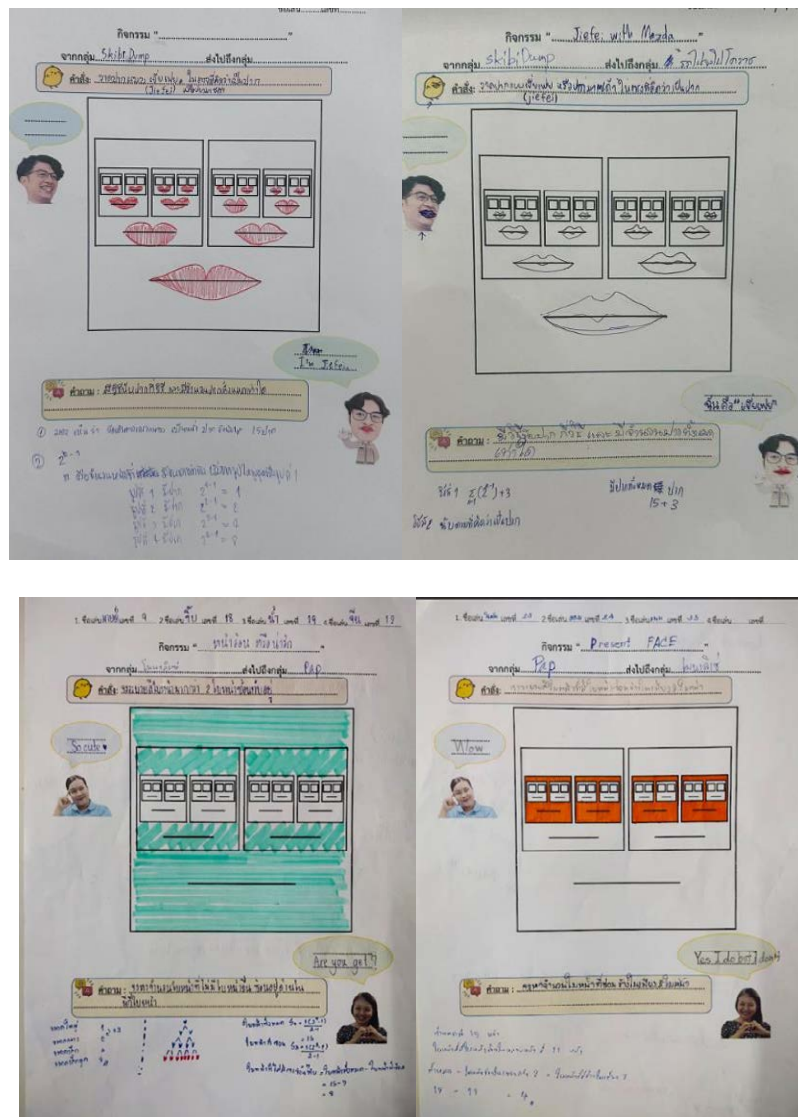


Figure 4: Student concept illustrating algorithm design

5. Evaluation found that students were able to predict problem solving methods in creating their own group instructions. Then, students worked together to evaluate whether the other groups can solve the problems according to the set goals or not. If it is not, they adjusted the instructions according to their answer of group's predictions. To enable other groups, understand the instructions and be able to solve problems to achieve their goals.

4. Conclusion

The purpose of this study was to explore the students' computational thinking while solving the problem in classroom using Thailand Lesson Study incorporated Open Approach (TLSOA) through unplugged activities. Using unplugged activities instead of computer can cultivate computational thinking. According to the open approach promoted the activities efficiently,

students certainly got 5 steps of CT. They could decompose the problem, saw a beauty the pattern, generate the formula or represent in abstract, students could do the instructions by themselves, evaluated and adjusted to made them clear.

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Moscow City University

**Title of the Presentation:
Building the smart chatbot teaching honorific speech in Japanese:
educational potential.**

Geraimovich, Elizaveta
Trushina, Mariia

The honorific language «Keigo» is considered to be one of the most difficult grammar in Japanese language. The difficulty of Keigo for learners is that there are several polite forms that will differ depending on whose actions we are describing.

However, the complexity of polite speech also lays in several other factors. Firstly, Keigo is learnt in a short time frame, usually about a semester, which is not enough time for a full understanding. Secondly, practicing polite speech usually consists of typical exercises on substituting the correct form of the verb or determining the type of polite speech, in other words, not on real situations of communication. It follows that in order to master polite speech more productively, it is also necessary to develop a resource through which Keigo can be learnt in real-life situations, requiring the use of different types of polite speech.

It should be noted that nowadays we can see the rapid development of technologies such as neural networks, apps and chatbots. Thanks to such technologies, we can artificially recreate real-life communication situations, which can help us in studying foreign languages. Using modern methods of teaching the Japanese language, we believe that it is possible to achieve better development of linguistic and cultural competencies among students.

Based on the above, we believe that in order to master Japanese polite speech more effectively, it is advisable to develop an application or chatbot that would simulate a real-life communication situation. Such an app could be a supplement to practicing polite speech in Japanese classes. For instance, by using smart chatbot for language training purposes the following problems as the lack of real situations of using Keigo or students' anxiety in front of native speakers can be solved.

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**University of the National
Education Commission,
Krakow**

Collaboration as intra- and inter-personal skills.

International cooperation in learning communities.

Twardosz, Natalia
Ospanova , Milana
Grochowska, Marta

In today's globalized social context, the ability to engage in effective international cooperation has risen to the status of a crucial element in the development of both individuals and societies. International collaboration in the field of education emerges as a significant factor shaping intercultural competencies among educators. Examining this issue reveals several key aspects that synergistically contribute to the harmonious development of these competencies.

Firstly, the exchange of experiences and pedagogical practices constitutes a pivotal element in the process of cultivating intercultural competencies among educators. Participation in international educational projects enables teachers to mutually share experiences with representatives of diverse cultures, thereby generating new perspectives and fostering an understanding of cultural differences. This international exchange of pedagogical practices also broadens the repertoire of teaching methods, positively influencing the flexibility and adaptability of educators.

Another crucial aspect is the development of language skills. International collaboration often necessitates communication in foreign languages. The participation of educators in international educational projects provides them with an opportunity to refine their language skills. This process not only enhances language competencies but also promotes effective intercultural communication, a critical aspect in working with students from various cultural backgrounds.

Understanding cultural diversity represents yet another foundational element. Collaborating with teachers from different cultural backgrounds allows educators to gain a deeper understanding of this diversity. Teachers learn the importance of respect and appreciation for cultural differences, translating into effective teaching in multicultural educational environments while simultaneously fostering an open and tolerant atmosphere. Cultivating openness to new ideas is a subsequent outcome of international collaboration. Through the diversity of perspectives and approaches to education, teachers learn to be receptive to innovative ideas, methods, and strategies. This enriches their pedagogical practice, enabling

effective adaptation to the evolving needs of students. International cooperation also allows educators to better comprehend global educational challenges such as access to education, equality, and climate change. Engaging in international educational projects empowers teachers to work towards addressing these issues while simultaneously developing skills to initiate positive social changes.

The final, yet equally significant aspect, is the development of intercultural dialogue skills. Active participation in international educational projects hones educators' ability to conduct intercultural dialogue in the classroom. Teachers acquire the skill of effective communication with students from diverse cultures, contributing to the creation of a more open and tolerant educational environment.

International cooperation serves as an invaluable platform for the comprehensive development of intercultural competencies among educators. The outcomes of this process translate into more effective teaching that takes into account global challenges and cultural diversity, solidifying educators' role as key mediators connecting diverse cultural worlds in the pursuit of the holistic development of students.

Nowadays, the teacher should be responsible for the development of students, but also create an educational space where people from different groups can get to know each other and integrate. These are special skills that include - interpretation of social events and situations, awareness of cultural differences, reflection and inquiry. A culture of cooperation in school is only possible through mutual respect, the ability to build interpersonal relationships, reflective action and the strengthening of self-creative competences. The latter, in turn, allow for the formation of one's own personality, which has a significant impact on the development of students and their attitudes. The teacher's personality is at the heart of the school's development and is therefore a significant person for the pupils, giving feedback, determining their reactions and shaping attitudes. Theoretical knowledge should correlate positively with a positive emotional attitude towards all educational participants. It is particularly important to take care to create with full awareness, "We" and not "I and Others". Encountering different points of view, exploring different views and opinions influences the organisation's creativity. Values based on dialogue, communion and cooperation foster a friendly environment, create shared responsibility and provide a strong foundation for personal and group identity. In turn, a person who emphasises not only interpersonal skills, but also intrapersonal skills, will be able to shape his or her own charges accordingly. These include: adaptability to otherness and the ability to adapt to a different social system, the ability to integrate into society, linguistic competence and understanding of others, knowledge of cultures, cultural empathy, flexible personality (cognitive and behavioural flexibility), cultural identity, self-reflexivity, self-criticism and many others. That is, a focus on cultural pluralism, which is a determinant of the organisation of the school and teachers as a school that is coherent in action, responds to the needs of students, solves problems and difficulties, and cares about tri-participation in education.

The perspective of a reflective teacher, who cares about interpersonal skills and the shaping of one's own development (intrapersonal skills), thus creates a vision of a dignified school, based on dialogue and co-creation. Society needs professional teachers, so their higher education should be based not only on the development of professional competences, but also on the development of social competences that create collaborative learning communities. It therefore seems important to look for perspectives to develop different social groups that will form a unity, taking into account the multiplicity of views and specificities.

The aim of this presentation will be to present the aforementioned communities (as well as activities - Erasmus, staff exchanges, international conferences, international summer schools) operating at the University of the Commission of National Education in Krakow, which prepare graduates for 'being globally ready', as well as the ability to function in a culturally diverse environment, work, conduct research and intercultural communication, establish international contacts, participate in international events (e.g. summer schools, conferences, exhibitions), and organise research stays at prestigious foreign institutions.

The University of the Commission of National Education in Krakow has possibilities for lecturers and students to participate in international exchanges or internship programs. One of them is a popular one called Erasmus, a flagship program of the European Union, which was launched in 1987. Since then, it has become popular and successful among students from Europe. It enables trips abroad for studies and internships, promoting the educational and professional mobility of university students. It belongs to those forms of human activity that are of particular importance for personality development, self-education, and self-discovery in an international, culturally diverse environment. Interpersonal skills are those that enable effective communication, empathy, and collaboration with others. They are essential for building and maintaining relationships, both personal and professional. Intrapersonal skills, on the other hand, involve self-awareness, emotional intelligence, and personal growth. They are important for developing a strong sense of self and for achieving personal goals.

One of the developing intrapersonal skills coming from these programs is communication skills. Being in an international environment exposes participants to a variety of languages. Even if the primary language of instruction is not their native tongue, students often become proficient in English and may learn other languages. This linguistic diversity enhances communication skills, enabling participants to express themselves effectively in various contexts. Interacting with people from diverse backgrounds enhances cross-cultural communication skills. Students learn to navigate cultural nuances, adapt their communication styles, and develop a global mindset. These skills are essential in today's interconnected world. Studying abroad is associated with many challenges such as language barriers, academic differences, and homesickness. It may seem terrifying and overwhelming at first, but overcoming fear, challenges, and getting out of the comfort zone build resilience, which is a much-needed skill to acquire. Another benefit of Erasmus is students' improvement of their

self-awareness. Through exposure to new cultures and ideas, students gain a deeper understanding of their values, beliefs, and priorities. This heightened self-awareness contributes to personal growth and a more well-rounded worldview. Educational exchange encourages participants to meet new friends and socialize, which is an important part of students' lives. Going out with friends, even for studying sessions, can give a feeling of belonging, improve mental health and make living abroad interesting. Successfully navigating the social environment and overcoming challenges boost self-confidence. Living and studying abroad for weeks or months by oneself increases independence. Dealing with difficulties, even the everyday ones, makes individuals more self-sufficient.

Expanding interpersonal skills is also valuable and possible with studying abroad. Erasmus encourages collaborative learning through group projects, joint classes, and extracurricular activities. Students learn to work in diverse teams, understanding how to leverage individual strengths, navigate language barriers, and appreciate various perspectives. These experiences contribute to the development of strong teamwork and collaboration skills. One of the primary outcomes of participating in Erasmus is exposure to diverse cultures. Students engage with peers from different countries, fostering an appreciation for cultural differences and promoting cultural competence. This experience enhances the ability to navigate and communicate effectively in multicultural environments.

A study of the impact of Erasmus Program participation on professional life (Alejziak, B.) shows that 37.96% of responders had a better professional start, 19.44% think that getting a job in their country was easier, and 14.81% say that they've had a chance to get a more attractive position because of participation in the Erasmus program. It shows a great advantage of student exchange, which is professional development.

In conclusion, Erasmus plays a great role in personal growth and the development of interpersonal and intrapersonal skills. The program's emphasis on cultural exchange, collaboration, adaptability, and communication prepares students for success in an increasingly interconnected and diverse global landscape. Erasmus experiences are unique and can vary for each participant, but the program is designed to offer a rich and diverse environment that contributes to the holistic development of individuals both personally and professionally. The program is not only helpful in evolving many needed skills but also brings joy and unforgettable experiences for every participant.

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Online International Student Conference 2024



Large Language Models (LLMs) in Education

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Brief Bio



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Assistant Professor at University of Tsukuba

Specialization

- Language Education
- Teaching English as a Foreign Language (EFL)

Research Theme

- Studying cognitive processes of EFL reading using eye tracking
- Analyzing EFL reading materials employing computational techniques

Brief Bio



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Text Readability and Processing Effort in Second Language Reading: A Computational and Eye-Tracking Investigation

Shingo Nahatame 

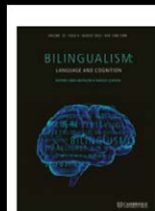
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Causal and Semantic Relations in L2 Text Processing: An Eye-Tracking Study 91

Shingo Nahatame



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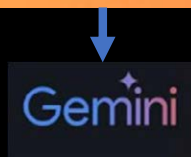
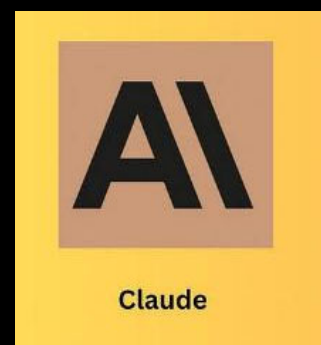
Outline

1. What Are Large Language Models (LLMs)?
2. How Do LLMs Contribute to Education?
3. What Are Considerations for LLMs in Education?

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1. What are LMMs?



1. What are LMMs?

- A type of AI designed to process and generate natural language text
- Trained on the huge amount of text data (corpus) and have m/billions of parameters
→ “Large” language models
- **Predicts the next most likely word** based on the context it has seen (NN and attention mechanism)
→ not actually "understand" the language in the way humans do.

Outline

1. What Are Large Language Models (LLMs)?

2. How Do LLMs Contribute to Education?


3. What Are Considerations for LLMs in Education?

2. How Do LLMs Contribute to Education?

- **Creating questions, exercises, and tasks**
→ e.g., make multiple choice questions
- **Explaining terms, concept, and rules**
→ e.g., provide clear explanation for grammars
- **Evaluating essays and giving feedback**
→ e.g., grade essays at CEFR levels
- **Simplifying and summarizing text**
→ e.g., make the complex materials easier

2. How Do LLMs Contribute to Education?

- **Creating questions, exercises, and tasks**



Can ChatGPT make reading comprehension testing items on par with human experts?
*Donghwang Shin, Gwangju National University of Education
Jang Ho Lee, Chung-Ang University*

Abstract

APA Citation: Shin, D., & Lee, J. H. (2023). Can ChatGPT make reading comprehension testing items on par with human experts? *Language Learning & Technology*, 27(3), 27-40.
<https://hdl.handle.net/10125/73530>

Given the recent increased interest in ChatGPT in the L2 teaching and learning community, the present study sought to examine ChatGPT's potential as a resource for generating L2 assessment materials on par with those created by human experts. To this end, we extracted five reading passages and testing items in the format of multiple-choice questions from the English section of the College Scholastic Ability Test (CSAT) in South Korea. Additionally, we used ChatGPT to generate another set of readings and testing items in the same format. Next, we developed a survey made up of Likert-scale questions and open-ended response questions that asked about participants' perceptions of the diverse aspects of the target readings and testing elements. The study's participants were comprised of 50 pre- and in-service teachers, and they were not informed of the target materials' source or the study's purpose. The survey's results revealed that the CSAT and ChatGPT-developed readings were perceived as similar in terms of naturalness of the target passages' flow and expressions. However, the former was judged as having included more attractive multiple-choice options, as well as having a higher completion level regarding testing items. Based on such outcomes, we then present implications for L2 teaching and future research.

<https://www.lltjournal.org/item/10125-73530/>

2. How Do LLMs Contribute to Education?

- Explaining terms, concept, and rules



You

You're an English language teacher in a Japanese junior high school. Provide a simple explanation of the difference between "be going to" and "will (future tense)"

< 2 / 2 >



ChatGPT

Certainly! When teaching English, especially to junior high school students, it's important to keep explanations simple and clear. Here's a straightforward way to explain the difference between "be going to" and "will" when talking about the future:

2. How Do LLMs Contribute to Education?

- Explaining terms, concept, and rules

Summary

- **"Be going to"** is used for planned actions or clear intentions and predictions based on present evidence.
- **"Will"** is used for spontaneous decisions, general predictions (without present evidence), and promises or offers.

Detailed Explanation

1. Planned Actions or Clear Intentions vs. Spontaneous Decisions:

- **"Be going to"**: Use this when the decision has been made before the moment of speaking. It shows that there's a plan or a clear intention behind the action.
 - Example: "I am going to study English after school." (The decision to study English was made before this moment.)
- **"Will"**: Use this for decisions made at the moment of speaking, without any prior planning.
 - Example: "I'll open the window." (The decision to open the window is made spontaneously.)

Outline

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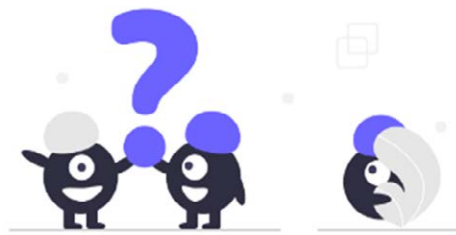
3. What Are Considerations for LLMs in Education?

3. What Are Considerations for LLMs?

- **Age restrictions**
 - ChatGPT: at least 13 years old to use
 - parental consent required for users under 18
- **Hallucination**
 - sometimes generate incorrect information
- **Handling confidential information**
 - avoid providing sensitive or personal information
- **Use as a Tutor, Not for Cheating**
 - avoid the use as a tool for simply providing answers for assignments or tests

Enjoy the Conference!

Any questions?



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