Education for Sustainable Development in Asia and Europe
A Comparative Perspective

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Preface

Sustainable Development Goal 4 of the 2030 Agenda for Sustainable Development – "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" – is not only key to the achievement of many other Sustainable Development Goals (SDGs) but also the bedrock of any society. In examining the targets of all of the Sustainable Development Goals, it is clear that education can provide a valuable means of supporting their implementation and achievement.

Education for Sustainable Development (ESD) provides a valuable framework and methodology to support the implementation and achievement of the SDGs, as it promotes the inclusion of key sustainable development issues in teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption. As the 2010 Report of the Council of the European Union states: "ESD is essential for the achievement of a sustainable society and is therefore desirable at all levels of formal education and training, as well as in non-formal and informal learning."

Education for Sustainable Development consequently promotes competencies like critical thinking, imagining future scenarios and making decisions in a collaborative way, and will ultimately help empower a learning society with knowledge, skills, values and attitudes to take informed decisions and responsible actions for the promotion of environmental integrity and economic viability while respecting cultural diversity.

The COVID-19 pandemic has put a dent in the progress made in the achievement of SDGs across Asia and Europe. The pandemic and the evolving geopolitical discourse on social, environmental and climate issues have impelled countries to take steps to redouble efforts to fully implement the 2030 Agenda for Sustainable Development, especially those furthest behind.

There are evident differences between European and Asian states in terms of the achievement of the sustainable goals. However, both continents are faced with the common challenge of reducing the environmental impacts of connectivity without neglecting the economic and financial sustainability aspects, while at the same time ensuring that benefits will accrue to society at large. Cooperation and collaboration between the two regions are vital for the achievements of the SDGs and it is imperative that states in the two regions exchange their best practices and lessons learned.

It is therefore necessary to analyse and reflect on how countries across Europe and Asia are implementing ESD in the achievement of SDGs and to analyse its impacts. This edition of *Panorama*, "Education for Sustainable Development in Asia and Europe: A comparative Perspective", will address precisely such questions.

In order to achieve the Sustainable Development Goals, it is important to learn from each region's experiences as well as to compare experiences so as to determine how the various initiatives and programmes can be synergised to ensure that there is equitable and inclusive education for all and that no one is left behind. This issue of our journal provides a window into the different experiences and steps taken by various countries across Asia and Europe.

Andreas Klein
Director
Regional Programme Political Dialogue Asia

Where is Education Heading in 2023 and Beyond? Insights from Europe and Southeast Asia

Michael Klemm, Selena Huynh and Suzette Barajas

INTRODUCTION

The education sector is at the crossroads of major changes and disruptions. And the question is not anymore: Will there be drastic changes? Will we see more technology in education? Will the students have more options to study and learn?

The question has moved beyond the "if" and we are now elaborating and ascertaining where the biggest change will take place and the impact on students, learners, institutions, corporates and governments.

The education sector has faced tremendous challenges during the COVID-19 pandemic and this laid bare some long-standing unresolved issues within education systems and education institutions. Accordingly, on a positive note, a new understanding and desire to address those issues has given life to new initiatives, new approaches and new investments. All of which should result in a transformation of education and an improved education system to a scale that we have not experienced for years, possibly decades.

This article attempts to share some insights into past and current challenges within the education system. It also suggests and predicts new models and ideas to move forward to in order to achieve what all educators aim for: better skilled and happy students.

IMPACT OF SCHOOL CLOSURES ON STUDENT LEARNING

In light of the COVID-19 pandemic, European and Asian countries encountered new obstacles in the education sector. Schools and institutions in each country had varying levels of preparedness for the unpredictable nature of the crisis. The resulting

closure of many schools put a pause on student learning in the physical classroom and brought about a digital transformation of education.

School closures severely impacted student learning as some schools remained closed for extensive periods. Following the closures, schools began to pursue some form of distance or hybrid learning. Implementing distance learning, however, is not easily achievable for all populations. In order for schools to utilise digital platforms for instruction and learning, teachers and students would require access to computing devices and the internet. Countries with less access to reliable digital infrastructure were thus at a larger disadvantage.

In addition, teachers and students alike have to adjust their perceptions of how a learning environment should look like and how to best utilise new available tools and infrastructure. Skills and knowledge in terms of pedagogy, classroom management and engagement, data management, and data security are some of the most important areas for teachers to learn and to improve their competence levels in.

Many developing countries were overwhelmed in handling a sudden switch to remote learning, especially with the governments focused on addressing urgent health and economic implications. In Southeast Asia, Indonesia experienced peak levels of poverty in September 2020[1] at a record 10.2 per cent, with three out of four households experiencing a reduction in income[2]. Lack of access to the internet, electronic devices, and even electricity prevented many families from providing more support for their children's education. Parents were forced to shift their focus towards other obligations to support the family[3]. Indonesia's government response nonetheless consisted of obtaining partnerships with education technology (EdTech) companies to provide free access to online learning platforms. The government additionally partnered with telecoms operators to provide free internet quotas for teachers and students[4]. Other actions to support education included broadcasting school lessons on television to further student education[5].

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1. (https://databankfiles.worldbank.org/data/download/poverty/987B9C90-CB9F-4D93-AE8C-750588BF00QA/current/Global_POVEQ_IDN.pdf).

2. (https://www.unicef.org/indonesia/press-releases/80-million-children-indonesia-face-widespread-impact-covid-19-pandemic).

3. (https://www.unicef.org/indonesia/education-and-adolescents/coronavirus/stories/learning-home-during-covid-19-pandemic).

4. (https://www.unicef.org/indonesia/education-and-adolescents/coronavirus/stories/learning-home-during-covid-19-pandemic).

5. (https://www.unicef.org/indonesia/education-and-adolescents/coronavirus/stories/learning-home-during-covid-19-pandemic).

Access to a Computer for School work[6]

Percentage of students that have access to a computer they can use for schoolwork, PISA 2018
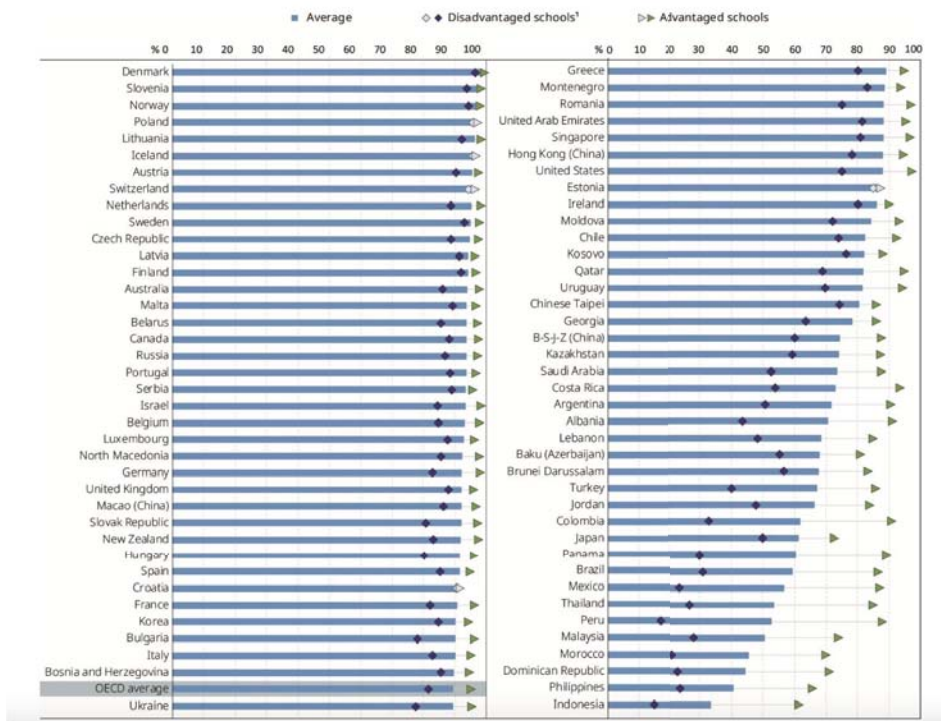
Meanwhile, in Europe, for instance, schools in France and Germany were better equipped with digital infrastructure, making them well prepared to adapt to a hybrid learning system. PISA in 2018 measured that 91-92 per cent of all students in France and Germany possessed a computer to use for school, and around 80 per cent of students from the lower quartile of socio-economic profiles possessed a computer to use for school[7, 8]. Approximately 90 per cent of the student population in these countries also had access to a quiet place to study[9, 10]. Students in France and Germany were able to have an advantage in possessing a fair amount of digital

6. (https://www.oecd.org/coronavirus/policy-responses/learning-remotely-when-schools-close-how-well-are-students-and-schools-prepared-insights-from-pisa-3bfda1f7/#figure-d1e74).

7. (https://www.oecd.org/education/France-coronavirus-education-country-note.pdf).

8. (https://www.oecd.org/education/Germany-coronavirus-education-country-note.pdf).

9. (https://www.oecd.org/education/France-coronavirus-education-country-note.pdf).

10. (https://www.oecd.org/education/Germany-coronavirus-education-country-note.pdf).

resources prior to the pandemic, allowing for an easier transition to digital learning as the crisis struck.

Likewise, in Singapore, about 89 per cent of households had computer access, and about 98 per cent of households with school-going children had computer access at home in 2019. Especially for households with school-age children, internet and broadband access rates were both near 100 per cent[11]. The Ministry of Education (MOE) of Singapore still addressed resource concerns by loaning out 20,000 computing devices and 1,600 internet-enabling devices[12] to students.

Although Singapore evidently has more available digital infrastructure to prevent student learning loss, as the education sector continues to transform and implement new technologies, new standards for the quality of education are becoming necessary to match today's continuously developing education scene. Providing students with more access is a starting point to increasing opportunities in education, but is it enough to sustain and ensure the quality of education? What will become of the abundance of technology, and how will teachers and students navigate through this digital scene? More research and investment must be made to adequately implement these digital tools and platforms into remote and hybrid learning, and only then can education be sustainably transformed in an era of continuous digitalisation.

DIGITAL TRANSFORMATION OF EDUCATION

Since COVID-19 was an unforeseen circumstance that affected many students globally, there has been a new focus for educational goals. The new goal is to ensure universal access across all audiences. A way to achieve this is through a diverse set of tools that can be accessible to everyone so as to establish equitable access within the education system.

In Southeast Asian countries, the pandemic highlighted gaps throughout their education systems that were already affecting the 35 million children who were out-of-school[13]. A method that some Asian countries have established is to set up access across new and old technologies. So far, Asia has the highest usage of televi-

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11. (https://www.imda.gov.sg/-/media/Imda/Files/Infocomm-Media-Landscape/Research-and-Statistics/Survey-Report/2019-HH-Public-Report_09032020.pdf).

12. (https://www.todayonline.com/commentary/tackling-3-obstacles-digital-transformation-education).

13. (https://uk.bettshow.com/white-paper-education-for-the-future).

sion learning and the second-highest in radio[14]. However, Europe has the highest usage in online learning while not emphasising older technologies such as radio or television like Asia[15]. Focusing on one area of education places a disadvantage on users who lack access to modern technology, which is why it is essential to diversify for all audiences.

COVID-19 has also emphasised the importance of EdTech in modern society. Most EdTech products in Southeast Asia involve online video learning and tutoring, such as gamified learning, AI-powered apps, classroom management portals, and education immersive software. Tutoring platforms like Byju's (India)[16] or Ruangguru (Indonesia)[17] became household names in the education space, having raised large funds from investors with the promise to establish online learning as a credible and popular alternative to traditional education.

The chart below shows how investment in education technology ballooned in the last decade. We have experienced a significant increase during the COVID-19 pandemic, which accelerated online learning and addressed the general misperception of many technological advancements in education based on digital tools and platforms.

While a drop in investment activities post-pandemic is likely to happen, this does not change the fact that the EdTech industry has left behind its reputation as an insignificant industry player as far as investment but also educational impact are concerned.

The drastic drop in EdTech investment in the People's Republic of China (PRC) is due to the fact that the PRC government implemented drastic policies and rules restricting children's access to online education tools and platforms. This has significantly undermined the business models and growth prospects of some very large online education companies operating in the PRC.[18]

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14. (https://uk.bettshow.com/white-paper-education-for-the-future).

15. (https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/08/sg_policy_brief_covid-19_and_education_august_2020.pdf).

16. (https://www.forbes.com/sites/anuraghunathan/2021/10/06/byjus-founder-is-on-a-buying-spree-to-keep-his-edtech-company-best-in-class/?sh=1fc6727761aa).

17. (https://www.businesstimes.com.sg/companies-markets/green-business/offering-access-to-education-and-a-ticket-to-a-better-life).

18. (https://www.scmp.com/tech/policy/article/3155447/china-reiterates-ban-online-and-offline-advertising-campus-tutoring-it).

HOLONIQ. GLOBAL IMPACT INTELLIGENCE

Holon IQ

$11.4B of EdTech Venture Funding for 1H 2022 (1 Jan-30 June). A moderate slow-down would deliver around $17B+ for the full year.

Global Education Venture Capital Funding, 2010-1H 2022 in USD Billions

China 29.5B
USA 25.2B
India 11.5B
Europe 7.5B
RoW 7.0B

$0.5B $0.7B $0.9B $1.3B $1.8B $4.2B $3.2B $4.4B $8.2B $7.0B $16.1B $20.8B $17.4B

+35% +31% +72%

PROJECTION

2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022

Source: HolonIQ, 30 June 2022. All numbers rounded and may not sum exactly due to rounding. Excludes PE transactions. All years calculated at historic FX.   www.holoniq.com

Europe's EdTech industry had been developing pre-COVID-19 but as in most other regions, school closures and other restrictions on the education sector brought new life and funding into the EdTech industry. This is poised to continue with a new understanding that digital tools in the classroom are here to stay and make learning more individualised, accessible and transferable. For example, both Germany and France invested a large share in EdTech startups as their focus revolved around smart classrooms[19].

In Southeast Asia, there has been an increase of Massive Open Online Courses in Indonesia, led by a programme called Prakerja[20]. Prakerja utilises cash incentives to upskill or reskill unemployed people through "online courses from platform partners"[21]. Alternatively, in Europe there has been an emphasis on digital certification that is both convenient and flexible so as to incentivise lifelong learning[22]. An example of digital certification includes micro-credentials, which target a wide range of people through short-term courses to promote personal or professional

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19. (https://www.businesswire.com/news/home/20210303005431/en/Europe-EdTech-and-Smart-Classroom-Market-Forecast-to-2027-Coming-Together-of-Latest-Technologies-for-Enhanced-Learning---ResearchAndMarkets.com).

20. (http://review.insignia.vc/2021/01/26/7-insights-into-southeast-asias-edtech-boom-in-2021-a-venture-capital-perspective/).

21. (http://review.insignia.vc/2021/01/26/7-insights-into-southeast-asias-edtech-boom-in-2021-a-venture-capital-perspective/).

22. (https://education.ec.europa.eu/education-levels/higher-education/micro-credentials).

development. These can include both public and private platforms that can be easily accessible online.

On the downside, the increase of digital transformations in education brings about more risks of cyberattacks. In 2019, Maastricht University in the Netherlands suffered a ransomware attack, and had to pay out 220,000 euros to recover from a network-wide shutdown that affected both students and instructors[23]. These attacks have increased as universities can be perceived as soft targets since they may not be as well monitored as healthcare and financial services[24]. There is more at risk with universities than K-12 institutions due to the amount of personal information stored within their systems as well as the fact that most higher education platforms are online. While digitisation may be the best approach for flexibility and accessibility in higher education, there needs to be an increase in monitoring applications and anti-malware software in place to protect both students and instructors. As the topic of data access, management and security becomes more important, governments and organisations are trying to set standards and certifications for users and institutions to better evaluate digital education too. Dxtera Institute[25] and IEEE[26] are two examples of established organisations offering knowledge, standards and certifications in this context.

Digital transformation can revolutionise education systems across the entire world. With the development of digital infrastructure through public and private investments, we can create an efficient change in education systems. However, efforts to implement this change needs to be gradual, measured and with the inputs as well as ownership of teachers and students. If teachers are not able to execute digital transformation in an effective manner then there is little chance of success in the digital transformation of education. It is essential that teacher training should emphasise information and communications technology (ICT) skills within the classroom to create the most effective educational experience for students.

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23. (https://portswigger.net/daily-swig/ransomware-attack-maastricht-university-pays-out-220-000-to-cybercrooks).

24. (https://www.insidehighered.com/news/2022/07/22/ransomware-attacks-against-higher-ed-increase).

25. (https://dxtera.org/).

26. (https://sagroups.ieee.org/1484-2/subscribe-to-email-list/).

EDUCATION QUALITY AND TEACHER TRAINING

The quality of teaching and learning is often difficult to measure and quantify. However, with new approaches to education and an emerging focus on digital education, there is a need for improved quality, inclusiveness, and sustainability in educational systems[27]. Supplying students and teachers with access to digital infrastructure is the first step to providing more equal opportunities in education. The availability of digital tools allows instruction to proceed not only during times of limited physical interaction, but also during a period where technology is transforming the learning experience into a more connective, adaptive, and holistic one[28].

Teachers have the necessary technical and pedagogical skills to integrate digital devices in instruction.[29]

Percentage of students in schools whose principal agreed or strongly agreed that teachers have the necessary technical and pedagogical skills to integrate digital devices in instruction, PISA 2018

27. (https://edtpartners.com/report-the-future-of-higher-education/).

28. (https://edtpartners.com/report-the-future-of-higher-education/).

29. https://www.oecd.org/coronavirus/policy-responses/learning-remotely-when-schools-close-how-well-are-students-and-schools-prepared-insights-from-pisa-3bfda1f7/#figure-d1e207

For digital learning to be effective, both teachers and students must understand how to use these platforms and become adequately familiar with them[30].

Improving the quality of teaching is dependent on improving the training criteria and effectiveness for teachers. Teachers must learn how to use and implement digital technologies into the classroom to make remote lessons fully effective as well as use other pedagogical approaches and tools for learning purposes. The 2018 TALIS survey showed that only 51 per cent of teachers in France among a 56 per cent average of teachers in OECD countries had the use of ICT for teaching included in their educational training[31]. The survey also reported that 45 per cent of teachers in France feel they can support student learning through the use of digital technology by "quite a bit" or "a lot"[32]. With only half of teachers in these countries being experienced in ICT, there must be inconsistencies in the learning quality for students, and there must be a push to reduce these learning inequalities. Policymakers must emphasise recruiting, developing, and retaining a stronger workforce of educators so that both teachers and students can experience a quality hybrid-learning experience[33].

Similarly, in Indonesia, one of the nation's most significant challenges in education is also improving education quality and assuring the quality of teachers[34]. In 2022, only 40 per cent of the 2.9 million Indonesian teachers are digitally literate[35]. The rise of the digital era emphasises the importance of using technology and the internet to explore educational and knowledge resources, as well as to expand opportunities for the learning process in and beyond the classroom[36]. Having these opportunities come about will require better development of the content in online learning, better design of online exams, and the appropriate application of interactive online learning platforms[37]. Education stakeholders and policymakers need to focus on what the future of education holds by taking steps to better prepare teachers and students for this digital age.

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30. (https://www.oecd.org/education/Germany-coronavirus-education-country-note.pdf).

31. (https://www.oecd.org/education/France-coronavirus-education-country-note.pdf).

32. (https://www.oecd.org/education/Germany-coronavirus-education-country-note.pdf).

33. (https://www.tandfonline.com/doi/full/10.1080/02619768.2020.1816961).

34. (https://files.eric.ed.gov/fulltext/EJ1281576.pdf).

35. KASpaces Workshop. 2022. Umar Abdullah, Indonesian Government Policy in developing infrastructure.

36. (https://files.eric.ed.gov/fulltext/EJ1281576.pdf).

37. KASpaces Workshop. 2022. Umar Abdullah, Indonesian Government Policy in developing infrastructure.

The private sector has jumped into the space of teacher training, which has been identified as one of the critical missing links between education and utilisation of digital tools. In Southeast Asia, teacher-training portal and community "Akadasia" is one of those organisations on the forefront of pushing boundaries in improving teacher capabilities and offering no-cost or low-cost teacher training.[38]

DIGITAL INFRASTRUCTURE

Over the past decade, many countries have decreased their government expenditures as a percentage of total GDP on education, which indicates a common challenge with funding for education. For Germany and France, the education sector is one of the lowest funded sections of their respective public sectors in 2021 according to the OECD[39]. The education sector in Singapore is the third highest government expenditure placing it just above Germany and France in 2019[40].

In France, the percentage of total GDP spent on education has been decreasing since 2010, from 5.75 per cent to 5.4 per cent in 2018[41]. Unlike Singapore, Germany's government expenditure on education has been fluctuating at a higher percentage than its Southeast Asian counterparts. Germany's public spending on education has been hovering between 4.8 per cent and 5 per cent over the last decade[42], while France has been decreasing its government spending on education as a percentage of its GDP, still placing them significantly above Singapore.

38. (https://akadasia.com/).

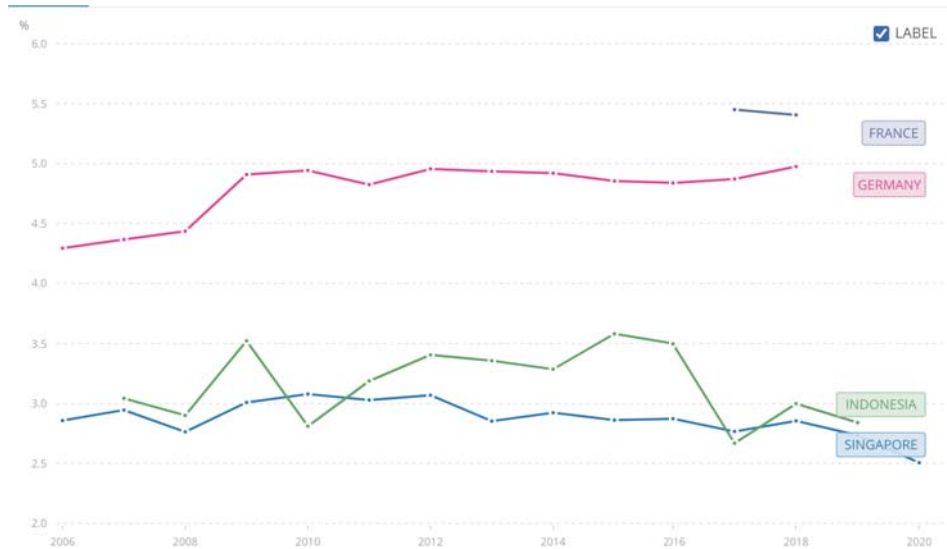39. (https://www.oecd.org/gov/gov-at-a-glance-2021-germany.pdf).

40. (https://www.mof.gov.sg/policies/fiscal).

41. (https://tradingeconomics.com/france/public-spending-on-education-total-percent-of-gdp-wb-data.html).

42. (https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS?locations=DE).

Government expenditure on education.[43]

Western European countries like Germany and France have higher government expenditures on education compared to most countries, including Southeast Asian countries. However, the distribution of these funds may vary from country to country and is not a clear indicator of the quality of education. A lower percentage might not necessarily affect the quality of infrastructure within the education system if they are either privately funded or if households bear the majority of the cost.

The role of the private sector in education is more prominent within Southeast Asian countries relative to European countries. Out of Singapore's 424,402 students in 2020[44], about 121,000 students attend private education institutions[45]. However, this is a different story when it comes to Germany, where only 750,000 attend private schools out of 8.4 million students[46]. Around 28.5 per cent of students are enrolled in private education in Singapore, which is significantly more than Germany's 8.9 per cent, indicating that private schools play a much larger role in Singapore than in Germany.

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43. (https://data.worldbank.org/indicator/SE.XPD.TOTL.GD.ZS).

44. (https://www.moe.gov.sg/-/media/files/about-us/education-statistics-digest-2020.ashx?la=en&hash=9E7EFD9B8088817C207F8AE797037AAA2A49F167).

45. (https://eduvalue.com.sg/the-decline-of-private-education-in-singapore-how-to-work-against-the-decline/#:~:text=It%20is%20estimated%20that%20the,(PEIs)%20(3)).

46. (https://www.internations.org/germany-expats/guide/education).

Where is Education Heading in 2023 and Beyond? Insights from Europe and Southeast Asia

17

In terms of IT infrastructure, including IT equipment for students, Singapore has substantially invested and, for instance, distributed personal laptops or tablets to secondary school students seven years before COVID-19[47]. In 2019, Germany had one computer per 10 students. However, since the COVID-19 pandemic Germany's federal government has realised that there is a need to improve the digital infrastructure at schools and therefore have stated that they will invest 5 billion euros over the next 5 years[48].

Indonesia has offered free internet for 27.3 million students and teachers to help ease the challenges of COVID-19, as well as developed BTS towers to improve internet access across educational institutions[49]. With all of these efforts happening simultaneously across Southeast Asia and Western Europe, education systems are aiming to become more digital and reliable through the development of their digital infrastructure. This has the potential to transform the education system as a whole and create new models of education.

NEW MODELS OF EDUCATION

The change and transformation of education is mostly slow and it is happening gradually. But this has not been the case with some drastically different new models of education that have sprung up in the last few years.

New models of education essentially disintegrate the traditional and long-lasting notion of education, which consists of linear, time-fixed, location-fixed and non-transferable teaching and content principles.

Does teaching need to be in the classroom? Do students need to attend in-person at the same time in the classroom? Does every student need to learn the same content for a particular subject or degree? Does the teaching time need to be fixed for each student and certification? Why can't students change institutions any time? Why are pre-acquired skills not acknowledged and need to be "learnt" again, including assessments/examinations?

47. (https://www.straitstimes.com/politics/all-secondary-school-students-to-get-personal-laptop-or-tablet-for-learning-by-2021-tharman).

48. (https://www.datenportal.bmbf.de/portal/en/education.html).

49. (https://docs.google.com/presentation/d/1H5SvUMlCiChIq9wVV8rBBAIp7YQX2QdB/edit?usp=sharing&ouid=104611943886627683946&rtpof=true&sd=true).

These are fundamental questions, which often led to the development and rise of alternative and innovative new models of education. While some new models have been around for some time, some other ideas and approaches have been born or sometimes "reborn" as a direct result of the school closures during the COVID-19 pandemic and other related implications.

Here are some of the new models in education:[50]

▪ Online School/University

Probably the model that is the most well-known, as online institutions have offered education courses for several years. Having said that, this model has suffered from a general perception that online education is of less value and remote learning did not receive the same acceptance as face-to-face education.

This has drastically changed with school and university closures as most (if not all) education institutions needed to switch to remote learning and even the most prestigious education institutions needed to endorse online education.

Online education is much cheaper than education in traditional "brick & mortar" buildings and it is almost universally accessible, provided there is internet and a computer. Nowadays, as the restrictions of the pandemic are slowly disappearing, most education institutions are looking into more and better utilisation of online learning. "Hybrid learning" as a combination of online and in-person classes is almost a must for any education provider, which covers pre-school, K-12, higher education as well as the adult learning space.

Online education portals have helped universities with adding or even switching to online education courses, especially with support in marketing, creating online-ready content as well as enhancing online delivery.

Examples: Open University (present in various countries), International University of Applied Sciences (Germany), Coursera, UpGrad.

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50. (https://www.qf.org.qa/eiu).

▪ Cluster Model

This model of education has not taken off in many parts of the world but it is particularly impactful in countries where education is very expensive. In the cluster model, several education institutions break down the archetypal approach by creating "the university as a mini city" where a student can learn, sleep, eat, do sports and largely anything else. In the cluster model, institutions collaborate in sharing facilities, human resources and services.

This can save the institutions substantial expenses, which in return can reduce tuition fees for students.

Example: Atlanta University Center Consortium.

▪ Corporate University

For a long time, companies have let the government set up, run and manage higher education institutions. While in developing and emerging economies, the private sector has found interest and invested in education for quite some time, in many developed countries (especially in Europe), the education sector is still largely public sector driven. However, this is in the process of changing and corporates have set up universities to not only address the skills shortage in the labour market but also to explore education as a revenue-generating segment.[51] Large corporates as owners of universities provide some substantial advantages that are critical in today's education market with a strong emphasis on employability:

- Strong industry and skills focus

- Easy access to internships and jobs

- Utilisation of existing infrastructure and technology

- Well-known and established industry brand

CONCLUSION

The education sector is currently experiencing one of its most exciting but also anxious moments and times.

Most exciting for those who explore new models, technologies, strategies and partnerships and show willingness to change.

51. (https://nymag.com/intelligencer/2020/05/scott-galloway-future-of-college.html).

Most anxious for those who are averse to change and who prefer to stick to traditional models of content, delivery and partnerships. While everyone has a role to play and traditional and conservative approaches to education will not change overnight, students and the industry will continue to demand change and shake some long-standing foundations of the education sector.

On one hand, Europe and Southeast Asia have drastically different circumstances in relation to the education of their young generation and professionals. On the other hand, intended outcomes and education impact all often the same from governments, corporates and the education sector; hence, challenges do not drastically differ. The lack of interest and willingness to overcome long-held perceptions of how education and pedagogy should be is probably the biggest obstacle in both regions to progress in changing education as a whole and making students, learners and parents understand.

Whoever is willing and able to adjust to the changing customer and competitive landscape will likely have a long-term future for maintaining and growing its education footprint but also for improving learner outcomes.

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Where is Education Heading in 2023 and Beyond? Insights from Europe and Southeast Asia

21

From "Education *for* Sustainable Development" to "Education *as* Sustainable Development": Lessons from Five Alternative Universities in Asia

Adler Yang and En-Ju (Angela) Pi

I. INTRODUCTION

In the face of unprecedented forms and scale of societal challenges and environmental crises, the opinion that the concept of sustainable development (hereby "SD") should be integral to education has become nearly unanimous across the globe. Among all educational stages, higher education (hereby "HE") bears greater expectations for its contribution to SD, as it is traditionally entrusted with at least two additional responsibilities of *research* and *service* to *teaching* – which is to develop society's epistemic and infrastructural public goods – and in practice produces most of the leading professionals that develop, lead and manage society's institutions[1].

The typical ideal scenarios of education for SD (hereby "EfSD") in higher education institutions (hereby "HEIs"), for example, may include encouraging sustainability-aware interdisciplinary curriculum and research; implementing green architecture and renewable energy with accountability measures of environmental footprints; introducing inclusive protocols to ensure equality among people of different gender and race, and people with disabilities or special needs; and raising

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1. Sibbel, Anne. 2009. Pathways towards Sustainability through Higher Education. International Journal of Sustainability in Higher Education 10(1): 68–82; Clugston, Richard M., and Wynn Calder. 1999. Critical Dimensions of Sustainability in Higher Education. In Sustainability and University Life, ed. Walter Leal Filho. Peter Lang, 31–46.

awareness of power dynamics involved in research[2]. Unfortunately, the sweeping crises in HE across the globe, such as resource cuts, oversupply of academic talent, and increasing debt and inequality,[3] are often treated as priority, thus greatly reducing the time, resource, and effort that a HEI can allocate for EfSD. Even if these common factors deterring SD in HE such as lack of time, funding, and interest[4] are resolved, given that conventional HE curriculum is "developed to provide students with an increasingly narrow understanding of courses, professions and jobs, with a focus on specific knowledge and skills"[5], most HEIs only focus on "developing new specialist courses on SD … which are improving the sustainability literacy and capabilities of those interested in pursuing careers in this area" while others are "still being schooled into social assumptions and practices which serve to exploit people and planet"[6], not to mention that even in specialised SD courses, there is little to no support for pedagogies appropriate for EfSD[7].

2. Fien, John. 2002. Advancing Sustainability in Higher Education: Issues and Opportunities for Research. Higher Education Policy 15(2): 143–52; Tilbury, Daniella. 2011. Higher Education for Sustainability: A Global Overview of Commitment and Progress. In Higher Education's Commitment to Sustainability: From Understanding to Action, ed. GUNI. Barcelona: Palgrave, 18–28.

3. For example, see: Scott, Peter. 2018. The Crisis of the University. Routledge.

4. Which is similar to the factors deterring most innovations and reforms. See: Velazquez, Luis, Nora Munguia, and Margarita Sanchez. 2005. Deterring Sustainability in Higher Education Institutions: An Appraisal of the Factors Which Influence Sustainability in Higher Education Institutions. International Journal of Sustainability in Higher Education 6(4): 383–91.

5. Leal Filho, Walter, Chris Shiel, and Arminda Paço. 2016. Implementing and Operationalising Integrative Approaches to Sustainability in Higher Education: The Role of Project-Oriented Learning. Journal of cleaner Production 133: 126–35.

6. Tilbury. 2011. HE for Sustainability.

7. Christie, Belinda A., Kelly K. Miller, Raylene Cooke, and John G. White. 2013. Environmental Sustainability in Higher Education: How Do Academics Teach? Environmental Education Research 19(3): 385–414.

The fundamental limitations of conventional HE models[8] and unsatisfactory "ideal scenarios" of EfSD[9] prompted groups of academics, educators, and practitioners across the globe to initiate alternative forms of HEIs that are commonly called "alternative universities" (hereby "AUs")[10]. Their stories attracted research interest in Taiwan, as Taiwan legislated the "Regulations Governing Permissions and Quality Assurance for School-based Experimental Education at Tertiary Level" (hereby "Experimental Higher Education Act") in 2017[11] to extend the accreditation eligibility for alternative or home schools and initiatives (formally called "experimental education" in Taiwan) previously limited to primary and secondary education stages. Preliminary research found many of the AU models radical yet promising in addressing several structural problems common in conventional HEIs and in fulfilling the aspirations of EfSD[12]; further inspired some of the designs of ongoing

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8. For example, see: Yang, Adler. November 2020. How Might Higher Education Serve as the Soil for Robust and Resilient Societies? 2020 Taiwan International Education Summit. Taipei, Taiwan.

9. A shared problem among many in AU communities is the problem with the concept of "sustainability/SD" itself, as it was developed in alignment with the interest of the establishment and implies "sustaining the unjust status quo" (Marcuse 1998), or at least is only the "neutral point of not doing more damage" (Wahl 2016). A commonly used substitute for sustainability/SD in the literature is "regeneration/regenerative". However, since the debate between the concept of "sustainability/SD" and "regeneration" is not the focus of this paper, "sustainability/SD" will still be used mainly, with occasions where "regeneration" is used to honour the AUs' values. For more, see: Marcuse, Peter. 1998. Sustainability Is Not Enough. Environment and Urbanization 10(2): 103–12; Wahl, Daniel Christian. 2016. Designing Regenerative Cultures. Illustrated edition. Axminster, England: Triarchy Press Ltd.

10. While no comprehensive index of all AUs around the world is available, many AUs committed to actualising regenerative, just and peaceful futures have joined the Ecoversities Alliance, and thus can be found on its website: https://ecoversities.org/.

11. The official articles in Chinese can be accessed at the Laws & Regulations Database of The Republic of China (https://law.moj.gov.tw/LawClass/LawAll.aspx?pcode=H0030062) and a non-official English translation can be accessed at HigherEdRevolution.org. (https://higheredrevolution.org/index.php/%E5%B0%88%E7%A7%91%E4%BB%A5%E4%B8%8A%E5%AD%B8%E6%A0%A1%E5%9E%8B%E6%85%8B%E5%AF%A6%E9%A9%97%E6%95%99%E8%82%B2%E8%A8%B1%E5%8F%AF%E8%88%87%E8%A8%AD%E6%A0%A1%E5%8F%8A%E6%95%99%E5%AD%B8%E5%93%81%E8%B3%AA%E4%BF%9D%E8%AD%89%E8%BE%A6%E6%B3%95_%5C_Regulations_Governing_Permissions_and_Quality_Assurance_for_School-based_Experimental_Education_at_Tertiary_Level_(Taiwan)/en).

12. For example, see: 薛曉華 et al. 2022. 夢想高教新視界：實驗大學的國際視野 [Envisioning Dream Universities: Experimental Universities Around the World]. Center for Teacher Education, National Tsing Hua University. ISBN: 9789860643480.

preparations and applications for new experimental HEIs[13]; and even sparked the advocacy to make unaccredited AUs in other countries eligible for offshore Taiwan accreditation[14].

To explore how EfSD might be done differently at HEIs, this paper presents five case studies of AUs in Japan, Korea, and India based on qualitative data from interviews, visits, and participant observations conducted between 2017 and 2022, and a review of existing information such as webpages, official documents and media coverage from their first availability up to August 2022. Given that a thorough evaluation of the AUs' success or impact is impossible due to the lack of sufficient data and the self-funded nature of the studies conducted, we instead focus on analysing, interpreting, and evaluating the AUs' approach or strategies for EfSD, which will be called *change theories* or *models* interchangeably, and finally, consolidate key insights for the betterment of EfSD in HE systems.

13. Such as the Experimental University for Holistic Ecology and Design for Sustainability (Unofficial translation. See its survey at: https://tsha.org.tw/news/%E5%A6%82%E6%9E%9C%E6%9C%89%E4%B8%80%E6%89%80%E5%A4%A7%E5%AD%B8%EF%BC%8C%E4%BB%A5%E7%A2%B3%E4%B8%AD%E5%92%8C%E7%94%9F%E6%85%8B%E6%B0%B8%E7%BA%8C%E7%82%BA%E6%A0%B8%E5%BF%83%EF%BC%8C%E6%95%99%E5%B0%8E/) and XU (See a related Op-Ed at: https://opinion.cw.com.tw/blog/profile/352/article/11017).

14. The idea to offer offshore Taiwan accreditation to foreign AUs was first openly raised at the Reimagining Experimental Higher Education Unconference in Taipei, January 2020 (https://www.accupass.com/event/1912301458092010164160), with representatives of the Ministry of Education, multiple educational nonprofits, and foreign AUs attending the event. It was further discussed at the 2020 Quality Education Forum, and its preliminary pathway is written in a preliminary suggestion document for future amendments of the Experimental Higher Education Act. See: 陳盈螢. 17 January 2020. 台青年邀日、韓實驗大學分享，盼推動台灣成實驗教育之島. 親子天下 翻轉教育. (https://flipedu.parenting.com.tw/article/005621); Yang, Adler. June 2020. 大學裡搞實驗教育，行不行？ 論「部分班級實驗教育條例」實現 高等教育學(習)者民主共治、共學的可能性 [Is it possible to run an Experimental Education Program in a Higher Ed Institution? Exploring futures of higher ed with the Partial Institutional Experimental Education Act]. 2020 Quality Learning Forum. (https://doi.org/10.13140/RG.2.2.11498.34240); International Research and Action Alliance for Experimental Higher Education. 2020. 2020年第一版實驗高教修法方向與路徑 [Pathways for Future Revisions of the Experimental Higher Education Act. Ver.1, 2020.]. (https://www.academia.edu/45572633/2020%E5%B9%B4%E7%AC%AC%E4%B8%80%E7%89%88%E5%AF%A6%E9%A9%97%E9%AB%98%E6%95%99%E4%BF%AE%E6%B3%95%E6%96%B9%E5%90%91%E8%88%87%E8%B7%AF%E5%BE%91_Pathways_for_Future_Revisions_of_the_Experimental_Higher_Education_Act_Ver_1_2020_).

II. RECLAIMING AUTHENTIC RELATIONAL SELVES: TEKISEN DEMOCRATIC UNIVERSITY (TDU), TOKYO, JAPAN

Tekisen Democratic University (雫穿大学, formerly called Shure University, hereby "TDU")[15], Japan's first democratic university, was co-founded in Tokyo in 1999 by Japan's leading educational sociologist Kageki Asakura (朝倉景樹)[16] and a group of free school graduates and *futoko*[17]. It calls itself democratic for at least three reasons: First, all dimensions of university leadership, management, and governance are openly and cooperatively run by faculty, staff, and students, with mutual respect at its core. Second, there are no compulsory programmes and students self-determine their learning paths in a deliberative and reflexive manner, including determining what and how they want to learn, and when they will graduate. Third, the university considers itself as a continuum of the democratic education and free school movement, in which most schools follow similar principles as those above. The movement can be at least traced back to the founding of Summerhill School in the UK in 1921 and TDU has been playing a leading role in the International Democratic Education Community (IDEC) since its founding.

15. Official website: https://tdu.academy/; Official Facebook page: https://www.facebook.com/TDUtokyo; Official Twitter account: https://twitter.com/tduniversity.

16. Kageki Asakura (朝倉景樹) is the author and co-author of several important works on the sociology of education in Japan, such as 登校拒否のエスノグラフィー [An Ethnography of Futokos] (1995) and 教育のエスノグラフィー [Ethnographies on Education] (1997), and is lauded as the leading figure on *futoko* and alternative education issues in Japan. He also speaks internationally and advises education innovation and policymaking in several countries, such as Korea and Russia. See: "朝倉景樹." 2022. Wikipedia. (https://ja.wikipedia.org/w/index.php?title=%E6%9C%9D%E5%80%89%E6%99%AF%E6%A8%B9&oldid=87596605). Retrieved 20 August 2022; Democratic Education and Working Institute Japan. n.d. (https://kagekia.org/).

17. *Futoko* (不登校) is a Japanese term that refers to the school-aged children who are absent from or do not attend government-accredited schools for whatever reason and for a substantial time. It was formerly mistranslated as *school-phobics* or *school-refusals*, both of which denote negative psycho-social characteristics that do not apply to all of these school-aged children. While it is more often written as *futoko* in English directly, it is sometimes translated as School-Non-Attendants or SNA in short.

Figure 1: TDU members co-hosting a press conference with other civic organisations for Mobilising Support to Ukraine Under War as featured by the NHK[18].

The university's commitment to democracy is, of course, an end in itself. But at the same time, it is also a tender attempt to intervene with the root causes of Japan's systemic social sustainability challenges.

It has been long argued that while the school or mass education system claims to equip the next generation with knowledge and skills for their future success, under the capitalist system, however, this is done by funnelling and moulding them to become the components that will eventually fit and make up the capitalist social machinery. In individualistic societies such as the *developed* Western countries, such moulding may seem more obscure as it neatly marries with individualistic goals, and may also be compensated with the *liberty* that arises from a culture that is more indifferent to people's private lives and spaces, which may serve as a release "vent"

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18. TDU is a leading institute in the global democratic education movement and is also active in international humanitarian activities. Source: TDU - 雫穿大学（てきせんだいがく）. 4 May 2022. (https://www.facebook.com/TDUtokyo/photos/515600033606239).

and thus reduce individuals' disruptive or revolutionary impulses. In a collectivist[19] society, however, the concept of *private life/space* is rather alien as a human is seen as a relational being in nature and in no circumstances are they really free from their *responsibilities* to whom/whatever they are in relation to[20]. The moulding of individuals, coupled with the lack of space for relief, doesn't only accumulate one's stress and exhaustion easily, but also leaves very little room for the healthy development of one's self-concept and self-actualisation. While no cases are identical, literature shows that contemporary psycho-social ailments prevalent in Japanese society – whether it's the rural villagers who migrated to join the urban workforce yet were unable to gain a new urban identity nor reclaim their old rural identities, or the struggles of the depressed, *hikikomori*[21], bullies, suicided, and even random killers – are largely attributable to such a collectivist culture wedded to capitalistic alienation[22]. In TDU's way of putting it, as the conventional school system and job market do not entail the function of supporting the development of people's

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19. While "conformist" is sometimes used, we consider it inaccurate as the cultural norm is not to "conform" (in which the target one conforms to is also ambiguous) but to take the "collective" as a high priority in one's considerations; thus, this may seemingly manifest as behaviours "conforming" to the collective or authority more often. By looking into the culturally favoured narratives or non-conformity in East Asian history and literature, we can also see that it centres on the consideration for something bigger than oneself, which supports our choice of word.

20. *Responsibility*, instead of *accountability* or *liability,* is used in this context, as people inevitably have to *respond* to one another in relational settings ("no-response" is, in fact, a kind of response) yet are not necessarily *accountable* or *liable* to them. Exemplifying the Japanese inherently relational concept of human (人間, which literally translates as "among people"), spheres considered private in individualistic societies, such as family, friendships, and even one's own thoughts and feelings, are all relational to the Japanese psyche, as these are all things or objects that one inevitably interacts with.

21. *Hikikomori* (ひきこもり), sometimes called "modern-day hermits" or "shut-ins", refers to the people who practise extreme social isolation or withdrawal through self-confinement or reclusion. With it strikingly taking up 1.2 per cent of Japan's population, some propose to classify it as a new kind of psychiatric disorder (e.g., Teo and Gaw 2016), yet others reject this view with evidence that mental illness does not precede hikikomiri behaviour, and argue that it is instead an alarming symptom of Japan's systemic social ailment. See: Teo, Alan Robert, and Albert C. Gaw. 2010. Hikikomori, A Japanese Culture-Bound Syndrome of Social Withdrawal? A Proposal for DSM-V. The Journal of nervous and mental disease 198(6): 444–49; McLeod, Hamish J., Maki Rooksby, and Tadaaki Furuhashi. Hikikomori: Understanding the People Who Choose to Live in Extreme Isolation. The Conversation. (http://theconversation.com/hikikomori-understanding-the-people-who-choose-to-live-in-extreme-isolation-148482); nippon.com. Japan's "Hikikomori" Population Could Top 10 Million. 2019. (https://www.nippon.com/en/japan-topics/c05008/japan's-hikikomori-population-could-top-10-million.html).

22. For example, see: 見田宗介. 2008. まなざしの地獄 - 尽きなく生きることの社会学. 河出書房新社. ISBN 978-4-30-924458-7; 野下智之 et al. 2013. 無差別殺傷事犯に関する研究. 法務総合研究所研究部報告 50. 法務省. (https://dl.ndl.go.jp/info:ndljp/pid/10225886); 碓井真史. 2008. 誰でもいいから殺したかった! Tokyo: ベストセラーズ.

authentic selves and authentic relationships, instead reducing them to prescribed functional components entangled with all-encompassing webs of responsibilities, it becomes "suffocating to live" to many[23].

Figure 2: Self-designed/organised learning programmes to support the disaster relief efforts during the 2011 Great East Japan Earthquake and Tsunami[24].

Despite the fact that free school graduates in Japan, as in most places in the world, do not exhibit inferior knowledge and skills upon entering HE or employment[25], and the fact that they also have access to colleges under the "diploma equivalency" policy[26], TDU considers the prescriptive nature of HE programmes and their neglect of the relational dimension of one's development a perpetuating mechanism of the aforementioned psycho-social ailments.

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23. Translated from "生きづらい" in Japanese.

24. This is one of TDU students' long-lasting self-designed and organised programmes, which has continued for more than ten years. Source: TDU - 雫穿大学（てきせんだいがく）. 12 August 2021. (https://www.facebook.com/TDUtokyo/photos/344335097399401).

25. For example, see: Akin, Wilford M. 1942. The Story Of The Eight-Year Study With Conclusions And Recommendations. Volume I. Harper & Brothers. (http://archive.org/details/storyoftheeighty009637mbp). 10 January 2021; Riley, Gina, and Peter Gray. 2015. Grown Unschoolers' Experiences with Higher Education and Employment: Report II on a Survey of 75 Unschooled Adults. Other Education 4(2): 33–53.

26. See: Article 150, item (vii) of the Enforcement Regulation. Ministry of Education, Culture, Sports, Science and Technology. (https://www.mext.go.jp/en/policy/education/highered/title02/detail02/1373912.html).

Figure 3: A TDU student presents her self-ology research on her relationship with her "dark tendency to avoid"[27].

Addressing such a fundamental flaw in the design of the existing HE model, TDU takes a completely different approach: It completely disentangles education (which is non-prescriptive and centres on the individual's healthy development and its constructive cohesion with society) from professional certification (which is prescriptive, so as to fulfil each profession's functional requirements). It does not seek accreditation from the government, and thus does not award government-recognised credentials. Instead of assigning students to and shaping students based on the prescriptions of professional credentials, TDU focuses on facilitating students' reflexive and deliberate exploration and development of their "authentic relational selves", which starts with equally respecting oneself and others and

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27. *Self-ology* is a field of research developed at TDU by Kageki Asakura and others. It is inspired by Japan's unique "当事者研究 (Tojisha Kenkyu, sometimes translated as 'research by/ of/for the concerned parties' or 'concerned party research')" approach, and typically focuses on studying one's personal issues/challenges/difficulties to enable self-clarity, self-emancipation, and self-actualisation, by utilising a inclusively wide range of research methods. For more, see: Ishihara, Kohji. 2015. Learning from Tojisha Kenkyu: Mental Health "Patients" Studying Their Difficulties with Their Peers. In Disability Research Today, Routledge, 43–58; 松島恵介. 2020. 鬱病に罹患した生態心理学者による一人称的当事者研究の試みと, 鬱病治癒方略の提案のためのヒント: ギブソン, 木村敏, 大森荘蔵, 三木成夫, タレルを参照点として. 認知科学 27(2): 110–22; みつ子樫葉 and 陽介柳瀬. 2020. 当事者研究から考える校内授業研究のあり方. 広島大学大学院人間社会科学研究科紀要. 教育学研究 1: 105–14. Photo Source: TDU - 雫穿大学（てきせんだいがく）. 11 November 2020. (https://www.facebook.com/TDUtokyo/photos/151624193337160).

naturally extending this respect to the society and the environment[28]. TDU offers seven typologies of relations as frames of reference for every student to explore with, including their relational selves in the context of gender, family, others, work, society, money, and time[29].

Figure 4: TDU's Public Research Seminar on Self-ology with prominent Japanese philosopher Satori Saishu (second from the left)[30].

TDU facilitates such relational exploration and development with two pillars in mind (Figure 5): One is to support students in facing, unravelling, resolving, and subliming their life issues, for example, identifying one's own "enabling" and

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28. From the very beginning of TDU, environmental issues have been dear to many TDU students. For example, their students' practice of the traditional Japanese "*Mottainai*" culture, which adds the fourth "R" of "respect" to the well-known mantra of "reduce, reuse, recycle" and is championed by the Nobel Prize-winning Kenyan environmentalist Wangari Maathai (Crossley-Baxter, 2020), was studied in research by the Korean alternative education institution Mindlre (민들레 학교). The green projects that the students voluntarily initiate also include but are not limited to building a solar-powered car, implementing green interior design, practising sustainable urban and campus farming, and jointly making the decision for the campus to subscribe to a green electricity supplier. See: Crossley-Baxter, Lily. 2020. Japan's Ancient Way to Save the Planet, March 2020. (https://www.bbc.com/travel/article/20200308-japans-ancient-way-to-save-the-planet.)

29. NPO法人TDU・零穿大学 (Translated by Yang, Adler 2019). 比起「適應社會」，我們更希望你「設計人生」—「沒有預設目標，只協助你開創適合自己的人生」的日本零穿民主大學小檔案. Taipei: Awakening Cooperative Lab.

30. For more about Saishu Satori (最首悟), see: Saishu Satori on WorldCat (https://www.worldcat.org/identities/lccn-n85032539/) or Wikipedia (https://ja.wikipedia.org/wiki/%E6%9C%80%E9%A6%96%E6%82%9F). Photo Source: TDU - 零穿大学（てきせんだいがく）. 7 November 2020. (https://www.facebook.com/TDUtokyo/photos/150353583464221).

"disabling" conditions by studying their experiences of entrapment and self-denial, thus gaining key insights for "designing a more enabling lifestyle." The other is to broaden students' awareness of the diversity of possible lifestyles and to provide a safe space for students to prototype their own until a viable lifestyle is ready to set off. The co-creation of curriculum among students and faculty based on the two pillars above exemplifies a nonlinear and nonbinary vision of HE and employment: The university is no longer a prerequisite stage that is completed before and separated from employment. Instead, it can be a safe haven for anyone to calibrate and recalibrate for healthy lifestyles that always account for healthy cohesion with all kinds of relations they are situated in, which students can always return to between jobs or even during employment. Such a fundamental redesign of the university, we discover, doesn't only address the psycho-social ailments that arise from strong inhibitive or suppressive cultures in collective societies, but may also cultivate responsible yet authentic relationalities in individualistic societies to reduce the self-centredness and disposition to neglect externalities prevalent in their members[31].

Figure 5: TDU's Change Model towards Reclaiming One's Authentic Relational Self[32].

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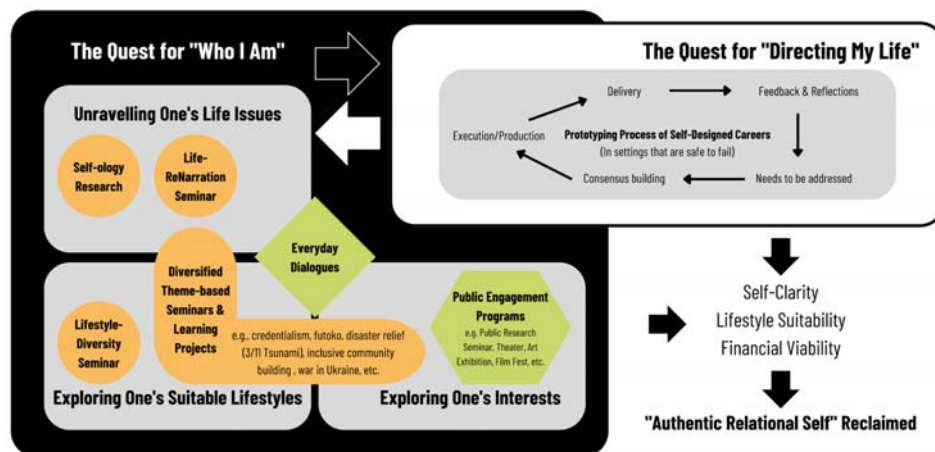
31. For example, Sibbel (2009) argues, given that the "inadequacies of the individualistic, consumer centric approach" is among the major barriers to achieving sustainability, "[h]igher education must develop the capacity in graduates to prioritise actions after balancing all the social, environmental and economic costs and benefits. ... [T]he curriculum should include experiences which lead to a greater awareness of social and moral responsibilities. In particular, greater self-awareness of personal value systems and a willingness to revise them is required to prepare graduates for work towards sustainability." See: Sibble. 2009. Pathways towards Sustainability.

32. Reproduced, translated and modified by Adler Yang from: NPO法人TDU・零穿大学. Translated 2019. 比起「適應社會」，我們更希望你「設計人生」.

III. DEMOCRATISING KNOWLEDGE PRODUCTION BY EMBRACING TACIT KNOWLEDGE: KNOWLEDGE CIRCULATION COOPERATIVE UNIVERSITY (KCCU), SEOUL, SOUTH KOREA

If TDU brings a tender and healing atmosphere, the three following Korean AUs may appear more radical by living up to their aims to create "alternative societies" to the mainstream capitalist system[33].

The metropolitan-based Knowledge Circulation Cooperative University (지식순환협동조합대안대학, hereby "KCCU")[34], co-founded by prominent Korean scholars such as Kim Se-gyun, professor emeritus of political science at Seoul National University, critical theorist Nae-Hui Kang and others in 2013 in Seoul[35], attempts to achieve this by not only practising *alternative education* but also by fostering an *alternative academic community* in which knowledge production is *democratised*[36]. Under this banner and the "Red-Green-Purple Paradigm (which denotes coop-erativism, environmentalism, and feminism respectively[37])", not only has KCCU attracted students ranging in age from 16 to 70, from those with no formal

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33. This may reflect the difference in the shared subjective experiences of social crises in the two countries, in which the experience of the former may be similar to that of a "boiling frog" in a long economic stagnation since the 1990s, while the experience of the latter was more like an acute earthquake in the 1997 Asia financial crisis. See: Yang, Adler. 2022. 韓國代案高教： 回應帝國與資本主義支配的重構主義嘗試 (Alternative Higher Education in Korea: Reconstructionist Attempts to Address the Domination of Imperialism and Capitalism). In 薛曉華 (ed) 夢想高教新視界： 實驗大學的國際視野. Hsinchu: 國立清華大學師資培育中心 Center for Teacher Education, National Tsing Hua University.

34. Official homepage: https://www.freeuniv.net/; Official Facebook page: https://www.facebook.com/kunion2013/; Official YouTube: https://www.youtube.com/user/kcunion2013/.

35. Nae-Hui Kang (강내희) was a professor of English literature at Chung-Ang University and now serves as the president of KCCU and editor-in-chief of the academic journal *Culture/Science* (문화/과학). See: Ahn, Seon-hee. 10 October 2013. Alternative Education Comes to the University Level. The Hankyoreh. (https://english.hani.co.kr/arti/english_edition/e_national/606529.html); Nae-Hui Kang on Worldcat identities (https://www.worldcat.org/identities/lccn-nr98039990/).

36. 강내희. 25 June 2017. 지식생산의 민주화. 한겨레 신문. (https://www.hani.co.kr/arti/opinion/column/800161.html).

37. The original terms that the "Red-Green-Purple Paradigm" denotes are "노동", "생태", and "페미니즘" in Korean. While the last term comes from the transliteration of feminism, and is thereby directly translatable, the former two are literally translated as "labour" and "ecology" respectively. In the author's English and Japanese communications with KCCU faculty and students (since the authors are not literate in Korean), the "Red" paradigm has been translated as "socialism", "communism", and "Marxism" interchangeably. To prevent it from being misread due to their authoritarian or cultish connotations in English, the authors use "cooperativism" to translate the Red paradigm as we found this value at the core of KCCU, and is likely the dimension of socialism/communism/Marxism that they actually focus on.

educational experience to those with doctoral degrees, but it has also attracted academics unhappy with becoming "essay-producing machines" and accomplices of the exacerbating vicious competition in the academic "market", in which academics are trapped in the "Red Queen Effect" and have to keep rushing to publish just to "stay in the same place"[38]. For example, Jeong Ryu (유정), a cognitive scientist who taught at Yonsei University, Seoul National University and Konkuk University for more than a decade before joining KCCU, decided to join KCCU because she found the mainstream academia overly specialised and fragmented, which makes it difficult for one to work outside of one's silos, thus making it easy to fall prey to the increasingly impenetrable "localism" of one's own field of study[39].

Figure 6: One of the founding meetings of KCCU held by professors who sought to change the academia[40].

According to KCCU's diagnosis, the conventional *competitive model* of education and research perpetuates the following vicious cycle (Figure 7): While all people possess unique tacit knowledge through personal experiences, such as confusion, feelings, intuition, and somatic memory, the competitive model often ignores such tacit knowledge and solely demands their acquisition of the established body of explicit knowledge, and subsequently reinforces such acquisition through competitive processes such as examinations, funding applications, and publications. This model, which mainly concerns "one's acquisition of tacit knowledge and their contribution to new developments upon it", greatly deprives students and academics of the space to base their learning and research upon their tacit knowledge, thereby

38. 姜正錫(강정석). 16 January 2020. 以民主實踐，突破新自由主義重圍——簡介「首爾知識循環協同組合代案大學」. Presented at Reimagining Experimental Higher Education UnConference, Taipei. International Action and Research Alliance for Experimental Higher Education.

39. Ryu, Jeong. 22 November 2022. Creating a Resilient Community with Robust Members. In Yang, Adler (Chair), Universities as the Soil for Resilient and Robust Societies [Symposium]. 2020 Taiwan International Education Summit, Taipei. (https://youtu.be/IzHw5m_RSzs).

40. Source: 姜正錫. 16 January 2020. 以民主實踐，突破新自由主義重圍.

condemning their tacit knowledge to disconnection and alienation. Consequently, as the competitive model hardly ever seeks to connect explicit knowledge acquired externally with the learner or researcher at a personal level, not only is one's unique invaluable tacit knowledge often wasted and lost, hence not contributing to the collectively shared body of knowledge, moreover, such a process also alienates one's learning or research from their personal meaning in life. As a result, academic life becomes meaningless to many students and researchers, and the knowledge produced in such a process also becomes hardly meaningful to anyone – as it wasn't the intent to begin with.

Figure 7: KCCU's Change Model for Democratising Knowledge Production[41].
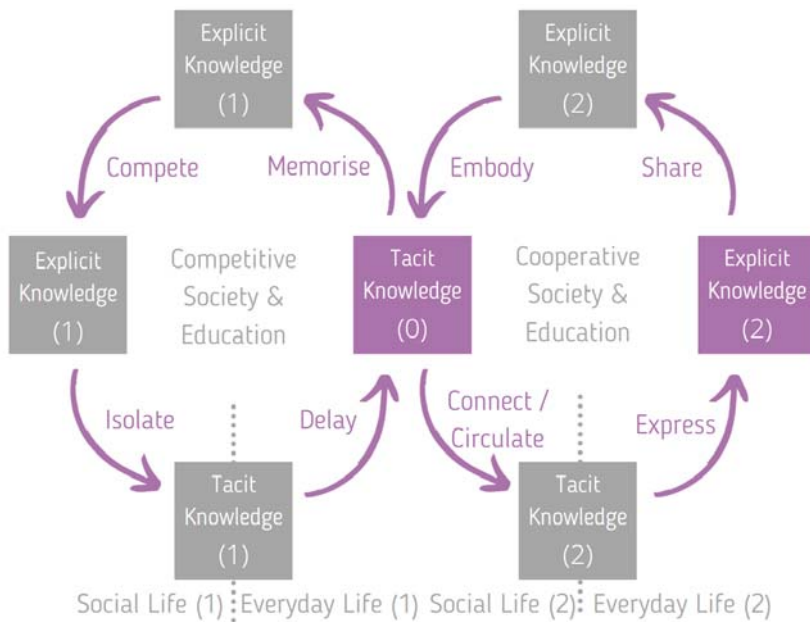
To reverse this vicious cycle, KCCU attempts to democratise and circulate knowledge through what they call a *cooperative model* of education and research: This model facilitates the interconnection and exchange of tacit knowledge among the academic community members by caring for and empathising with each other's tacit knowledge, such as life difficulties or perplexities, as the starting point for learning and research. To express, illustrate, and explain one's tacit knowledge with one another, one naturally has to explore ways to present it explicitly. As each

41. Translated by the authors from: 姜正錫. 16 January 2020. 以民主實踐，突破新自由主義重圍.

individual's tacit knowledge is gradually rendered visible through expression, such exchanges between community members enable the preliminarily manifested knowledge to become more extensive and profound, and to eventually link to the established body of explicit knowledge. Finally, as the whole learning and research process begins with one's tacit knowledge, the explicit knowledge that eventually emerges through this cooperative model will again naturally bring about new tacit knowledge, thus initiating a new learning/research cycle that continues to strengthen meaningfulness in knowledge production. For example, Ryu organised the Cognitive Science Research Seminar at KCCU with students and scholars from various backgrounds, such as education, linguistics, brain science, philosophy, psychology, anthropology, and artificial intelligence, to explore and develop their cognitive science-related tacit knowledge together, and even organised events to engage the public in this cooperative model[42].

Figure 8: Knowledge circulation among peers is crucial in KCCU's education system[43].

42. Ryu. 2022. Creating a Resilient Community.
43. 姜正錫. 16 January 2020. 以民主實踐，突破新自由主義重圍.

Ryu considers KCCU's cooperative model a concrete avenue to emancipate academic research, as it provides an intellectual environment to all without sacrificing the personal dimension, and it especially allows "the young people who want to make sense of and change what's wrong with *Hell Korea*[44], yet either don't have the money or exam marks to attend graduate school – and are unlikely able to do so even if they do attend – a place to take part in social change as they do study/research cooperatively.[45]" Instead of developing one's research based on gaps in the literature after years of cramming for it, students, regardless of background, bring their authentic concerns to the community, go through the aforementioned cooperative learning/research process, and crystalise their findings and breakthroughs by publishing them in suitable academic journals or media outlets.

In this way, not only is learning no longer rigid and knowledge is no longer "dead", as Ryu puts it, just as importantly, this model ensures that research does not take place behind closed doors but instead becomes more interdisciplinary and integrative through the interplay of multiple perspectives and the spontaneous transcendence of various localisms. Through this cooperative model that transforms *competition* into *cooperation* and *alienation* into *association*, KCCU continues its endeavour to foster a peaceful alternative to the development of individuals and societies (Figure 9).

44*. Hell Korea* is an internet meme popularised since 2015, and means that Korea is a hellish, hopeless society. See: Hell Joseon. 2022. Wikipedia. (https://en.wikipedia.org/w/index.php?title=Hell_Joseon&oldid=1095142240). Accessed 22 August 2022.

45. Ryu. 2022. Creating a Resilient Community.

Figure 9: KCCU's Change Theory for Peace through Cooperative Education[46].
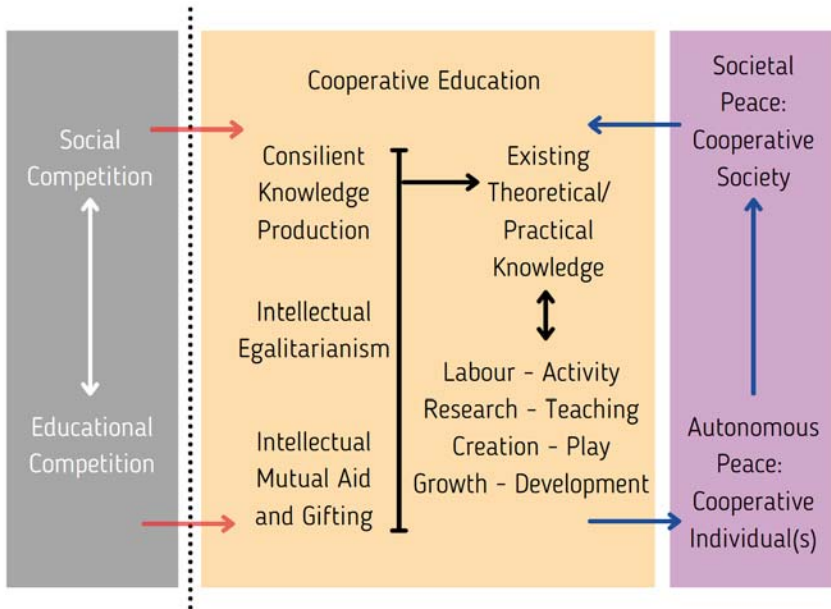
IV. BRINGING METROPOLITAN YOUTH TO REVITALISE THE RURAL THROUGH "PLATFORM 9 ¾": BUSAN ON PEUM TO (BOPT), BUSAN AND YANGSAN, KOREA

While the change theories and models developed by the previous two AUs address the challenges of social sustainability directly and environmental sustainability indirectly, Busan On Peum To (부산온배움터, formerly called Green University, now literally translated as Busan Academy for Holistic Learning, hereby "BOPT")[47] is one of the AUs that embody environmental regeneration in their theories and practices.

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46. Translated by the authors from: Ryu. 2022. Creating a Resilient Community.

47. Official website: https://m.cafe.daum.net/busanecoschool/_rec; Official Facebook group: https://www.facebook.com/groups/577554615632691/.

Figure 10: Chae (first from the left) and students attending the Youth Social Activists Course at BOPT's Busan Campus to pilot their UBI Programme[48].

By studying the modern and contemporary history of Korea, literature scholar Saeng-Pyeong Chae (채상병) became aware of the philosophical roots of the historical and ongoing tragedies under imperialism, colonialism, and neoliberalism, which he believes lie in modern civilisation's exploitative and controlling obsession with science, technology, money, and material goods. To resolve humanity's alienation from nature and its intensifying self-destruction, he holds similar beliefs as the intellectuals and practitioners of the degrowth, localisation, and swaraj movements: First, humans will never end their self-destruction as long as the exploitative, controlling, and growth-oriented rationale hasn't changed. Second, as long as people are dependent on powerful institutions, domination will never end; thus, civil society should seek solutions for civilisation's predicament within themselves instead of from big institutions[49].

48. During the course, students decided that they are going to prototype a peer-supported Universal Basic Income system to study the opportunities, challenges and potential outcomes of its implementation. Photo taken by Adler Yang at BOPT's Busan Campus, 18 December 2019.

49. Yang. 2022. Alternative Higher Education in Korea.

Figure 11: The "Peaceful Coliving" symbol on BOPT's pamphlet[50].

To create a hub for driving social change toward social and environmental re-generation, Chae founded BOPT in metropolitan Busan and its adjacent rural town Yangsan in 2003. The university doesn't only upend the conventional model in terms of practice but also in its philosophy: Instead of the prevalent premises of seek-ing truth, cultivating problem-solvers, or preparing professionals in the Western HE tradition/practice, BOPT is founded upon the philosophical soil of Korea's neo-Confucianism tradition called *Tonghak* (동학, literally translated as Eastern Learning), in which the goal of one's education is to seek harmony with nature and to sanctify and revive one's unpolishedness and authenticity. Consequently, the university replaced the traditional university departmental system with four main learning themes, "humanities", "clothing, food and housing," "health and wellness" and "energy and technology," which include programmes such as ecological hu-manities, traditional dressmaking, wilderness survival, traditional fermented food and drink, ecological architecture, holistic wellness, parenting, energy self-reliance and appropriate technology. In other words, the education is centred on the spirit and competence of *mutual aid* and *self-sufficiency* in an attempt to empower people to live regeneratively, reduce their dependence on the neoliberal order, and thus gradually dismantle the root causes of human self-destruction.

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50. The "Peaceful Co-living Symbol" (생명평화무늬) was originally created by Korean Buddhist monk Do-peob (도법) and has become a common element in the culture of Korea's environmental movement. Photo taken by Adler Yang at BOPT's Busan Campus, 18 December 2019.

Figure 12: A sharehouse run by a BOPT member, which also serves as one of BOPT's learning sites in Yangsan[51].


BOPT's attempt to change the social landscape of neoliberal consumerism through education is not only reflected in its curriculum but is also supported by an *ecosystem* (Figure 13). While BOPT has a small campus with only a handful of classrooms in an old industrial neighbourhood in metropolitan Busan, similar to "Platform 9¾" in the Harry Potter series, the Busan campus is actually just the entrance to the BOPT world, which is scattered in the rural town of Yangsan (양산시) in Gyeongsangnam Province (경상남도), an hour away from Busan by bus. By having an "entrance" in the metropolitan area, BOPT's programmes bring the youth from the feverishly competitive and expensive Busan to the hollowising[52] but tranquil Yangsan to learn and work with local cooperatives, including but not limited to local free schools, cafes, stores, or farms, to transform Yangsan into an ecovillage.

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51. Photo taken by Adler Yang in Yangsan, 19 December 2019.

52*. Hollowisation* is a term mainly circulated in East Asian academia which describes the process of all kinds of decline of a community or region. For example, see: Cho, Young-Jae, Du-han Kim, and Eun-Jung Cho. 2015. A Study on the Relation between the Hollowization and the Phenomenon of Decreasing and Aging Population in Rural Villages-Focused on Geumsan-Gun. Journal of Korean Society of Rural Planning 21(4): 85–94; Seki, Mitsuhiro. 1997. Kudoka o Koete: Gijutsu to Chiiki No Saikochiku (Beyond Hollowization: Reconstruction of Technology and Local Economy). Tokyo: Nihon Keizai Shinbunsha; Song, J., and H. Jung. 2012. Globalization and Hollowization Effects; Global Strategies of Japanese Automobile Industries. The Korean Journal of Japanese Studies 35: 157–83; Wen-yong, Feng, Zheng Qing-rong, L. I. Xiu-ying, and L. I. U. Lin-fang. 2007. Trends and Summary on the Study of Rural Settlement Hollowization in China. 《信阳师范学院学报 (哲学社会科学版)》 27(1): 70–73.

From the town of Yangsan's perspective, BOPT brings in community-building and regional revitalisation talents that are in short supply, thus playing a crucial role in addressing its hollowisation; to BOPT and its students, Yangsan is a field that not only enables in-depth learnings that integrate theory and practice, but may even create jobs and entrepreneurial opportunities alongside their cooperative learning and work with the locals.

Figure 13: BOPT's Ecosystem and its Change Model[53].
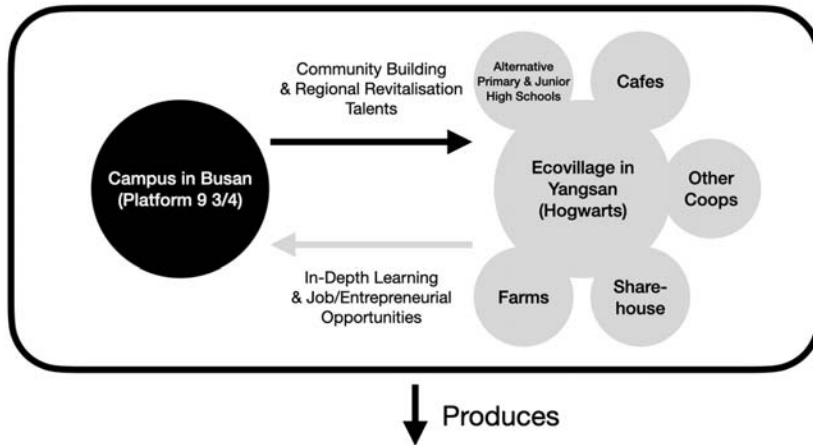
Talents & a Prototype For Alternative (Peaceful and Regenerative) Societies

Through this learning ecosystem, Chae and his colleagues and students at BOPT are creating a prototype for an alternative society step by step. Even if the students eventually leave this ecosystem and return to the mainstream, Chae believes they are already equipped with the mindset, knowledge and competence to become *ecological changemakers* capable of living in harmony with nature and reviving their authenticity wherever they go.

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53. Produced by Adler Yang and largely based on: Chae, Sang-pyeong. Interview. Conducted by Yang, Adler. 18 December 2019.

V. LIVING AS LEARNING, BEING AS CHANGEMAKING: SAMIL HAKLIM, HONGCHEON, KOREA

Similar to BOPT, Samil Haklim (삼일학림, literally translated as Three-as-One Learning Forest[54], hereby "SH") is located in an ecovillage called Life and Peace village (생명평화마을), where its members live and learn symbiotically with the village. It was founded by an intentional Christian community, Bargn Nuri (밝은누리, or "bright world")[55], formed by college students in 1991. As members got married and gave birth, they committed themselves to developing a rural-urban cooperative community so that they could have an alternative to capitalism ingrained in every aspect of mainstream society. In this community, their pursuit of "life and peace" values are embedded in their everyday lifestyle, from food, clothing, shelter, marriage, pregnancy and birth, to parenting and education.

Figure 14: A panoramic view of the Sang Saeng Ecovillage[56].

To realise the ideals of self-sufficiency and regenerative living, the Bargn Nuri Community jointly purchased land in 2010 in the rural county Hongcheon (홍천군) in Gangwon Province (강원도), located hours east of Seoul by driving, and built the Life and Peace Ecovillage based on a combination of South Korean traditional and

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54. Their Korean name 삼 ("Sam" = three) 일 ("il" = one) 학 ("Hak" = learning) 림 ("lim" = forest) is very nuanced as it harmoniously marries traditional Christian and Eastern philosophy. While "three-as-one" denotes "trinity", it also refers to the Eastern worldview that the sky/heaven, earth, and human are one. On the other hand, "learning forest" refers to a place where all kinds of people come together to learn, and its term and concept can be traced back to both the Eastern Asia and Christianity traditions of practising educational/intellectual/spiritual activities in harmony with nature.

55. Official website: http://en.welife.org/.

56. Photo taken by Adler Yang at Sang Saeng Ecovillage, 21 December 2019.

modern ecological architecture[57]. The building process was open to all members to participate and is part of the SH curriculum. The physical space of the ecovillage isn't just a place where some of the Bargn Nuri members live, but is also the physical campus of Samil Haklim and Saengdong Jong (생동중하교, Bargn Nuri's junior high school division) – exemplifying its philosophy that living and learning are inseparable.

Figure 15: SH's students cleaning up the Main Hall with villagers after dinner[58].

Similar to BOPT, SH is one of Bargn Nuri's educational branches that are committed to the whole community's vision. In the spirit of self-sufficiency and harmony with nature, SH's required courses for graduation include "Self-Awareness (a transdisciplinary programme integrating mindfulness, self-awareness, history, philosophy and religion)", "Sustainable Agriculture", "Sustainable Architecture", "Sustainable Innovation", "Aesthetics in Life and Nature", and "Self-Directed Projects", in which the student has to plan and carry out learning projects on their

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57. For example, the first thing the members did when they moved to Hongcheon was to get rid of the modern toilet and build an eco-friendly outhouse, which is a symbolic act of recovering the circulation of life. Faeces and urine that were flushed away and wasted become renewed as fertilizers after fermenting for years.

58. The floor of the main building in the Ecovillage is made of Korean paper (한지) mixed with natural ingredients for fire and water resistance, and the walls are made of traditional rammed earth and overlapped with waste egg cartons to strengthen the structure. It is embedded with a natural temperature conditioning system which can comfortably accommodate more than a hundred people without any electric air conditioning, even when the temperature was below zero degrees during the author's visit. It is also designed with a stunning feature based on Eastern architectural philosophy, which is to harmonise with the rule of nature instead of controlling nature at one's own will: The main hall serves as a large space for diverse activities, such as village or school meetings, dining, and presentations, and is located in the centre of the complex to fully utilise the height and spaciousness afforded by the roof tip in the centre; around the centre of the complex, the spaces beneath the lowered eaves are used for smaller groups and activities, such as classrooms, kitchens, and storage rooms. The result of such minimally artificial design is the harmony among traditional aesthetics, ecological sustainability, plus incredible functionality. Photo taken by Adler Yang at Sang Saeng Ecovillage, 20 December 2019.

own. While the main campus is in Gangwon Province, classes can be held anywhere, including other ecovillages.

The required courses in the mainstream education system, such as languages, mathematics, natural sciences and social sciences, are available in SH as electives and students won't be judged even if they don't take them – these courses are available just to make sure that students are not involuntarily secluded from the rest of society. Of course, as SH is also not a government-accredited university, whether to "graduate" or not is completely at the student's discretion – students learn at their own pace and are allowed to *discontinue* or *resume* their progress toward receiving SH's "diploma". For example, there is a year called "independent year", (similar to "gap year"), which is a period when students materialise what they have learnt and face challenges from "reality". Most students leave the campus and find a place where they can apply their studies and reify their values. At the end of the year, students decide whether they will continue to study at SH or not. This is often a tough time for them, since they have to face the harsh reality of not following the mainstream and endure worried interrogations even from their families. But through such hardship, students often better realise what kind of life they want to live.

Under this rationale of curriculum design, the coerciveness of schooling often experienced by students in the conventional system is largely absent, as the activities of "required courses" are largely inseparable from all villagers' communal life and responsibilities, and there is no pressure for "graduating".

Figure 16: Information board on the wall of the Main Hall explaining its architectural design[59].

While SH lives up to its commitment to environmental sustainability in many dimensions of its practices of communal learning and living in the Life and Peace Ecovillage, its members are not secluded in their own utopic commune but instead are active in participating in striving for greater social change. Among their many approaches to achieving greater social change, there is a specific area of policy[60]

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59. Photo taken by Adler Yang at Sang Saeng Ecovillage, 21 December 2019.

60. As of the end of 2019. SH's policies have been evolving since then and are undergoing significant changes to respond to the challenges posed by COVID-19. For more, see footnote 64.

that we consider as an ingeniously minimal yet impactful leverage point: their unique way of organising and implementing "educational stages" (Figure 17).

Figure 17: Bargn Nuri's Ecosystem and its Change Model[61].
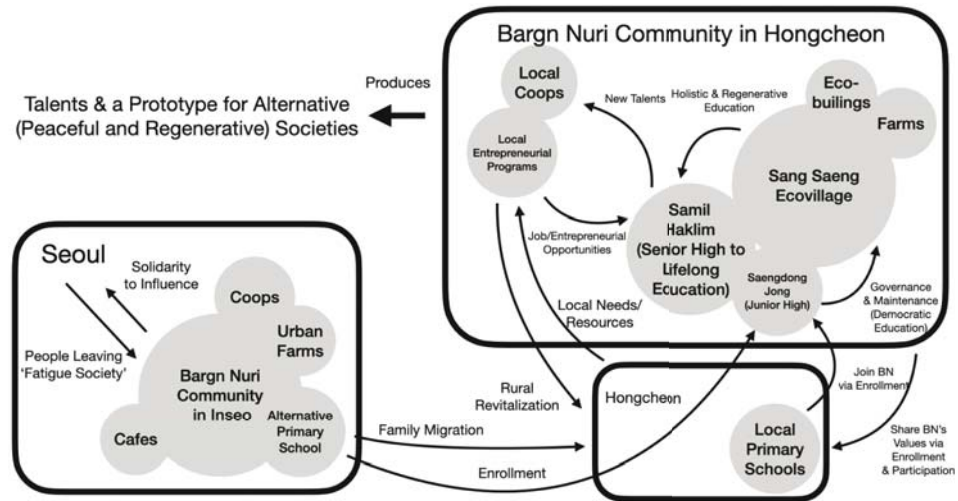
First, instead of beginning HE after high school, at SH it begins from one's graduation from junior high school. With the education at SH bringing learning back to addressing issues and needs in everyday life, teenagers gain the ability to be self-sufficient without a college degree, whether they live in the village or go to work in the mainstream society, thus reducing their need to take part in the feverish competition for conventional university admission[62]. If similar approaches are applied widely to a large population of teenagers, we can expect the unhealthy competitive

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61. Translated by Adler Yang from: Yang. 2022. Alternative Higher Education in Korea. Note that this visual representation is not an official one produced by Bargn Nuri, but is an interpretation and reconstruction based on Yang's (2022) study.

62. In SH educator Seoyoung Gil's own words (edited/proofread, emphasis added): "In South Korea, going to college after high school is an *unwritten law*, and it is impossible not to consider the rank of the university. Therefore, even though there are many alternative high schools in Korea, their graduates often still have no choice but to drift back to the nearly invincible college *caste* system, in which 'colleges in Seoul' sits on top of the hierarchy. Upon the establishment of SH, teachers and students wanted to overcome the trap of such a system, culture and 'the *idolisation* of college entrance'; thus SH became a high school integrated college. Nowadays, for SH students, attending conventional college is a matter of *choice* or *need* rather than an *obligation* or *must*. When there is a need to learn a certain subject that cannot be fulfilled in SH, students are free to study at a conventional college. They can even attend both schools simultaneously. For example, there are mainstream graduate school students enrolled in SH at the same time."

culture for college admission prevalent in Asia to be alleviated, or at least significantly reduced among those who can succeed without a college degree.

Figure 18: A workshop run by SH/Bargn Nuri members in the local neighbourhood to bring daily SD designs to Hongcheon people's lives[63].

Second, the Bargn Nuri community intentionally decided not to have a preschool, kindergarten and primary school division in Hongcheon. On the other hand, they also didn't have a secondary and tertiary education division in their other chapter in Inseo, Seoul. Without having a pre-primary and primary division available, members of the Bargn Nuri community in Hongcheon will have to enrol their preprimary and primary school-aged children in local schools that are struggling with a lack of students and even risks of school closure due to the population exodus to the metropolises, thus supporting and building bonds with the local community. Without having a secondary and tertiary education division in Seoul, families and students who are unwilling to join the hypercompetitive and unsustainable mainstream secondary and tertiary schools that are likely to get them further trapped in

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63. Photo taken by Adler Yang in Hongcheon County, 21 December 2019.

Hell Korea and "fatigue society" upon graduation, are thus incentivised to move to the rural Hongcheon, thereby not only revitalising the hollowised rural Hongcheon but also transforming Hongcheon's community toward a more regenerative culture with their participation in, and contributions to the local community. While such a design is greatly impacted by the advent of COVID-19 and is undergoing significant changes[64], this approach towards the revitalisation of rural regions is in fact consistent with a significant body of existing literature, which indicates that the presence of flourishing institutions – such as industry clusters or educational institutions – can effectively revitalise previously underpopulated or underdeveloped regions[65].

64. On 6 October 2022, Seoyoung Gil wrote to the author (edited/proofread, emphasis added):

> As we faced COVID-19, maintaining a boarding school became more challenging. As students in Saengdong middle school and SH continued to rise, the number of cases was getting too many. Rather than passively closing the school or recklessly trying to accommodate all of the students in danger of getting infected, we decided to be more positive and started middle schools in each village. In Seoul, Hongchen and Gunpo in Gyeonggi Province, we started new alternative middle schools and also created a new village in Yangpyeong, Gyeonggi Province (in the middle between Seoul and Hongcheon). It is easier to focus and nurture when the scale is smaller, so divide ourselves into smaller scales just like cells. In this way, we can live more actively and nurture/educate students with more care and love.
>
> As this community is a living being itself, changes are inevitable and natural. Saengdong middle school became a seed and perished in the soil, and the lives of four new middle schools started to sprout in each village. The important task for SH now is to create an ecosystem where graduates can be in solidarity with others with similar minds or who attended alternative schools. We think that just providing alternative education and being indifferent to their life pathways is irresponsible. Korean society is very narrow and harsh to those who have different backgrounds. We cannot keep the graduates safe from all difficulties, but making a platform or system for them to flourish freely, is our responsibility.

65. For example, see: Yang, Adler. May 2021. 從「教育與地方發展」的關係 梳理「教育地方創生系統」的可能 [The Possibility of Creating "Region-Revitalizing Education Systems": An Analysis of the Systemic Relationship Between Education and Regional Development]. Presentation at 國家發展委員會「前草實驗大學x地方創生x育才扶產工作坊」. (https://www.researchgate.net/publication/351439759_congjiaoyuyudefangfazhandeguanxi_shulijiaoyudefangchuangshengxitongdekeneng_The_Possibility_of_Creating_Region-Revitalizing_Education_Systems_An_Analysis_of_the_Systemic_Relationship_Between_Education); Apatov, Eyal, and Arthur Grimes. 2019. Impacts of Higher Education Institutions on Local Population and Employment Growth. International Regional Science Review 42(1): 31–64.

VI.   FOSTERING A LEARNING ECOSYSTEM BY TAPPING INTO THE POWER OF SELF-ORGANISATION: SWARAJ UNIVERSITY, UDAIPUR, INDIA

While all of the AUs covered in our studies embrace ecological and organic over industrial and mechanistic values and practices, we found the communal/organisational structures and cultures in the East Asian AUs inclined more toward the homeostasis end of the eco/organic spectrum, while the following case in India, Swaraj University, is inclined more towards the homeodynamics end[66].

For one, while Swaraj University gets the attention of the Indian mass media every now and then, it appears in press in different names with seemingly different goals and kinds of members and participants[67]. With initiatives such as "Khoji Programme", "Hunarshala Tribal Youth Academy", "Unschoolers' Ecovillage", "Jail University", "Complexity University", "Walkouts Network", "Learning Societies Network", "Udaipur as a Learning City", "Healing Ourselves from the Diploma Disease Movement", and more, Swaraj University's education system engages people from a variety of backgrounds, from gap year students to jail inmates, tribal youth, farmers, artists, families, the elderly, local businesses, international social changemakers, and so on[68].

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66. Homeostasis and homeodynamics are concepts mainly used in biology, with the former referring to the "state-oriented" and the latter to the "rate-oriented" stability of an open system achieved with its self-organisation. For more, see: Lloyd, D., M. A. Aon, and S. Cortassa. 2001. Why Homeodynamics, Not Homeostasis? The Scientific World Journal 1: 133–45; Trzebski, Andrzej. 1994. Homeodynamics versus Homeostasis: Periodicities Superimposed on Non-Linear Dynamic Sympathetic Tone Generated in Ventral Medulla. Acta Neurobiologiae Experimentalis 54: 109–109.

67. For example, see: Jain, Manish. 22 August 2016. My Freedom to Unlearn: "Real Freedom Is Not the Ability to Just Choose Our Politicians. Real Freedom Is When We Can Choose Our Gurus". India Today. (https://www.indiatoday.in/magazine/independence-day-special/story/20160822-manish-jain-shikshantar-swaraj-university-my-freedom-to-unlearn-829407-2016-08-12); Khan, Faizal. 16 February 2020. There Is a Great Amount of Talent inside Prisons: Swaraj Jail University's Manish Jain. Financialexpress. (https://www.financialexpress.com/lifestyle/there-is-a-great-amount-of-talent-inside-prisons-swaraj-jail-universitys-manish-jain/1869156/); Khan, Faizal. 23 August 2020. This University Operates from inside a Central Jail. Money Control. (https://www.moneycontrol.com/news/trends/this-university-operates-from-inside-a-central-jail-5743971.html); Menon, Anasuya. 2014. A New School of Thought. The Hindu. (https://www.thehindu.com/features/metroplus/a-new-school-of-thought/article5538472.ece); Raghuraman, N. 2015. Gap Year Pays for Life. The Hindu. (https://www.thehindu.com/features/education/gap-year-pays-for-life/article6775420.ece).

68. See: About Us. n.d. Swaraj University. (https://www.swarajuniversity.org/about-us). Accessed 20 August 2022; Who We Are. n.d. Shikshantar Andolan. (https://www.shikshantar.org/who-we-are). Accessed 21 August 2022.

Figure 19: Featured talks of Swaraj University members on the Swaraj University website[69].

Also, although Swaraj University also attempts to change the society towards a more regenerative one through an ecosystemic approach, thus sharing the aims and visions of all of the aforementioned AUs, the vast number of parts, branches or processes within the Swaraj University ecosystem, "partially" listed above, do not appear to have clear functional features or roles that complement or support one another as in the case of the East Asian AUs. From a traditional organisational viewpoint, you would imagine that the Swaraj University must be backed by an affluent foundation or corporate to be able to sustain so many initiatives, or multiple "brands/product lines" in business language. On the contrary, all of Swaraj's initiatives are initiated and sustained by the people and comrade businesses and organisations they have forged from the bottom-up.

69. Source: Swaraj University Talks. n.d. Swaraj University. (https://www.swarajuniversity.org/#comp-kpxskiou).

Figure 20: A musical band formed by Swaraj Jail University students (inmates) performing at a music festival[70].

Compared to the previous AUs, Swaraj's change model may seem obscure, if there is any. However, with a deeper investigation, we found its model and its success can actually be explained through the lens of *complex adaptive systems*, which are systems manifesting complex behaviours that emerge from the often leaderless self-organisation of their parts following simple rules[71]. An ant colony is a classic example of a complex adaptive system, as its sophistication is not the result of a plan or leadership dependent upon specific members, but rather arises from the ants collectively following simple rules, such as releasing and following the traces of pheromone when they discover food[72].

While there are no clear *commandments* that Swarajians are required to obey, from the available information about Swaraj and our interviews and interactions, we found there are indeed several *guiding principles* that foster the university and its members/participants' flourishing (Figure 21). As its name suggests, *swaraj*, an

70. Source: Swaraj Jail University. n.d. Swaraj University. (https://www.swarajuniversity.org/swaraj-jail-university).

71. According to Swaraj's co-founder Manish Jain, he shares similar views on leadership and change with the works at the Berkana Institute on emergence in living systems. For more, see: Wheatley, Margaret, and Deborah Frieze. n.d. Using Emergence to Take Social Innovation to Scale. The Berkana Institute. (https://berkana.org/resources/pioneering-a-new-paradigm/).

72. For example, see: Cabrera, Derek, and Laura Cabrera. 2015. Systems Thinking Made Simple: New Hope for Solving Wicked Problems. Odyssean Press.

Indian concept popularised by Mahatma Ghandi that can be roughly translated as *self-governance*, *self-mastery* or *harmony of the self*, is the vision that Swaraj University pursues through a shared *jeevan andolan* (life movement). Based on their shared practice of *self-designed learning* and a shared belief that recognises "life and all its surprises/challenges/opportunities as the best guru"[73], Swaraj uses plain language understandable by people with all kinds of backgrounds to communicate the kinds of initiatives that Swaraj encourages its members to do, including but not limited to those that unlearn cultures of "scarcity/poverty" and move towards "abundance/wealth" via "gifting" over "competition"; those that reduce "deadlihoods (ways of living that is detrimental to people and the ecosystem)" and foster "alivelihoods (ways of living that flourishes people and the ecosystem)"; those that decolonise the "mainstream (detrimental static monoculture)" and embrace "manystreaming (diverse and resilient indigenous/local cultures)"; and those that help people to not become "job-beggars (competitors for scarce job opportunities at the cost of one's health and likely the planet as well)" but instead become "job-creators (designers of their own career that supports the flourishing of oneself, their community, and the planet)". In this way, initiatives at Swaraj are adaptable to specific audiences and contexts, spring and evolve spontaneously when "surprises/challenges/opportunities" arise, and can be changed or discontinued when the conditions change, as its co-founder Manish Jain puts it, "as this is how life is"[74]. Also, the multiplicity and variety of initiatives make engaging people with diverse backgrounds or from separate "echo chambers" possible; thus, an ecosystem of communities with shared values continues to grow organically, eventually to a scale where the quality and quantity of goods and services exchanged among themselves will greatly reduce their dependence on the mainstream, thereby leading to an emerging alternative society[75].

73. Source: Unschoolers Ecovillage. n.d. Swaraj University. (https://www.swarajuniversity.org/unschoolers-ecovillage).

74. Jain, Manish. Interview. Conducted by Pi, Angela and Yang, Adler. 30 May 2022.

75. In fact, Swaraj's "Healing Ourselves from the Diploma Disease Campaign" has enlisted over 1000 businesses and NGOs who are willing to hire people without formal degrees, and many of their 500+ "faculty mentors" around the country are also people without degrees or formal education - such as grandmothers, farmers, healers, artisans, etc. With this vast and growing ecosystem, the need for Swaraj students to obtain a "legitimate diploma" for their careers or rely on products or services provided by big corporations is greatly reduced. Source: Jain, Manish. Email correspondence with Adler Yang. 22 August 2022.

Figure 21: Some of the guiding principles driving the emergence of the various "Complex Adaptive Initiatives" at Swaraj University[76].
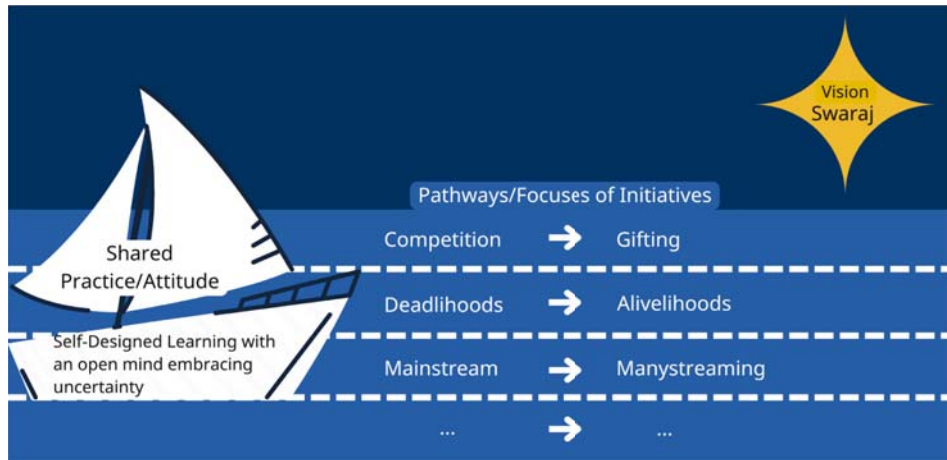
VII.   DISCUSSION

With the case studies of the five AUs covered in this paper, we found that instead of aiding SD indirectly through the training of sustainability professionals or leaders, or through the basic and applied research that furthers the frontier of sustainability know-what and know-hows, HEIs can actually play a more direct role in facilitating SD at a systemic level if they *stop separating learning from life and campus from society*[77]. Whether it's TDU's focus on the development of *authentic relational selves*,

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76. Produced by the authors. Given the relative inclination towards homeostasis observed in the change theories/models of the previous AUs, theirs are easier to be visually represented in processual or stakeholder system maps with clear edges and nodes denoting the relatively stable/recurrent main processes or interactions within their systems. However, it is more difficult to similarly visually represent the homeodynamics observed in Swaraj's change theories/models, as the authors have not found major processual or functional edges and nodes that are relatively stable/recurrent. Thus, we chose to visually represent Swaraj's change model with the metaphor of a *voyage* on uncharted waters, in which the sailboat (shared practice and attitude: self-designed learning with an open mind embracing uncertainties) enables the voyager to sail towards a clear direction (vision: Swaraj), yet via different waterways (pathways or focuses of the initiatives) contingent upon whichever their circumstances bring them into.

77. There are, in fact, more commonalities among these AUs that cannot be unfolded further due to the paper's word limit, such as: they all embrace democratic governance among faculty, staff, and students; focus on building portfolios over credentials; emphasise self-directed or self-designed learning; actively cooperate with civil society organisations; and so on. But we indeed find that the non-dichotomy between living and learning/society and campus underpinning all of these nontrivial common features.

KCCU's knowledge democratisation and circulation based upon individual tacit knowledge, or BOPT's, SH's and Swaraj's *curriculum as direct action* and *university as a cradle/hub for social change*, they show no attempts to impose artificial boundaries between learning/life and campus/society – In fact, *their educational process is SD in itself*, instead of just a *separated preparational stage* before the real thing.

This may seem easier said than done, especially when one considers the fact that all of the AUs covered in this paper are not accredited by the government. However, conventional HEIs can still learn from their change theories/models, which in essence, is that a HEI can integrate SD not only by the typical ideals mentioned in the Introduction, but also by taking account of the institution's dynamics in relation to its students, communities, and the greater social and ecological environment in designing its leadership and operational models or principles[78].

78. In fact, some scholars already share similar or even stronger views. For example, Ryan et al. (2010) writes: "The institutionalization of the principle of sustainability is *only* achieved when accepted and integrated in the university governance culture and progressively becomes part of the activities implemented. In other words, the governance approach of universities oriented to social responsibility is aimed at enhancing the close interdependence between economic and social efficiency, optimizing performance along the triple bottom line and *involving all the management processes*: from research and teaching to administrative and service activities, from the top management to the *entire organization*. This approach is implemented in both behaviours and internal communications, in external relationships and accountability. *A partial vision of the theme does not lead to real change and a holistic approach to sustainable development*." (emphasis added) See: Ryan, Alexandra et al. 2010. Sustainability in Higher Education in the Asia-Pacific: Developments, Challenges, and Prospects. International Journal of Sustainability in Higher Education 11(2): 106–19.

Figure 22: Four Circles of Alivelihoods – A framework developed by the Ecoversities Alliance to help AUs, or organisations and individuals aiming for SD to evaluate and transform their practices[79].

4 Circles of Alivelihoods
(Why green jobs, SDGs and social entrepreneurship isn't enough)

Am I doing work that is changing the rules and policies to benefit communities rather than corporations

Am I doing work that helps society go beyond an extractivist-military economy / culture / world-view

Am I doing work that replenishes various forms of real wealth i.e. health, social bonds, nature, local knowledge.

Changing the Game

Shift in Power

Regenerating Real Wealth

Sense of Purpose

Am I doing work that gives me joy and meaning

ecoversities.org

That said, if it is difficult for conventional HEIs to fully integrate SD into their practices, which is not only to practise an "education *for* SD" but an "education *as* SD (EaSD)", it is likely a sign urging us to examine what are the regulatory, or even the background axiological and epistemic frameworks that restrict HEIs from doing so, as well as to set up enabling frameworks in which AUs and their contributions can be widely acknowledged, cross-pollinated, and supported to flourish further. For example, alternative schools in Taiwan have long served as the *research and development* division of the national education system: activists and innovators treat alternative schools as pilots for broader policy changes; the government eventually granted them the legal status as *experimental education*; an increasing portion of education policymaking draws lessons from their experiences; and many

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79. Unpublished figure used with author's permission under Copyleft. For more about "alivelihooods", see: https://www.alivelihoods.in/.

alternative educational practices previously alien to conventional schools are also becoming common sense[80].

In the face of aggravating SD challenges, we urge stakeholders of HE systems around the world to come out from their silos, aim not just for EfSD but EaSD, and forge alliances with AUs for the future we all share[81].

Adler Yang has committed his life since adolescence to addressing systemic problems and increasing empathy in society through research and educative, peaceful initiatives. He is the Founding Director of the Awakening Cooperative Lab, a think-and-do tank aiming to research/design for, and actualise regenerative and harmonious societies with compassion and critical complex systems awareness. Some original concepts researched at Awakening include *Allocation Dependence* and *Learning by Caring*. The Lab has also supported marginalised youths to become award-winning, impactful, and compassionate leaders of their generation; directed the R&D for ZA Share, Taiwan's largest educational experimentation and innovation platform, to develop programmes and policy proposals for fostering progressive and equitable education ecosystems; and pioneered the experimental higher education movement in Taiwan.

Between the ages of 14 and 21, he completed the documentary film *If There is a Reason to Study* (2016), which won awards internationally, influenced education movements in Taiwan, and was lauded as the "Epitome of 2016 Taiwanese Movies" and the "Most important film on Taiwanese education." He also works or worked for the National Chung Kung University, Ministry of Education and National Development Council (Taiwan), EDiversity and Ednovators Fellowship (Hong Kong), Japan Society of Synthetic Anthropology, Alternative Education Resource Organisation (US), and Konrad Adenauer Sharing Political and Civic Engagements Spaces (Asia Pacific/Germany). His talk at TEDxTaipei was named one of the "10 Most Important Taiwanese TEDx Talks in 2014." He was named to *The News Lens* 2015 "30 under 30" list.

En-Ju (Angela) Pi is a Staff Member at Jendo Association, one of Taiwan's earliest civic think-tank and activism hub for the democratisation of education and society. Founded during the Martial Law, Jendo has pioneered most of Taiwan's progressive education reforms and was lauded as the "Underground Ministry of Education".

At Awakening Cooperative Lab, En-Ju currently works as an Assistant Researcher, while she simultaneously studies at the Arete Honors Program (Bachelors), National Yang Ming Chiao Tung University (NYCU), Taiwan. During NYCU, she mentored at a democratic early childhood education community and co-authored the *Homeschooling Handbook* (2020) published by the National Chengchi University. Before NYCU, she had worked as a co-host at the National Education Radio Station; journalist at *Shokuzine*, a media that covers stories and issues about vocational education; assistant at the International City Wanderer Education Association, an innovative programme empowering youths' self-exploration through location-based education, which was featured by *Forbes* and HundrED; and taught/mentored at several educational programmes, including a democratic school, an after-class programme for at-risk children, and an experimental architecture high school.

As a graduate of Humanity (Zhanfu) School, one of Taiwan's earliest democratic high schools, En-Ju developed an interest in educational issues, especially about their interplays with "multiculturalism" and "social change". She is now bringing sociological, anthropological, and complexity-aware lens into her work and research at Jendo and Awakening, also into the exploration of her future.

From Global Climate Action Policies to the Future Daxi Community Board Game: A Case Study of How SDG 13 Climate Action Links the State and the Youth in Taiwan

Shenglin Elijah Chang, Zhutian Xie, Huichin Huang, and Zongjun Li

INTRODUCTION: OVERVIEW OF CLIMATE CHANGE

The record-breaking heat of 2022 has made the effects of climate change more noticeable than ever. France experienced its hottest May on record. Britain was under a "red" extreme heat warning for the first time in its history. In South Asia, summer arrived ahead of schedule, bringing temperatures above 120°F (50°C). The United States is also reporting blistering temperatures. Taiwan is enduring rising sea levels, unexpected heavy rainstorms, regular extreme heat, and an increase in severe typhoons. Rainstorms and typhoons combined with fragile geological conditions and poor recovery capacity create the potential for mudslides. Prolonged droughts and extremely high temperatures are harmful to agriculture, industries and health. There is therefore an urgent need for governments to promote education systems that are oriented towards climate awareness and the United Nations' Sustainable Development Goals (SDGs)[1].

Established in 1988, the Intergovernmental Panel on Climate Change (IPCC) provides policymakers with scientific assessments about climate change[2]. It proposes three core issues to focus on in the fight against global warming: science (understanding and projecting climate change), mitigation (reducing greenhouse gas emissions), and impact and adaptation (preparing for climate impacts that are now unavoidable). Since the mid-1990s, the United Nations Climate Change Conferences (UNCCC) are yearly assessment meetings for the United Nations

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1. The United Nations. The 17 Goals. (https://sdgs.un.org/goals).
2. The Intergovernmental Panel on Climate Change. (https://www.ipcc.ch/).

Framework Convention on Climate Change (UNFCCC)[3]. IPCC committees negotiated international environmental rules for governments and businesses based on the assessment reports. From the perspective of adaptive governing SDGs, researchers argue that Climate Action as SDG 13 impacts most of the other SDGs. Zhenmin and Espinosa (2019, 495)[4] point out that mitigating climate changes offers positive preventions to slow down the worsening of most of the other SDGs, especially SDG 1 Poverty, SDG 2 Hunger, SDG 3 Health, SDG 10 Inequality, and SDG 14 Below-water and SDG 15 On-land ecosystem preservation.

Young people are at the centre of climate action. They are fighting the ecological crises and problems caused by greenhouse gas emissions, environmental hazards and pollution (Beukes 2021:1, Chersich et al. 2019:615)[5]. Sweden's Greta Thunberg challenged world leaders for not taking immediate action to mitigate climate change at the 2018 UNCCC and the 2021 Youth4Climate summit. In November 2018[6], young people joined the Friday for Future school climate strike movement.[7] Scholars and activists have supported the gamification of climate action. In Taiwan, the climate actions by young people have led educators and educational policymakers to endorse climate-safe teaching, activities, and civic engagement. National and international climate actions have influenced the rising generation. Scientists and policymakers argue that education is critical to bridging the science-action gap of climate change (Moser and Dilling 2012, O'Brien 2013)[8]. Our research team advo-

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3. What are United Nations Climate Change Conferences? (https://unfccc.int/process-and-meetings/conferences/the-big-picture/what-are-united-nations-climate-change-conferences); Climate Action Demands Intergenerational Solidarity. (https://unfccc.int/).

4. Zhenmin, L. and Espinosa, P. 2019. Tackling climate change to accelerate sustainable development. Nature Climate Change, 9(7), 494-496.

5. Beukes, J. W. 2021. Seen and heard: the youth as game-changing roleplayers in climate change and environmental consciousness. Chersich, M. F., Scorgie, F., Wright, C. Y., Mullick, S., Mathee, A., Hess, J., and Rees, H. 2019. Climate change and adolescents in South Africa: The role of youth activism and the health sector in safeguarding adolescents' health and education. South African Medical Journal, 109(9), 615-619.

6. Greta Thunberg's full speech at UN Climate Change COP24 Conference. (https://www.youtube.com/watch?v=VFkQSGyeCWg); Greta Thunberg says world leaders' talk on climate change is blah blah blah. (https://www.washingtonpost.com/climate-environment/2021/09/29/great-thunberg-leaders-blah-blah-blah/); Youth4Climate Empowering the Next Generation. (https://www.connect4climate.org/initiatives/youth4climate).

7. Timeline: Greta Thunberg's rise from lone protester to Nobel favorite. (https://www.reuters.com/article/us-sweden-nobel-thunberg-timeline-idUSKBN1WI1RT).

8. Moser, S. C. and Dilling, L. 2011. COMMUNICATING CHANGE SCIENCE:-CLOSING ACTION CLIMATE. In The Oxford handbook of climate change and society, p. 161; O'Brien, K. 2013. Global environmental change III: Closing the gap between knowledge and action. Progress in Human Geography, 37(4), 587-596.

cates that building youth-friendly and gamified public and private partnerships are critical to engaging the youth in climate action (Flood et al. 2018, Rajaen and Rajanen 2019)[9]. We present a case study of youth partnerships for creating the Future Daxi community-based board game to disclose the policy-to-action climate action experiment carried out by a rural vocational high school in partnership with an urban university. The scope of this paper ranges from global climate action to local knowledge transformation; from a state's governing systematic restructures to individual learning; and from governmental policymaking to students' game design.

Our classroom-based research follows the climatological pedagogy of gamification and serious-game design (Beukes 2021, Ouariachi et al. 2020, Fernández and Ceacero-Moreno 2021)[10]. Our paper consists of three sections: the SDG 13 education platform; the climate action youth competition and the Future Daxi team and the design of the Future Daxi board game; and post-gaming reflections. In Section I, we introduce the Climate Change Action Education Platform (CCAE Platform) as the context for readers to understand how the Taiwanese government's Ministry of Education (MOE) has incorporated climatological sciences into the national education systems[11]. Section II introduces the Climate Change Action Contests held by the CCAE Platform and the prize-winning Future Daxi team. The game was developed by a rural vocational high school, Jhih Shan High School (JSHS) in Daxi Taoyuan, in partnership with the Graduate Institute of Building and Planning at National Taiwan University (henceforth NTU)[12]. We explain how the team prepared for the project. In Section III, we explain the gamification of the Future Daxi board game, which won third prize in 2020. We examine how the team integrates Daxi sociocultural and environmental knowledge into the board game. In the conclusion we use the JSHS-NTU design journey and post-gaming reflections to re-examine Taiwan's CCAE

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9. Flood, S., Cradock-Henry, N. A., Blackett, P., and Edwards, P. 2018. Adaptive and interactive climate futures: systematic review of 'serious games' for engagement and decision-making. Environmental Research Letters, 13(6), 063005; Rajanen, D., and Rajanen, M. 2019. Climate change gamification: A literature review. GamiFIN, 253-264.

10. Beukes, J. W. 2021. Seen and heard: the youth as game-changing roleplayers in climate change and environmental consciousness; Ouariachi, T., Li, C.-Y., and Elving, W. J. 2020. Gamification approaches for education and engagement on pro-environmental behaviors: Searching for best practices. Sustainability, 12(11), 4565; Fernández, P. and Ceacero-Moreno, M. 2021. Study of the training of environmentalists through gamification as a university course. Sustainability, 13(4), 2323.

11. Climate Change Education. (https://climatechange.tw/); Ministry of Education. (https://english.moe.gov.tw/mp-1.html).

12. Jhih Shan High School. (https://www.lovejs.tw/home); National Taiwan University. (https://www.ntu.edu.tw/); National Taiwan University Graduate Institute of Building and Planning. (http://www.bp.ntu.edu.tw/).

Platform and discuss how gamified SDG 13 climate action projects can raise the climate awareness of citizens across generations. Our research thus bridges the gap between policy and action, by approaching climate action from the perspective of rural youth and their needs.

SECTION I: PLATFORM

Even though Taiwan is not a member of the UNFCCC, the Kyoto Protocol or the Paris Agreement, these have all influenced the Taiwanese government in its response to the international consensus. The Executive Yuan passed the National Climate Change Action Guidelines in 2012, and the National Development Council coordinates with cabinet ministries to formulate climate-safe policies. These are the ministries for science and technology, transportation, economics, interior affairs, health and welfare, and agriculture. Municipal governments, county authorities, and local communities also participate in the implementation of these policies. The MOE is responsible for promoting environmental education, cultivating transdisciplinary professionals to respond to climate change issues, informing the public about these issues, and encouraging citizens to adopt low-carbon habits.

Since 2012, the MOE has been promoting the "Climate Change Adaptation Cultivating Talents Technology Programme" (CCAC Talent Programme). Within MOE, the Department of Information and Technology Education (DITE-MOE) has coordinated the CCAC Talent Programme. Since 2013, the MOE has restructured its departments to sustain climate-oriented programmes. DITE-MOE, highlighted in purple in Figure 1, is responsible for developing teachers' networks and online and offline platforms to coordinate climatological educational resources. Combining with the Computer Centre, the Advisory Office, and the Division of Environmental Protection Education, the DITE-MOE is a new technological office responsible for informational and education policymaking and management. It also plans, promotes, monitors, and assesses prospective, professional, and cross-professional education programmes for technology, humanities, and social sciences. More importantly, DITE-MOE plans and promotes policies about environmental education in schools, plans and realises sustainable development, and cultivates talent and inter-departmental collaboration. It implements disaster prevention education in schools and safety management in research laboratories; it also plans and promotes policies on chemical and waste management.

After introducing the climate action duty of DITE-MOE, we introduce the CCAC Talent Programme in Figure 1. This programme provides colleges and universities grants to offer general education courses on sustainable development and

climate change adaptation. It offers college students opportunities to learn about sustainable development and climate change, and provides funds to colleges' and universities' interdisciplinary credit programmes that help cultivate adaptation to domestic climate change. In 2015, the Programme completed the integration of professional teaching materials in eight areas of climate change adaptation. In 2016, the Programme established the Climate Change Adaptation Teaching Alliances (CCAT Alliances) to assist in implementing climate change adaptation in professional fields.

Figure 1: The Department of Information and Technology Education (DITE-MOE), marked in purple, serves as the office to coordinate SDG 13 Climate Action-related educational programmes and policies. The comprehensive systems of the educational climate action transformations include all levels of schools nationwide. The structure is the ecosystem that supports the CCE Platform. (Translated from Chinese to English by the authors.)[13]
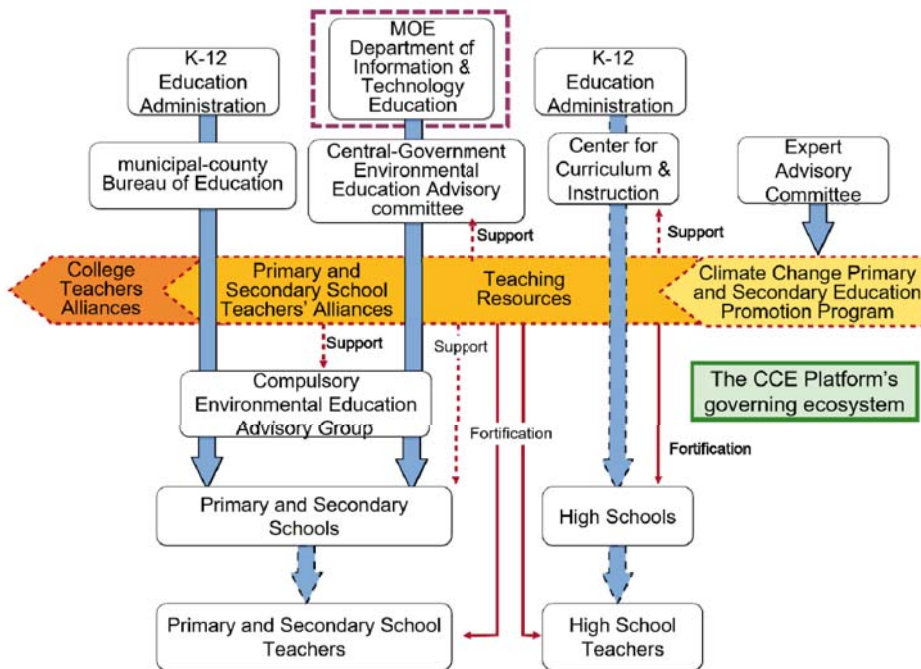
By doing so, the DITE-MOE is responsible for establishing Climate Change Education in Taiwan (henceforth, the CCE Platform) (Figure 2). Educational and

13. Chiou, C.-R. 2019. 育部氣候變遷人才培育成果 [Ministry of Education's Climate Change Talent Development Results]. Taipei, Taiwan: 育部資科司 [The Department of Information and Technology Education (DITE-MOE)].

school-based SDG 13 Climate Action activities are critical in rallying civic engagement against a climate crisis. Thousands of teachers and students from K-12 to higher education have applied for grants through the CCE Platform since 2015.

Figure 2: The functions and coordination of the CCE Platform in Department of Information and DITE, MOE, R.O.C. Taiwan. (Translated from Chinese to English by the authors.)[14]

The CCE-Platform is the integrated project consists of 4 projects collaborating with 11 executive teams to promote and facilitate the SDGs13CA

Management and development for platforms of K-12 educational promotion

the team of the Creative Practice Competition

the team of the promotion and platform for K-12

Future Daxi Board game JSHS-NTU

Main Project

University Teaching Alliance (Northern regions)

University Teaching Alliance (Southern regions)

Water resources, energy support and industries, biodiversity, agriculture, disaster prevention

Land use, seashore, health, infrastructure-transportation and informational systems

The Climate Change Education (CCE) Platform in Department of Information and Technology Education (DITE), Ministry of Education (MOE), R.O.C. Taiwan

The CCAE Platform evolved from the CCAC Talent Programme. Figure 3 shows that the teachers' alliances first appeared in the CCAC Talent Programme in 2012. In addition to teacher training, the CCE Platform offers a database containing hundreds of climatological teaching modules, including PowerPoint slides, videos, and syllabi.

14. Climate Change Education. (https://climatechange.tw/Home/Page/8).

Figure 3: The Climate Change Education Platform of Taiwan. (Translated from Chinese to English by the authors.)[15]
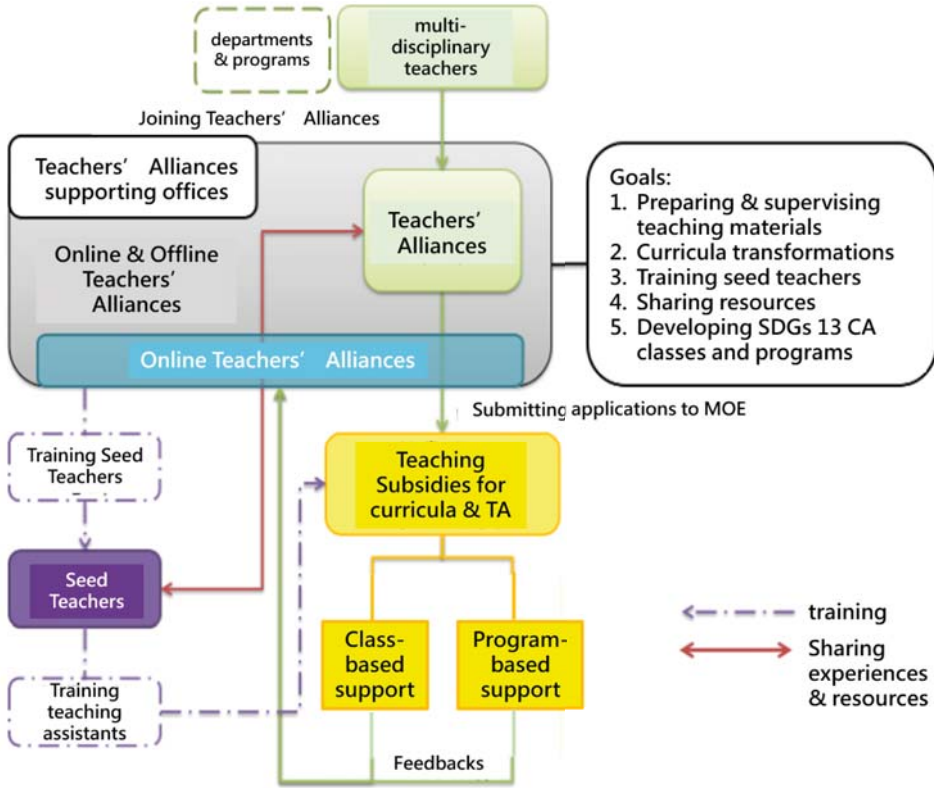
By 2018, the CCE Platform integrated MOE, K-12 schools, and all colleges and universities. Figure 3 depicts the supporting ecosystem of SDG 13 Climate Action.

SECTION II. THE CONTEST AND THE TEAM

We focus here on the Climate Change Adaptation Creative Practice Contest (CCACP Contest). To win, student contestants must show their understanding of climate change adaptation and their ability to propose problem-solving strategies. Students collaborate with university students of different majors; select issues and problems; survey the conditions; decide on target audiences; and negotiate solutions and strategies. From 2016 to 2021, thousands of students and hundreds of teachers on 519 teams participated in the contest (Table 1). A team can have no more than

15. Climate Change Education. (https://climatechange.tw/Home/Page/11?pageId=10).

three members. Sixty teams have won awards in the CCACP Contest. Twelve of the winning teams have gamified their climate-related strategies.

Table 1: Gamified Winning Projects of the Climate Change Adaptation Creative Practice Contest. (Data compiled by the authors.)[16]

Year	Total Teams	Winning teams #	Gamified Winning Project Name	Team School	Ranking
2016	41	6 (3+3)	Golden Blue Ark	NTNU-GISE	1ST Prize
2017	38	6 (3+3)	The Pressure of Temperature	NTNU-GISE	1ST Prize
2018	150	6 (3+3)	SAVIOURS	NTNU-GISE	1ST Prize
			My Mileage of Green	NTNU-DG	2nd Prize
			Go with Climate change	NCKU-DUP	3rd Prize
2019	92	10 (5+5)	Disaster reduction together	MCU-DUPDM	3rd Prize
			De Waterwolf: A Crossgenerational Game of Flooding Resilience	NTU-DG	Best Work (BW) Award
2020	109	11 (5+5+1)	Future Daxi Board Game	NTU-GIBP	3rd Prize
Covid-19 starts			(introducing Future Daxi in following sections)		
			Shennong's Time Machine	NTNU-DG	BW Award
2021	89	11 (5+5+1)	Green ProTech	NCCU-DLE; NCCU-DKLC; NTOU-DSTM	BW Award
			Critical Point	NTUST-GIDLE	BW Award
			Zoumei	NPUST-DAS	BW Award
Total	519	60	12【7 (3X1st +1X2nd+3X3rd) + 5BWAward】	11 universities	

   Most studies of climate action gamification focus on how environmental games stimulate game players' environmental values and change their behaviour (Ahamer 2013, Ouariachi et al. 2020, Reckien and Eisenack 2013)[17]. Our case study emphasises the design process and the way in which adolescent designers integrate local knowledge, stimulate community engagement and transform the identity of their hometown landscapes. Members of the participating teams collaborate on competition projects, some of which take years to develop. We concentrate on the Future Daxi board game, winner of the bronze medal in 2020. We discuss how the game design influences adolescents' understanding of their hometown environments and their life paths. How have NTU graduate students and JSHS adolescents developed their partnership to translate Daxi local knowledge into game design?

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16. Climate Change Education. (https://climatechange.tw/Creative/SummaryOfResult).

17. Ahamer, G. 2013. Game, not fight: change climate change! Simulation & Gaming, 44(2-3), 272-301; Ouariachi, T., Li, C.-Y., and Elving, W. J. 2020. Gamification approaches for education and engagement on pro-environmental behaviors: Searching for best practices. Sustainability, 12(11), 4565; Reckien, D. and Eisenack, K. 2013. Climate change gaming on board and screen: A review. Simulation & Gaming, 44(2-3), 253-271.

In the 2016 contest, Li (the fourth author) received his master's degree in sociology from National Tsing Hua University and became director of the Agricultural Marketing Programme at the JSHS in his hometown of Daxi. Most of his students attended JHSH. Li soon realised that his students paid little attention to the classroom readings. Therefore, he collaborated with the NTU team (the other authors of the paper) to develop field-learning oriented projects that incorporate Daxi local knowledge. In the NTU-JSHS partnership, NTU students tutored JSHS students, while the JSHS students helped the NTU students understand Daxi's environment and culture. Daxi's old town ranked as one of the top travel destinations for domestic travellers in Taiwan. (Figure 4 gives background information about the community.) Vocational high schools are essential for the education of Taiwan's rural youth. According to the 2018 High School Graduates Employment Survey (MOE 2018), of 231,000 senior high school graduates, only 42.7 per cent were from general senior high schools. More than half (57.3 per cent) were from non-general senior high schools.

Figure 4: Map and background information of Daxi.[18]

Daxi District of Taoyuan City (2.23million)
lifePopulation: 94,885 and 32,821 households (2018)
Small town style, agriculture, carpentry related industry
top one tourists' choice for small town trips

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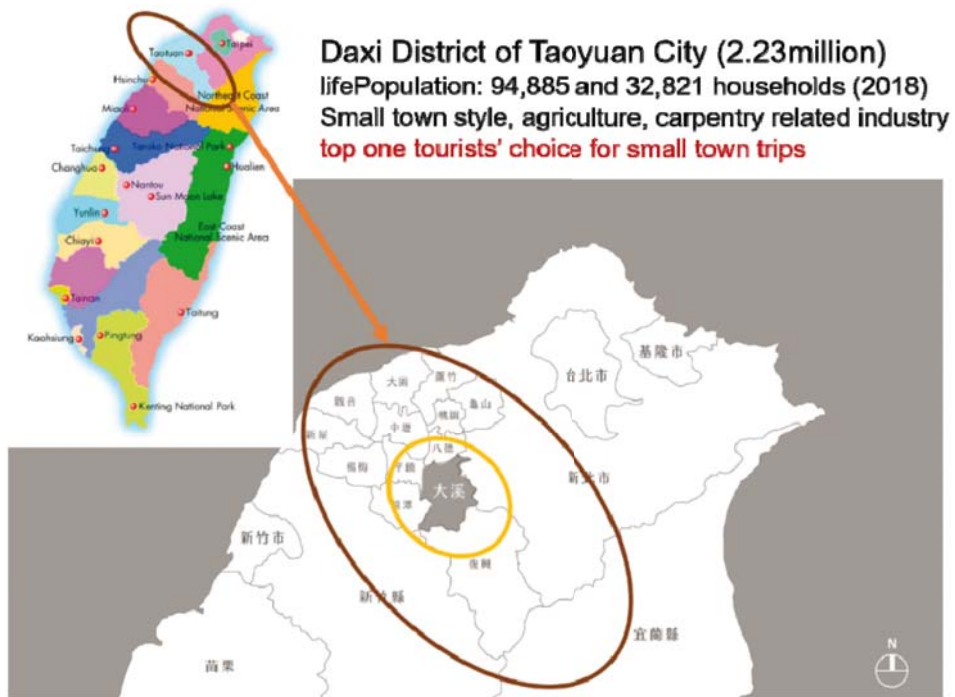
18. Map prepared by the authors.

The NTU-JSHS team experimented with ways to improve learning motivation and to raise the college-entering rate of rural youth and determined that the two fundamental mechanisms were cross-generation peer mentoring (Karcher 2014, Sundli 2007)[19] and gamification of local knowledge (Huang and Chang 2017, Chang and Chen 2020)[20]. Young people in Daxi are very involved in designing and playing board games. In 2018, JSHS teenagers initiated the designing of a climate change board game for K-12 students and Daxi tourists. "We want visitors to come to Daxi, not to consume our hometown. They shall, more or less, understand Daxi before the trip," said the JSHS students. The game design process began in 2018 and ended in 2021. NTU and JSHS members all appreciated learning from each other. The experiment began with JSHS members complaining that merely reading books in classrooms bored them, and proposed learning from playing. They suggested a climate-related board game introducing Daxi to outsiders. Their experiences with climate change were personal, based on their farming families' unhappiness when the weather was bad. While the NTU graduate students were amazed by the reaction of JSHS farmers' experience with climate change, the NTU members supported the idea of a game about climate change and took the initiative in its design. In 2018 and 2019, the first author offered classes on game development at NTU. The high school students enrolled in the classes. Even though they were exhausted by the 10-hour round trip, they were inspired by their NTU peer mentors to create the rules and strategies for the game, which they named Future Daxi.

Future Daxi combines the story of Noah's Ark (Genesis 6-9) and the Kabocha tree from a Daxi folktale. According to the JSHS students, the beloved tree is 50 years old. When an urban development project wanted to cut the tree down, community leaders and residents joined together to protect it. The NTU-JSHS team uses the story as the metaphor for Daxi's SDG 13 Climate Action game. The game is set in 2050, and the beloved Kabocha tree is withering. The Meteorological Bureau forecasts that the dying of the tree could cause heavy rains and the rising of the Dahan River to flood Daxi old town. To save the town, six players must deliver 20 buckets of water to irrigate the withering Kabocha tree. The six roles are Tribal Senior, the

19. Karcher, M. J. 2014. Cross-age peer mentoring. In M. J. K. David L. DuBois (ed.), Handbook of youth mentoring (Vol. 2, pp. 233-257). Thousand Oaks, CA: SAGE Publications, Inc; Sundli, L. 2007. Mentoring—A new mantra for education? Teaching and teacher education, 23(2), 201-214.

20. Huang, H. and Chang, S. E. 2017. Place-based Learning and Change of Sense of Place: Educational program in a historic town. Environment-Behavior Proceedings Journal, 2(6), 363; Chang, S. E. and Chen, Y.-Y. (2020). Knowledge ties in the emerging of place-based pedagogies. Journal of Design, 25(4), 43-64.

naughty Teenager, the Uber-water Guy, the YouTuber, the High-tech Farmer, and the Wood artist (Figure 5). The JSHS students identified with the naughty teenagers; the NTU students wanted to be YouTubers.

Figure 5: The six roles generated from the Daxi community by the JSHS-NTU team.[21]

By 2020, the NTU-JSHS had completed the prototype of the Future Daxi game, and three NTU students represented the team to submit their board game. Unfortunately, that was when COVID-19 broke out in Taiwan. Most of the preparations and presentations moved online because team members were in Taipei, Tokyo, and Hangzhou. Even though JSHS and NTU members could not conduct on-site discussions, the Future Daxi board game received the third prize in the 2020 CCACP Contest. The NTU and JSHS members were proud of their accomplishment.

SECTION III. GAME DESIGN AND REFLECTIONS

The choice of the board game design and theme were collective decisions. As a result, the game integrates the local and global and translates knowledge acquired from local interactions and global climate change knowledge into the game. The game was constructed through a parallel mechanism of goals, rules, and feedback. The translation is key to the gamification of local knowledge. For example, local places were given special significance because they are part of the residents' consciousness. In the Daxi interviews, participants agreed that Daxi Old Street had the most significance. It was where players could eat as much as they liked. Exploring and translating local knowledge gave designers and players an understanding of the rural (Xie 2021)[22].

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21. Images prepared by the authors.

22. Xie, Z. 2021. The Construction and Identification of Gamifying Local Knowledge in Youth Empowerment—a Case Study of Co-creating the Community Board Game of "Daxi 2050" to Confront Climate Change. National Taiwan University.

The components of the Future Daxi board game include: the 25 pieces of squares representing the land of the Daxi community, the scale of the water metre for watering the sacred tree, the Ancient Cards, and three types of Fate Cards and dices (Figure 6). The scale of the water metre represents the number of buckets of water that players must bring to the tree. Players may confront extreme weather events or discover supportive resources. Their success in saving the community is not guaranteed. We tested the game with International Degree Programme of Climate Change and Sustainable Development (IPCS) faculty and students in the climate change programme at NTU. The IPCS director remarked:

> Even though we failed twice, the game is enjoyable and follows sustainable development principles. The best way to complete the mission is to keep most land pieces unopened and concentrate on watering the tree together. We calculated too much about the pros and cons of each land square we opened. IPCS students concentrated on watering the tree. They completed the game soon.

Figure 6: Future Daxi Board Game Design.[23]

The Ancient Cards

Six Daxi gods and sages, familiar to the Daxi people, are depicted on the Ancient Cards (Figures 7 and 8). The game designers have given the gods and sages magical powers associated with climate action.

Figure 7: Local gods with magical powers.[24]

Figure 8: Historical sages as rescuers.[25]

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24. Images prepared by the authors.
25. Images prepared by the authors.

Fate Cards

The Fate Cards depict the climate disasters in the Daxi region. Among the natural disasters are acid rain, mudslides, dust storms and typhoons. Human-made disasters such as industrial spills and greenhouse gas emissions will affect the game environment differently.

Yellow Fate Cards

Acid Rain, Cold Stream, and Drought are frequent but less severe climate disasters.

Figure 9: Yellow Fate Cards.[26]

Acid Rain: The design team decided on acid rain first. Taoyuan has experienced the most damage from acid rain in Taiwan.

Cold Stream: A card developed for the team's follow-up discussion. The frequency of cold streams hitting the local weather station has increased. At the end of January 2020, the first wave of cold spell hit Taiwan. The lowest temperature recorded in Taiwan was 5.1 degrees at Daxi in Taoyuan, and this had a significant impact on crops.

Drought: The design team intensively discussed the drought in Daxi. Lack of rainfall and persistent high temperatures have caused a drought and a water shortage. In early 2021, a drought struck western Taiwan (including Taoyuan Daxi), causing water restrictions, farming suspension, and business shutdown.

Orange Fate Cards

Orange Fate Cards (Figure 10) represent more serious problems than Yellow Fate Cards: Meteorological Explosion, Global Warming, Wild Boars, Heavy Rain Report, and Industrial Wastewater.

Figure 10: Orange Fate Cards.[27]

Meteorological Explosion: Weather forecasting is the use of current changes in atmospheric conditions to derive future weather conditions through fluid mechanics.

Global Warming: Greenhouse gas emissions cause temperatures to rise. The surface temperature in Taiwan has increased by 1.3 degrees in the past 100 years and is increasing even faster this year.

Wild Boars: Wild boars often eat crops. In places with hunting restrictions or bans, these animals occupy farmland and threaten crops meant for people.

Heavy Rainfall Report: Daxi's summers always see heavy rains. Last summer, on 13 July 2021, it rained for two hours, with an hourly rainfall of 73mm. The rainwater accumulated to 50cm deep and damaged farmland and roads.

Industrial Wastewater: The discharge of industrial wastewater is an entirely human factor, and its impact can be controlled locally. Wastewater has a significant impact on soil, crops, organisms, and climate.

27. Images prepared by the authors.

Red Fate Cards

There are only three Red Fate Cards (Figure 11): Severe Typhoon, Forest Fire, and Earth Flow.

Figure 11: Red Fate Cards.[28]

Severe Typhoon: Typhoons are one of the most destructive natural disasters and the greatest climate threat to the people's livelihood and economy in Taiwan. A Severe Typhoon card destroys all the new houses and trees on the board.

Forest Fire: In addition to climate change, the lack of forest management and insufficient firefighting resources are the causes of forest fires. The fire season is getting longer every year, and the weather is getting hotter and drier. A Forest Fire card destroys all of the board's newly planted trees.

Earth Flow: Typhoons and rainstorms, under the conditions of a broken rock layer and a steep slope, will quickly cause soil to loosen and cause movement of earth and rock. Historically, typhoons have caused major landslides in the Daxi-Shimen Water Protection Zone, resulting in significant losses of life and property. An Earth Flow card damages all new houses on the board and results in their removal.

28. Images prepared by the authors.

REFLECTIONS

From 2019 to 2020, we managed dozens of game trials with hundreds of players, including high school and college students, university professors, and residents of different communities. We also ran online and offline trials in China and Japan. We organised players' reactions based on the second author's field notes. Some players were excited by the challenges; others were more strategic and careful. Some players responded immediately to unexpected situations; others tended to observe before acting.

The board game reflects different ideas of collaboration on climate action. While testing the game in the "Game of Life" class at NTU, students shared their feelings:

> At first, I think that the rules of this board game are very complicated, but soon you enter the game situation, and you feel that the game design is very fine; there are many wonderful details that you can feel the dynamic relationship between the players' actions and the climate action related crisis. I also feel that local cultural factors and climate action strategies are well combined through the game. (Student 1)

> The most meaningful game experiences for me included the discussion and support among the different characters, and working together for the goal of saving the sacred tree. This game stirred up my memories of Daxi and my awareness of climate change. (Student 2)

The game design workshop was held in 2019. The Daxi historical district became a field-based learning landscape for JSHS students. In 2020, in the game design stage, the JSHS students provided ideas and local knowledge. The NTU students incorporated that knowledge into the game design. The game won a national award, a significant learning experience for the JSHS students. They have been encouraged to make similar improvements in their learning, career pursuit, and rural understanding. More importantly, they passed their college entrance examinations and enrolled in college in 2022. Only two members withdrew at the end of their first year. There are still many barriers to overcome to transform learning models dominated by books and examinations.

CONCLUSION

Climate-related risks threaten both urban and rural areas around the world. Greta Thunberg's Youth4Climate stimulated Fridays for Future. The younger generation has taken the initiative in climate action. From educational climate action policy installations in Taiwan to adolescents' Future Daxi board game designing, our research links the state's political strategies to the actions of the youth. The board game allows young people to learn about climate disasters through relatively playful ways. Designing a climate-action game provides interactive processes to manipulate and to strategise players' fate in the unpredictable weather conditions. Through gamification, young people can form unique connections to their daily landscapes, reframe their community's sustainable culture, and reflect on ways to make their community resilient to disasters.

Since we met in 2018, the young members of the JSHS-NTU team in our research have continued their life paths. Some of them were high school students; others were graduate students. In the autumn of 2022, all high school students in the team entered college because of the stimulation of the Future Daxi game design project. They realised that higher education could help them to contribute to their hometown. In the meantime, the NTU team members all received their Master's degree and became community planners. Three core members carry on Daxi's rural educational projects. They have formed a team to revitalise Daxi through gamification. The Future Daxi board game is now in its third iteration and is ready for marketing. Its target audience is K-12 students. The JSHS-NTU members propose to test the game in Daxi's elementary and high schools.

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The Sooner the Better: Rethinking Early Childhood Development in Mongolia

Dulguun Batmunkh

INTRODUCTION

Until the end of the twentieth century, in most countries around the world, including in Mongolia, early childhood education and care (ECEC) was generally considered as the private responsibility of parents or primary caregivers of children – with the state intervening only in cases of unavoidable need. Kindergarten and preschool services were not even part of most formal education systems back then[1].

With the rise of feminist movements in the Global North demanding public-funded childcare for all so that equal employment and income opportunities are ensured for everyone[2], as well as the adoption of the UN Convention on the Rights of the Child in 1989, confirming the right to education for all children, ECEC finally started to gain more political interest from governments around the world.

Moreover, when the 1990s were declared as the decade of the brain[3], global scientific efforts to understand the human brain were stimulated and research results from different institutions around the globe broadly suggested that a child's earliest years – aside of their genetics – play a significant role in shaping their brain development and have a lasting impact on their general health, ability to learn, interaction with society and overall success potential in life. According to the Center on the Developing Child at Harvard University, for instance, more than one million new neural connections are formed every second in the human brain in the first five years of their life and after this period of rapid proliferation, connections will

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1. Scheiwe, Kirsten and Willekens, Harry. 2009. Child Care and Preschool Development in Europe: Institutional Perspectives. Basingstoke: Palgrave Macmillan.

2. Ruggie, Mary. 1984. The State and Working Women: A Comparative Study of Britain and Sweden. Princeton University Press.

3. Loc.gov. 1990. Proclamation by the President of the United States of America 6158, 17 July 1990. (https://www.loc.gov/loc/brain/proclaim.html).

reduce through a process called pruning[4]. In other words, as the brain matures, it becomes less capable of reorganising itself and adapting to new and unexpected challenges.

Average Human Brain Circuits Formation Over the Years

The brain's ability to change in response to experiences

The amount of effort such change requires

AGE

SOURCE: LEVITT (2009)
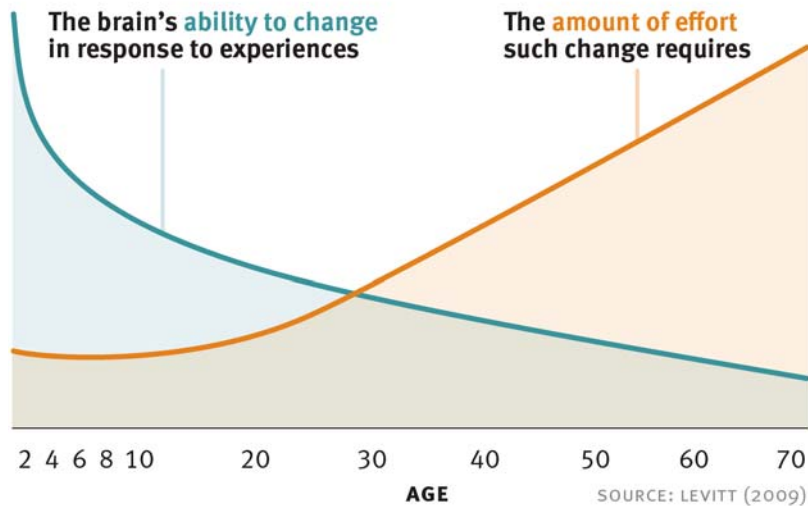
Center on the Developing Child 🛡 HARVARD UNIVERSITY   www.developingchild.harvard.edu

Source: The Center on the Developing Child at Harvard University. 2017.

Findings like the above led to a general acknowledgement in the international community that ensuring equal access to high-quality ECEC for every child is one of the smartest investments a nation can make for its long-term development, and international organisations promoted it even as the first phase of lifelong learning[5].

Providing ECEC for all children is not only beneficial for overall social development, but economists also assure that investing in human capital at the earliest life stage have higher returns and is a more cost-effective investment compared to programmes targeting skills development at later life stages[6]. Evidence from both

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4. Developingchild.harvard.edu. 2017. Brain Architecture. (https://developingchild.harvard.edu/science/key-concepts/brain-architecture/).

5. Esping-Andersen, Gosta. 2002. A Child-Centered Social Investment Strategy. Oxford Scholarship Online.

6. Heckmanequation.org. 2008. Invest in Early Childhood Development: Reduce Deficits, Strengthen the Economy. (https://heckmanequation.org/resource/invest-in-early-childhood-development-reduce-deficits-strengthen-the-economy/).

developed and developing economies suggests that an additional United States dollar (USD) invested in early childhood development programmes will yield a return of anywhere between six to seventeen USD[7] in the future.

Despite all these proofs and acknowledgements, ensuring access to high-quality ECEC services for all remains more a vision than a reality for most countries. Currently, a systematic comprehensive ECEC approach is primarily found in Nordic countries[8] while most other countries, such as Mongolia, still lag in providing adequate and accessible early childhood education services to their citizens, mostly due to policy and management inefficiency and budget constraints.

This paper analyses some of the major challenges in the ECEC system of Mongolia – a developing country in Northeast Asia with a population of over three million people[9]. Aside from examining the topic from the education curriculum and funding policy perspectives, it also points out the exclusion of vulnerable populations of the Mongolian society from ECEC services. Finally, it discusses the high load on parents and primary caregivers to raise young children whilst maintaining their financial stability and career growth and emphasises the importance of social security and labour policies that complement each other.

EDUCATION CURRICULUM

The foundation of the ECEC system in Mongolia was laid down in the early twentieth century with the rise of communism. Until then, caregiving at home was the primary way of bringing up young children in this traditionally nomadic country. The need for an official childcare service increased visibly in the early 1930s, as more and more women became part of the economically active population to contribute on the implementation of the five-year plans[10].

The first early childhood education curriculum for Mongolian kindergartens was primarily based on the Guidelines for Kindergarten Educators of the Soviet

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7. Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P. A., and Yavitz, A. 2010. The Rate of Return to the High/Scope Perry Preschool Program. Journal of Public Economics. (https://www.impact.upenn.edu/early-childhood-toolkit/why-invest/what-is-the-return-on-investment/).

8. Karila, Kirsti. 2012. A Nordic Perspective on Early Childhood Education and Care Policy. European Journal of Education.

9. National Statistical Office. 2021. Population of Mongolia in 2021. (https://www.1212.mn/tables.aspx?tbl_id=DT_NSO_0300_003V1&SEX_select_all=0&SEXSingleSelect=_1&AGE_GROUP5_select_all=0&AGE_GROUP5SingleSelect=_1&YearY_select_all=0&YearYSingleSelect=_2021&viewtype=table).

10. Nonna, D. 2009. Development of Preschool Education in Mongolia. Undraga Print LLC.

Union. To take the special characteristics of the country itself into account, the Ministry of Enlightenment of the Mongolian People's Republic developed its own Kindergarten Curriculum later in 1964[11]. However, as this curriculum was heavily based on school-like subjects and lacked content for children's personal development, the ministry had to update it numerous times[12].

In 1989, Mongolia started its transition from being the second country in the world to adopt communism (after the Soviet Union) to a democracy. Therefore, the entire education policy had to be reformed accordingly and the Preschool Children's Upbringing and Education Curriculum[13] was introduced in 1990. This programme included age-specific activities for all age groups in kindergarten and proposed the idea of working closely with parents to support their children's development for the first time[14]. Through an update in the Kindergarten Education Curriculum later in 1991[15], the Ministry of Education of Mongolia also added content to teach children about the folk customs and traditions of the country. However, the teacher-centred learning approach from the communist era was still deeply manifested in the curricula.

Only later in 1998, with the introduction of the Preschool Education Content Standards[16], was more flexibility provided to kindergartens to design their activities based on their local needs, and to run those in a more child-centred way.

In the framework of a larger reform in the education sector, the Preschool Education Standards were renewed again based on the Four Pillars of Learning proposed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) for the Twenty-First Century in 2005[17]. Even if it was a good attempt to align the national preschool curriculum standards to international recommendations, this document was too heavily packed with guidelines that had minimum

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11. Ministry of Enlightenment. 1964. Kindergarten Curriculum. Ministry of Enlightenment, Mongolian People's Republic.

12. Ministry of Enlightenment. 1968. Kindergarten Education Program. Ministry of Enlightenment, Mongolian People's Republic.

13. Ministry of Education. 1990. Education and Training Program for Preschool Children. First Edition.

14. Nonna, D. 2009. Development of Preschool Education in Mongolia. Undraga Print LLC.

15. Ministry of Education. 1991. Kindergarten Education and Curriculum, Revised Second Edition, Textbook and Children's Book Publishing House of the Ministry of Education.

16. National Center of Standards and Metrology. 1998. Mongolian Standard for Primary and Secondary Education. Part 1: Preschool Education Content. Resolution No. 13 of the Council of the National Center for Standards and Metrology.

17. Department of Standards and Metrology. 2005. Standards of Preschool Education.

consideration of the Mongolian context and hence became too unrealistic to be implemented[18]. Moreover, the strict requirement for teachers to develop a unit-based content for every subject with concrete numbers of lessons and activities per day caused a shift back to a more school-like, teacher-centred learning setting at kindergartens[19].

With amendments to the Law on Preschool Education Article 3.1 in 2016, the purpose of early childhood education in Mongolia was reframed as "to support, pro-tect, develop, and train young children to build their individual characteristics, skills, and creative abilities, and to help them acquire the basic skill set to pursue lifelong education[20]". The Preschool Education Core Curriculum was updated accordingly in 2019 and allowed more flexibility for kindergartens to design and implement their education content and activities based on individual needs of the children with increased attention to social skills and behaviour development[21]. According to the current curriculum framework, kindergarten children in Mongolia receive an edu-cation on the thematic areas of social interaction, athletic development, language, nature and environment, mathematics, as well as music and painting.

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18. Norjkhorloo, N. 2020. Our Preschool Education Can't Go Always Back and Forth. (http://buuvei.mn/?q=%D2%AF%D0%B7%D1%8D%D0%BB-%D0%B1%D0%B0%D1%80%D0%B8%D0%BC%D1%82%D0%BB%D0%B0%D0%BB-%D0%B1%D0%BE%D0%B4%D0%BB%D0%BE%D0%B3%D0%BE/%D0%BC%D0%B0%D0%BD%D0%B0%D0%B9-%D1%81%D1%83%D1%80%D0%B3%D1%83%D1%83%D0%BB%D0%B8%D0%B9%D0%BD-%D3%A9%D0%BC%D0%BD%D3%A9%D1%85-%D0%B1%D0%BE%D0%BB%D0%BE%D0%B2%D1%81%D1%80%D0%BE%D0%BB-%D1%8D%D1%80%D0%B3%D1%8D%D0%B6-%D0%B1%D1%83%D1%86%D0%B0%D0%B6-%D0%B4%D0%BE%D1%80%D0%BE%D0%BE-%D0%B4%D1%8D%D0%B2%D1%85%D1%86%D1%8D%D1%8D%D0%B4-%D0%B1%D0%B0%D0%B9%D0%BC%D0%B0%D0%B0%D1%80%D0%B3%D2%AF%D0%B9-%D0%B1%D0%B0%D0%B9%D0%BD%D0%B0).

19. Norjkhorloo, N. 2020. Our Preschool Education Can't Go Always Back and Forth. (http://buuvei.mn/?q=%D2%AF%D0%B7%D1%8D%D0%BB-%D0%B1%D0%B0%D1%80%D0%B8%D0%BC%D1%82%D0%BB%D0%B0%D0%BB-%D0%B1%D0%BE%D0%B4%D0%BB%D0%BE%D0%B3%D0%BE/%D0%BC%D0%B0%D0%BD%D0%B0%D0%B9-%D1%81%D1%83%D1%80%D0%B3%D1%83%D1%83%D0%BB%D0%B8%D0%B9%D0%BD-%D3%A9%D0%BC%D0%BD%D3%A9%D1%85-%D0%B1%D0%BE%D0%BB%D0%BE%D0%B2%D1%81%D1%80%D0%BE%D0%BB-%D1%8D%D1%80%D0%B3%D1%8D%D0%B6-%D0%B1%D1%83%D1%86%D0%B0%D0%B6-%D0%B4%D0%BE%D1%80%D0%BE%D0%BE-%D0%B4%D1%8D%D0%B2%D1%85%D1%86%D1%8D%D1%8D%D0%B4-%D0%B1%D0%B0%D0%B9%D0%BC%D0%B0%D0%B0%D1%80%D0%B3%D2%AF%D0%B9-%D0%B1%D0%B0%D0%B9%D0%BD%D0%B0).

20. Parliament of Mongolia. 2016. Law of Mongolia on Preschool Education, 2008, Revised Part from April 14 2016.

21. Ministry of Education and Culture. 2019. Curriculum of Preschool Education, First Appendix of the Minister's Order No. A/494. Ministry of Education, Culture, Sports, Science and Technology.

Later in 2020, in the name of ensuring that every child is ready for school, the Ministry of Education introduced a Child Development Assessment Sheet[22] that must be filled up by kindergarten teachers to conduct a regular skills assessment for all individual children in their classes. This increased the workload of teachers enormously and shifted their focus back on primarily preparing children to become ready for school rather than paying attention on their holistic skills development and overall well-being.

Early childhood education institutions must serve as a safe space for young children to learn how to get along with others in a social setting, to explore their individual talents and interests, as well as to acquire fundamental skills on learning how to learn. Based on the current education policy and curriculum guidelines, early childhood education institutions operating in Mongolia are not fully able to offer these potentials to children and have to limit their function to serving primarily as a place where young children get prepared for school.

FINANCE AND INCLUSION

According to the World Bank, only 60 per cent of children aged three to six worldwide have access to ECEC services[23], and this number goes even lower in low-income countries. Compared to the global average, nearly 74 per cent of children aged three to five years (in Mongolia, children start with primary school education at the age of six) have access to early childhood education services in Mongolia[24]. The World Bank points out that the state budget expenditure for preschool education in Mongolia has grown steadily in the last two decades[25] by sustaining its spending

22. Regulation on the Assessment of Development and School-Readiness of Children Enrolled in Preschool Education Programmes. (https://legalinfo.mn/mn/detail?lawId=211164&showType=1).

23. World Bank Group. 2016. Education Global Practice, Smarter Education Systems for Brighter Futures. (https://documents1.worldbank.org/curated/en/827581468189575720/pdf/98448-REVISED-PUBLIC-03-WB-Improving-Learning-ECD-041116-print.pdf).

24. National Statistical Office. 2018. Mongolia Social Indicator Sample Survey 2018. Multiple Indicator Cluster Survey. (https://mics-surveys-prod.s3.amazonaws.com/MICS6/East%20Asia%20and%20the%20Pacific/Mongolia/2018/Survey%20findings/SISS2018-MICS6%20SFR_English.pdf).

25. World Bank. 2017. Pre-Primary Education in Mongolia Access, Quality of Service Delivery, & Child Development Outcomes. (https://documents1.worldbank.org/curated/en/481101490364915103/pdf/113752-WP-PUBLIC-P152905-QualityJanWithExecMarchclean.pdf).

for preschool services at around 24 per cent[26] of its annual education budget on average.

However, an examination of the detailed spending patterns and budget allocation will reveal the gaps in the ECEC funds of the country. After covering priority expenditures such as staff salaries, meals for the children, general utilities and maintenance costs, the state budget cannot cover the cost of most learning tools, including learning and teaching materials, extracurricular activities, and other expenditures that are essential to create more room for creative and experimental environments[27]. Thus, kindergartens rely heavily on contributions from parents and transfers from their local authorities. Unequal capacity to mobilise such funds are leading eventually to major differences in quality of learning and teaching environments at kindergartens across the country.

On top of that, the state must budget larger funds to expand public kindergarten facilities every year, as there's a much higher demand for kindergarten spots than the existing supply, especially in the capital city Ulaanbaatar. Currently, public kindergartens in this city do not have enough space to enrol all children who are in the kindergarten age, and with the limited public funding, the process of building more kindergartens runs too slowly. Therefore, a lottery system was introduced in 2015 to ensure a fair enrolment procedure for all children. However, a 2017 Asia Foundation Report found that 77 per cent of sampled parents always, often, or sometimes used bribes, personal connections, or positions to get their child admitted to kindergarten[28]. Parents from financially comfortable families no longer even bother with the lottery system and enrol their children at private kindergartens instead, as they also offer better learning environments. Unfortunately, poorer families do not have this luxury and some of those whose children did not get picked for kindergarten have to become a stay-at-home parent until their children

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26. World Bank. 2017. Pre-Primary Education in Mongolia Access, Quality of Service Delivery, & Child Development Outcomes. (https://documents1.worldbank.org/curated/en/481101490364915103/pdf/113752-WP-PUBLIC-P152905-QualityJanWithExecMarchclean.pdf).

27. World Bank. 2017. Pre-Primary Education in Mongolia Access, Quality of Service Delivery, & Child Development Outcomes. (https://documents1.worldbank.org/curated/en/481101490364915103/pdf/113752-WP-PUBLIC-P152905-QualityJanWithExecMarchclean.pdf).

28. The Asia Foundation. 2017. Transparency, Ethics, and Corruption Issues in Mongolia's Education Sector. (https://asiafoundation.org/wp-content/uploads/2017/06/Education-Sector-Corruption-Survey-Eng.pdf).

reach school age. The Government of Mongolia announced[29] in September 2022 that such lotteries will no longer run from this year onwards, as they are starting to subsidise the private kindergarten expenses for the children who could not get enrolled in public kindergartens. However, visible outcomes of this statement and its sustainability can only be measured in the course of the upcoming years.

Aside from the insufficient number of kindergarten spots, geographic location and the socioeconomic background of the families are also key determinants to leaving numerous children out of early childhood education. Currently, early child-hood education institutions primarily cater to families in the larger cities and towns of the country only. Yet, over 20 per cent of the Mongolian population continue to live as nomadic herders. In 2021, over 188,000[30] out of the 922,000[31] families in Mongolia were registered as nomadic herders and most of the children in those families are left out from early childhood development programmes, as there are no kindergarten facilities in their neighbourhood[32]. The Law on Preschool Education provides the legal framework for alternative forms of preschool services. For in-stance, mobile kindergartens that use the traditional *gers* (yurts) are operating during summertime in several parts of the country. These have multiple benefits, as they not only allow nomadic children to learn how to socialise with their peers from a young age, but also help herder parents to boost their productivity by allow-ing them to focus on their work while their children can learn in a safe environment. The challenge remains, however, to find cost-effective and accessible solutions to run mobile kindergartens beyond the summer season.

Health issues that children are born with or that were caused to them due to their living environment also prevent a critical number of children from attaining early childhood education. There are nationwide a few kindergartens that are oper-ating with adequate facilities to accommodate children with special support needs

29. Statement by the Prime Minister of Mongolia, L. Oyun-Erdene. 2022. Attending kindergarten by lottery and running in-person registrations no longer exist: https://montsame.mn/mn/read/303064

30. National Statistical Office. 2021. Number of Herder Households Nationwide. (https://www.1212.mn/tables.aspx?tbl_id=DT_NSO_1001_027V1&BAG_select_all=0&BAGSingleSelect=_0&YearY_select_all=0&YearYSingleSelect=_2021&viewtype=table).

31. National Statistical Office. 2021. Number of Households Nationwide. (https://www.1212.mn/tables.aspx?tbl_id=DT_NSO_0300_033V1&SOUM_select_all=0&SOUMSingleSelect=_0&YearY_select_all=0&YearYSingleSelect=_2021&viewtype=table).

32. National Statistical Office. 2018. Mongolia Social Indicator Sample Survey 2018. Multiple Indicator Cluster Survey. (https://mics-surveys-prod.s3.amazonaws.com/MICS6/East%20Asia%20and%20the%20Pacific/Mongolia/2018/Survey%20findings/SISS2018-MICS6%20SFR_English.pdf).

and only less than 40 per cent of disabled children can go to kindergarten according to numbers from 2018[33]. Public and private kindergartens that provide services to children with disabilities named aspects that make their work extra challenging as the lack of training curricula, teaching and learning tools, rehabilitation-treatment-related equipment, transport, and extra benefits for teachers[34]. Moreover, many young children frequently miss out on kindergarten and school during wintertime due to the poor air quality in major cities and provincial centres, as it causes them respiratory illnesses. The cost of treating such illnesses is a further burden on poor families that are already struggling with covering the basic funding for their children's education[35].

Another key factor and probably the most influential determinant holding children back from getting enrolled in early childhood education programmes is the income of their families. According to an assessment by UNICEF from 2013, seven out of ten children from low-income families in Mongolia do not attend kindergarten[36]. As mentioned previously, learning supplies and materials in kindergartens are largely financed by out-of-pocket expenditures of the children's families and for those who are living under the poverty line such fees nearly seem impossible to cover.

All in all, even if it appears at first glance that Mongolia spends an adequate amount of its annual budget on early childhood development, when looking closely at the financial expenditures through an inclusion lens, one can easily point out that the ECEC sector needs more investments and an inclusive budgeting approach so that every child has access to an early childhood education programme.

33. Bolor-Erdene, B. 2018. The Construction Work of Complex No. 10 for Disabled Stands Still for Five Years. Ikon.mn. (https://ikon.mn/n/17xm).

34. The Ministry of Education, Culture, Science and Sports and the Asian Development Bank. 2020. Preschool Education Sector Study Report. (https://www.globalpartnership.org/sites/default/files/document/file/2020-24-12-preschool-education-sector-study-report.pdf).

35. Banzragch, Undrakh and Enkhbat, Tsolmon. 2018. Child Rights Situation in Mongolia 2018. Save the Children Mongolia. (https://resourcecentre.savethechildren.net/pdf/crsa_eng-20181225_final_for_websitel_0.pdf/).

36. Enkhtuvshin S., Bolormaa Z. and Dulamjav G. 2013. Child Friendly Kindergarten Self-Assessment. UNICEF. (https://www.unicef.org/mongolia/media/716/file/Child%20friendly%20kindergarten%20self%20assessment%20(Mongolian).pdf).

INVOLVEMENT OF PRIMARY CAREGIVERS

For most parents, especially for mothers, it would have been impossible to continue to work without the availability of an adequate public ECEC service. The Women, Business and Law team of the World Bank analysed data from 173 countries and confirmed that where the government provides free primary ECEC, women are more likely to receive a formal wage[37]. And this is not just about their economic participation, but it is about their mental health too. In the Bright Horizon's 2022 Modern Family Index, most survey respondents from the United States of America (USA) indicated that childcare is one of their daily stressors at work[38]. Nine out of ten of them were feeling that they were lacking time for their children's development and were overwhelmed in attempting to balance professional and family duties. It is fair to assume that primary caregivers in most other countries, including in Mongolia, also face the same issue although there is no country-specific data on this matter.

In Mongolia, parenting roles for fathers and mothers are unequally shaped from the beginning of the birth of their child. Even if paid parental leave is offered to both parents, paternity leaves are way shorter[39]. While female employees receive 120 days of paid maternity leave which starts 60 days prior to the birth of the child and ends 60 days after giving birth, male employees only receive up to ten days of paid leave after their child is born according to the current law[40]. Overall, parenting remains strongly gendered and mothers tend to take a more active day-to-day role in the lives of their children – particularly for those under the age of five. Fathers are mostly considered as the main financial provider and head of household due to the traditional aspects of the patriarchal society in Mongolia[41].

Therefore, providing all parents and primary caregivers with the potential to remain financially stable while being on parental leave and continue their career through ensuring access to high-quality daycare and kindergarten facilities for their

37. The World Bank and International Bank for Reconstruction and Development. 2015. Women, Business and the Law 2016. (https://thedocs.worldbank.org/en/doc/555061519930693642-0050022015/original/WBL2016KeyFindingsEN.pdf).

38. Bright Horizons Family Solutions LLC. 2022. Eight Annual Modern Family Index. (https://www.brighthorizons.com/-/media/BH-New/MFI/MFI-2022/Bright-Horizons-MFI-2022.ashx).

39. Law on Family. 1999. The Parliament of Mongolia. (https://legalinfo.mn/mn/detail/226).

40. Amendment on the Law on Family. 2021. (https://legalinfo.mn/mn/detail?lawId=16230709635751).

41. Sukhbaatar K. 2020. Communication in Family. Mongolian National University of Medical Sciences.

children must receive a higher priority on the ECEC and social security policy agenda of Mongolia. Moreover, policies that encourage primary caregivers to combine childcare with work, such as introducing shared parental leave (taking an example from the Scandinavian model) or more flexible working hours at work, may be particularly useful. Some international organisations and private entities that are operating in Mongolia have started introducing pilot versions of these policies, such as by creating decent workspaces for pregnant and postpartum mothers and opening small daycare centres at their offices. However, waiting for every organisation to come up with such solutions by themselves will require a long time. A policy solution to implement such family-friendly employment models is therefore needed nationwide.

Moreover, social safety nets for families must be strengthened to support out-of-work parents and primary caregivers and reduce their household income volatility – especially during economically unstable periods caused by unforeseen forces like the COVID-19 pandemic.

Aside from ensuring equal access to affordable, accessible, high-quality ECEC services for all children, another important indicator to measure the efficiency of the ECEC system in a country can be how meaningfully the primary caregivers are involved in the upbringing of their children without being held back in their careers and financial wellbeing. The coherence between ECEC services, the social security and the labour policies must be ensured so that primary caregivers are meaningfully involved in their children's upbringing whilst being able to continue their career path and staying financially stable.

CONCLUSION

Education is fundamental to the growth and development of every nation, and within education, early childhood education has a substantial and everlasting impact on the comprehensive development of every child. A strong foundation will increase the chances of raising productive and empowered citizens and add value to the human capital. Despite a growing evidence base and global consensus on the importance of ECEC, this sector remains under-resourced and comparatively neglected as a policy issue in many countries around the world, especially in developing nations like Mongolia.

In sum, there are three central messages that have come from this paper. First, early childhood education institutions in Mongolia must revise their current curriculum and build their capacities to upgrade their function so as to be a place where young children can learn how to communicate with others in a social setting

efficiently, explore their individual talents and interests as well as acquire fundamental skills on learning how to learn rather than focusing too narrowly on getting children ready for school. Second, the ECEC sector in Mongolia is in essential need of massive long-term investments and must adopt an inclusive budgeting approach at the same time to ensure that every child, regardless of their socioeconomic background, has access to early childhood education services. Finally, Mongolian policymakers and employees must ensure that ECEC services and social security and labour policies complement each other so that parents and primary caregivers can maintain a balance between their family and professional lives.

Children's early childhood years present a window of opportunity for every country to address the inequalities in their society. While the long-term returns on Mongolia's ECEC investments have not been studied yet, initial results are promising and indicate that providing access to high-quality ECEC services is associated with improved cognitive and non-cognitive skills of children.

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Building Potential Educational Reforms for Forced Migrant Children

Kyoko Ichikawa

INTRODUCTION

This chapter discusses potential educational reforms for children in the aftermath of natural disasters, such as forced migrant children fleeing from the massive tsunami and subsequent nuclear accident at the Fukushima No.1 Nuclear Power Plant, and how education can engage and empower children in their recovery.

In recent years, countries throughout the world, including Japan, have faced VUCA (Volatility, Uncertainty, Complexity, Ambiguity) situations. Japan faced the largest tsunami disaster ever recorded in Japanese history in 2011 and the nuclear power plant accident caused by the tsunami. Furthermore, the Kumamoto Great Earthquake struck in 2016, and earthquakes continue to strike in Ishikawa as of June 2022.

A major theme in Japanese society concerns both how to prepare for disasters and how to recreate the educational reforms after disasters.

THE IMPACT OF THE GREAT EAST JAPAN EARTHQUAKE

The Great East Japan Earthquake struck on 11 March 2011 on the coast of Miyagi Prefecture in north-eastern Japan (Chart 1). The magnitude was 9.0 and the maximum height of the tsunami caused by the earthquake was 30 meters. Ten schools in the northeast were affected by the earthquake, the tsunami, and subsequent fires. More than 900 students, 10 teachers, and a mayor lost their lives in the Great East Japan Earthquake and subsequent tsunami. Moreover, one of the Educational Board chairpersons survived being swept away by the tsunami waves and was submerged up to their neck in water.

The Great East Japan Earthquake has left behind many orphans. The number of these orphans who lost one of their parents was 1,323 and the number who lost both of their parents was 240.

The areas most affected by the Great East Japan Earthquake were three prefectures: Miyagi Prefecture near the epicentre, Fukushima Prefecture near the Fukushima nuclear No. 1 power plant and Iwate Prefecture, north of Miyagi. Nearly 40,000 children in these three prefectures had to move to other prefectures due to the disaster.

In addition, 37 primary and secondary schools have been closed or suspended in these three prefectures. In Fukushima Prefecture, nine municipalities were forced to evacuate due to the nuclear power plant accident.

There are three phases that need to be considered when thinking about the relationship between disasters and quality education. Pre-disaster education is the first phase. Enabling a devastated society and education to recover from the disaster is the second phase. The third phase is the creation of reconstruction education.

Chart 1: The intensity of the Great East Japan Earthquake.
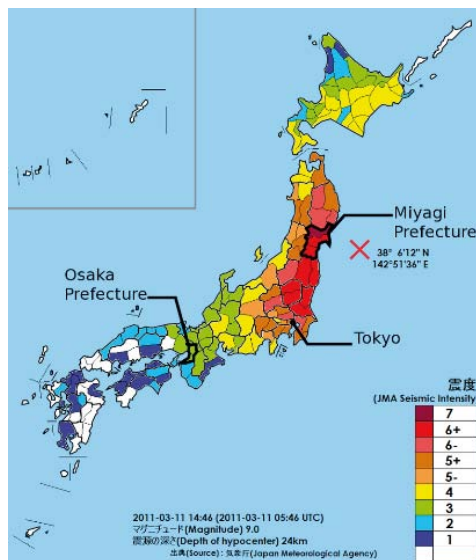
Source: Japan Meteorological Agency

DISASTER PREVENTION EDUCATION IS KEY FOR SUSTAINABLE SOCIETIES

The miracle of the Great East Japan Earthquake is that in Kamaishi City, Iwate Prefecture, students were able to evacuate and survive on their own. This was a result of the disaster-prevention education that they had received prior to the disaster, which proved to be essential.

The 20-metre-high tsunami hit the Unosumai area of Kamaishi, which faces the coast, and it caused the loss of 1,500 residents. In Kamaishi, a 63-metre-tall super dyke, the world's tallest, had been built in 2008; however, the tsunami overcame this dyke.

Primary and junior high school students, drawing on their experience of disaster-evacuation training, immediately fled to higher ground. These students not only saved their own lives but also took the initiative to guide residents to evacuate from the tsunami. The city was in an area that had been struck by tsunamis several times in the past. The community and local schools were able to learn from the lessons of these past experiences.

They were deeply aware that this means that education, especially education on disaster preparedness, will ensure that people's lives are saved.

In contrast, at Ookawa Primary School in Miyagi Prefecture, students evacuated to a low hill close to the school grounds and then failed to evacuate subsequently to higher ground. In total, 74 students, 70 per cent of the total student population at the school, lost their lives. Moreover, in Otsuchi Town in Iwate Prefecture, the disaster headquarters was established at a lower elevation than that stipulated in the disaster management plan. And Otsuchi Town suffered severe damage, with the mayor and cadres of town officials losing their lives and the chairperson of the board of education survived being swept away.

COMMUNITY SCHOOLS AND COMMUNITY-ENGAGED CURRICULA FOR 21ST-CENTURY EDUCATION

The Reconstruction Design Council of the Japanese cabinet secretariat, in response to the Great East Japan Earthquake, submitted the report *Towards Reconstruction: "Hope beyond the Disaster"* to the prime minister in June 2011. This report mentioned rebuilding schools in devastated areas as core centres of the local community.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) enhances "community schools" as engaged schools. Community schools are encouraged to build a reciprocal relationship between the schools and the communities.

The community schools encourage parents, teachers, residents, and other people to engage in dialogues and discuss the challenges in the communities and their visions.

Three disaster-affected prefectures are rebuilding the educational reform by strengthening the community school framework. These schools focus on the traditional local dialects, local festivals and livelihoods that bring people together and ensure that these are passed on to the children as a core part of their reconstruction education. In Otsuchi Town, a learning process was facilitated to enable the passing on of the local dialect and the traditional lives and culture of the local people from the community elders to the younger children. The younger children's generation and the elders' generation are connected by the intermediate generation, the university students (Chart 2). University students are mostly engaging from outside the community, and are drawing on the wisdom of the local elders and learning alongside the children. In Otsuchi Town, the university students created a dialogue *karuta* (card games) based on stories from the local elders, which became part of the learning materials for local community studies in primary schools.

These new initiatives were achieved as a result of an application by the board of education to the MEXT for the creation of a special education curriculum zone. The involvement of university students was made possible with the support of the Agency for Cultural Affairs, and the author was one of the driving forces behind this initiative.

Chart 2: Community schools create classes in collaboration with the local community.

Photo by Kyoko Ichikawa 2015

CHILD FORCED MIGRATION DUE TO DISASTERS

Nearly 40,000 children in these three prefectures have had to move to other prefectures due to the disaster (Chart 3). In addition, 37 primary and secondary schools have been closed or suspended in these three prefectures. In Fukushima Prefecture, nine municipalities were forced to evacuate due to the nuclear power plant accident. Children were forced to move and had to either study in schools established by their original municipality in the destination area, or transfer to a school in the host municipality and start studying there. For example, Tomioka Town has relocated its town hall functions to Koriyama City, 80 kilometres away, and Futaba Town has relocated to Kazo City in Saitama prefecture.

Chart 3: A map of the area around the Fukushima No. 1 Nuclear Power Plant.

Source: International Atomic Energy Agency 2015

The Fukushima nuclear power plant accident has caused three different types of forced migration. First, there were forced migrants as a result of the nuclear power plant accident and these children were living in evacuation centres. Second, there are people who still face difficulties that have arisen with respect to returning to the areas that cannot be returned to, for example, parts of Namie Town, Futaba Town and Okuma Town. Third, there were people who self-evacuated as a result of the nuclear power plant accident and the Great East Japan Earthquake. Among those who self-evacuated were many parents and children who evacuated to western Japan to escape the effects of radiation. In metropolitan areas such as Tokyo

and Kanagawa, activities such as recreation programmes are held every summer to enable children who normally cannot play outside.

The Great East Japan Earthquake has left many children orphans. The number of orphans who have lost one of their parents was 1,323 and the number of earthquake orphans who lost both of their parents was 240.

The children of Fukushima affected by the nuclear power plant accident have often been stigmatised and discriminated in their schools and communities. High schools in their own community had to be shut down and relocated schools were established in other communities inside and outside of Fukushima.

Schools fostered change-makers. Students proposed solutions to revitalise shrinking communities and explore alternative energy sources.

Many of the children in Fukushima were deprived of their own land and many students are still unable to return to their hometowns.

THE CREATION OF RECONSTRUCTION EDUCATION FOR QUALITY EDUCATION: FUTABA MIRAI GAKUEN HIGH SCHOOL IS TRULY CHALLENGING THE FUTURE

Futaba Mirai Gakuen High School was established based on the school's philosophy of being a change agent, with the ambition of developing leaders who will be responsible for the reconstruction of Fukushima.

The coastal areas of Fukushima are not only facing serious problems such as damage caused by the earthquake and the nuclear power plant accident and dealing with radiation, but also the challenges facing every region and community in Japan.

The nuclear power plant accident following the Great East Japan Earthquake caused five prefectural high schools in the Futaba area of Fukushima (Futaba High School, Namie High School, Namie High School Tsushima, Tomioka High School and Futaba Shoyo High School) to be unable to accept students. The principals of the five high schools established a relocated high school, Futaba Mirai Gakuen High School, aimed at creating a revolution, with the aim of building a new way of life and a new society.

The earthquake and the nuclear power plant accident have brought to the fore not only serious issues such as the damage caused by the disaster and the response to radiation, but also the challenges facing every region and community in Japan, such as the declining birth rate, the aging population, the rapid depopulation, and the exhausting of industry. Futaba County and Fukushima Prefecture have, in a sense, become the world's "issue-advanced region".

At Futaba Mirai Gakuen junior and senior high schools, students explore the local problems Fukushima is facing as a resource for learning.

Students also inquire about how to address these problems in class.

INQUIRY LEARNING CREATES A NEW HORIZON IN THE FUTURE SOCIETY

Under the inquiry learning concept, students discover for themselves the issues to be engaged in, rather than be given the issues to be engaged in by the teachers (Chart 4).

In inquiry learning classes, students identify and address issues that are integral and inseparable from oneself. At first, freshmen understand the local issues from different perspectives. Sophomores apply solutions to these issues. Juniors reflect on and conclude their practice. The school collaborates with experts from outside the school to promote the inquiry learning classes. The school accepts very famous theatre professionals as instructors. In this school, high school students are divided into six main groups to promote the inquiry learning classes, for example, nuclear disaster prevention, renewable energies, media and communications, agribusiness, sports and health, social welfare and health. Students explore how to address these challenges, supported by school teachers and specialists from the communities. For example, one of the students was able to generate wave power through repeated experimentation and unsuccessful attempts.

This practice enhances reforming the community-engaged school. Moreover, Mr. Oriza Hirata, an instructor at Futaba Mirai Gakuen High School, emphasises that inquiry is not only the exploration of new solutions to issues but also the exploration of the complexities of human beings and society. In order to build mature democratic societies, inquiry learning classes explore what kind of future we want to live in and how we can engage with society to ensure that future.

Chart 4: Inquiry Learning Cycle.

Inquiry learning Cycle

What do I take actions throughout inquiring learning ?

Taking Action

Focusing on — What do I focus on issue?

What is core component I wish to pursue?

Making conclusions

Reflection

Finding out — What kinds of resources might support?

How might I utilize my knowledge and ideas?

Going Further

Sorting out — What approach is relevant to my issue?
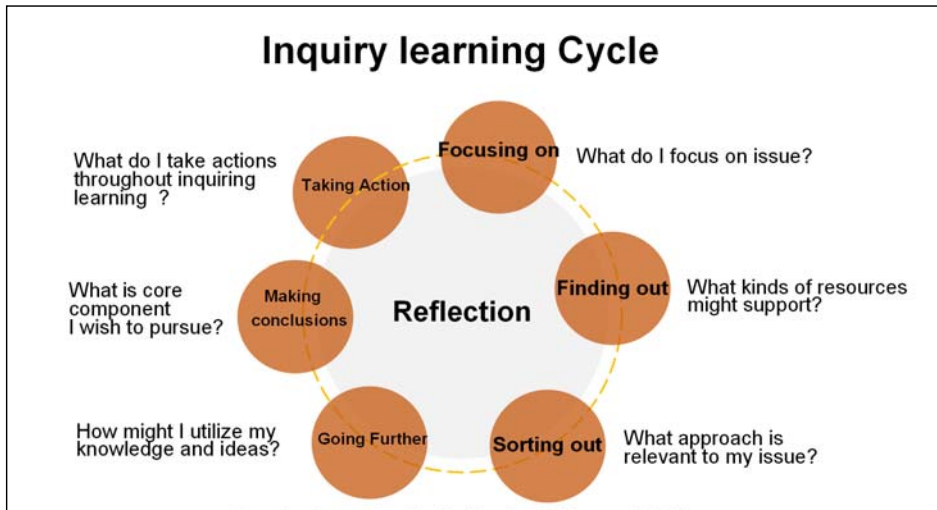
Source: Kyoko Ichikawa 2022

BUILDING YOUTH CENTRE CAPABILITIES INSIDE SCHOOLS

In Japanese society, one in six children is living in relative poverty, and schools are also expected to have facilities promoting children's inclusion. Students in Fukushima had moved multiple times, in and out of the Fukushima area, following the nuclear power plant accident. This resulted in mental stress and caused them to fall behind in their studies.

Futaba Mirai Gakuen High School established a youth centre within the school in collaboration with "Katariba", non-profit organisation.

At the youth centres, students were able to talk to youth workers about their problems such as mental health problems, and to study after school. The creation of youth centres within schools prevents students from being isolated and encourages them to continue their studies and social engagement. The creation of such support systems for preventing the isolation of students in schools would be a model for the 21st-century society. Promoting collaboration with new actors such as non-profit organisations is also essential.

CONCLUSION

Japanese society faces natural disasters such as earthquakes and torrential rains almost every year. We are facing an uncertain and complex future, with increasing inequality and a declining population. Community-based education is essential for building a sustainable society in response to uncertain and complex issues. Competency-centred educational reforms that explore, rather than knowledge-acquisition-centred education are necessary. Although these educational reforms are policies driven by the Ministry of Education, Culture, Sports, Science and Technology, more attention should be focused on the efforts of the schools themselves to generate new educational practices in collaboration with their local community. Educational transformations should be driven at the micro level (one school level), at the mezzo level (the local level), and at the macro level (the educational policies and administration level).

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Ichikawa has engaged in and facilitated disaster relief and community revitalization projects in Japan and Thailand. The Great East Japan Earthquake relief projects based on the narratives of residents, initiated by Ichikawa, were supported by the Agency for Cultural Affairs, Government of Japan, as important in preserving the inheritance of dialects and in cultural revitalization. She is currently engaged in community rebuilding activities associated with the return of residents to Futaba town, damaged by the nuclear accident, in Fukushima prefecture.

Ichikawa is the author of the Japan chapter Konrad Adenauer Sharing Political and Civic Engagements Spaces (KASpaces) Accelerating Progress and Equity in Education 2021.

Reference

International Atomic Energy Agency. 2015. The Fukushima Daiichi Acident: Report by the Director General.

Indonesian Government Policies Addressing Economic and Educational Challenges Caused by the Pandemic:
Commitment to the SDGs Agenda and Human Development

Umar Abdullah and Hilal Tri Anwari

INTRODUCTION

Over the past two years, the coronavirus pandemic has dominated the headlines. While we have seen a gradual decline in new cases compared with the earlier transmission in several countries, the COVID-19 pandemic is not over yet. Some countries have declared their intention to start treating COVID-19 like other endemic diseases. Other countries, however, have reported an increase in new confirmed cases, including China and Singapore. In Indonesia, the first COVID-19 case was officially confirmed on 2 March 2020. President Joko Widodo announced that two patients from Depok West Java province had tested positive for COVID-19. On 10 March 2020, the president declared a national emergency and established the COVID-19 Handling Task Force. Subsequently, the transmission cases increased and spread to many provinces in Indonesia. To handle the virus transmission, the government took strenuous actions. A country-wide lockdown, known as the Large-Scale Social Restrictions (PSBB), was deployed, especially in the state capital, which was the highest-risk place for COVID-19 infection in the nation. Soon after, the central government raised the emergency situation status to national disaster. Interactions were restricted and public gathering spaces such as non-essential workplaces, schools and universities were closed.

To balance COVID-19 prevention and business recovery, PSBB was replaced by public activity restrictions, known as PPKM, at the onset of 2021. The PPKM policy was in effect for the regions with high incidence of transmission cases. COVID-19 cases reached a peak in July 2021, with the number of transmissions increasing to more than 3 million. Since then, the virus spread has been brought under

effective control and the number of transmission cases has declined gradually. At present, the Indonesian government is preparing to go through a transition from a pandemic to a COVID-19 endemic. Before implementing the transition, the government is encouraging the community to obey the health protocol while at the same time relaxing social distancing measures. Indonesia is among the world's top five countries in terms of the highest number of vaccinated citizens, with more than 280 million doses of vaccine administered.[1] This high vaccination coverage offers hope for Indonesians and the global community that the pandemic could begin fading soon. Yet, the pandemic has posed serious challenges for the government, particularly in the social and economic sectors. Now, the question is how the Indonesian government will deal with the challenges caused by the COVID-19 pandemic in its economy and educational sector. This paper tries to explore the answer by reviewing the policies taken by the government and their impacts.

POST-PANDEMIC ISSUES

COVID-19 is actually a healthcare problem. However, its massive and harmful transmission has led to serious crises in many sectors. First, like in other countries, it has caused severe disruptions in the economic segments. It has in fact caused a contraction in the growth of the national economy. In its report, the Central Bureau of Statistics (BPS) indicated that in 2020, the Indonesian economy experienced a growth contraction of 2.07 per cent (c-to-c) compared to that in 2019.[2] Indonesia's economy grew 5.17 per cent in 2018 and then the growth rate slowed to 5.02 per cent in 2019. The pandemic reduced Indonesia's economic growth to minus 2.07 per cent in 2020.

Most micro and small-to-medium enterprises (MSMEs) were hit hard by the pandemic. A survey by the Indonesian Bank showed that 77.95 per cent of Indonesia's MSMEs faced difficulties in performing their operations.[3] MSMEs were confronted with two main challenges: a decrease in sales due to social distancing restrictions and an increase in the cost of business operations. As MSMEs play a key role in national economies and employ millions of people, disruptions in this sector

1. setkab.go.id. (https://setkab.go.id/en/indonesia-among-worlds-top-5-countries-with-highest-vaccination-coverage/). Accessed 10 June 2022.

2. bps.go.id. (https://www.bps.go.id/pressrelease/2021/02/05/1811/ekonomi-indonesia-2020-turun-sebesar-2-07-persen--c-to-c-.html). Accessed 10 June 2022.

3. liputan6.com. (https://www.liputan6.com/bisnis/read/4876398/7795-persen-umkm-terdampak-pandemi-covid-19-selama-2021). Accessed 10 June 2022.

will potentially exacerbate the socio-economic crisis. The rise of unemployment is the direct impact of these disturbances. Data from BPS showed that the unemployment number was up by 2.67 million to 9.67 million in August 2021.[4] This was greatly contributed to by the increased number of people on employment termination as a result of many businesses stopping their operations during the pandemic. In fact, the pandemic has caused about 15.6 per cent of workers to experience layoffs, 13.8 per cent of whom received no compensation at all.[5] This percentage is much higher if we include the number of workers on temporary layoffs with pay cuts. Some companies are turning to salary reductions instead of permanent work termination to avoid paying termination compensation. Thus, temporary layoff is worse than permanent employment termination.

A number of issues in the abovementioned economic sectors have led to various social problems – the second post-pandemic challenge to deal with. The major one is the increase in the poverty rate. After a significant decline in the poverty rate to 9.22 per cent in September 2019,[6] Indonesia's poverty rate was up by 10.14 per cent or 27.54 million in March 2021.[7] A large number of impoverished people will create various crises and contribute to the presence of much greater problems, one of which is inequality. Inequality is closely related to poverty because inequality is a factor of the persistence of poverty. That is, while many people were unable to perform their business activities due to PSBB and PPMK, other groups of people took advantage of the situation. For example, while the conventional business world experienced a significant economic setback during the pandemic, the e-commerce industry became the forefront of the retail sector.

Education is another social dimension affected by the pandemic. The preamble of the 1945 Constitution of Indonesia states explicitly that the lifelong education of the people is one of the major goals of the state. Article 31 of the Constitution further states that every citizen shall be entitled to receive education and has the obligation to undertake basic education, and that the government shall provide the funding. Thus, despite the pandemic and social distancing measures, the

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4. bps.go.id. (https://www.bps.go.id/pressrelease/2020/11/05/1673/agustus-2020--tingkat-pengangguran-terbuka--tpt--sebesar-7-07-persen.html). Accessed 10 June 2022.

5. Chairani, Ikfina. 2020. Impact of Covid-19 Pandemic Using Gender Perspective in Indonesia. Jurnal Kependudukan Indonesia 39.

6. beritasatu.com. (https://www.beritasatu.com/archive/802831/pandemi-covid19-picu-angka-kemiskinan-naik-di-atas-10). Accessed 12 June 2022.

7. Syamsuri, Sa'adah, Yaumi, and Roslan, Isma Aulia. 2022. Reducing Public Poverty through Optimization of Zakat Funding as an Effort to Achieve Sustainable Development Goals (SDGs) in Indonesia. Jurnal Ilmiah Ekonomi Islam 792.

government has to fulfil its citizens' right to education by making good policies and taking measured actions and innovations. Despite the challenges, the commitment of the Indonesian government to educating its citizens for lifelong growth remains high. To ensure the continuity of education during the pandemic, the government has therefore changed its policy in education and prescribed learning to be conducted remotely. However, this distance learning mode is still not optimal in its implementation.

PRIORITISING HEALTH, EDUCATION AND ECONOMIC RECOVERY

As portrayed in the abovementioned situation, the Indonesian government now faces tough challenges to recover from the lasting post-pandemic effects. The national strategic programmes, such as infrastructure development, that aimed to strengthen Indonesia's economy are not seemingly going as planned. The main reason is because the government has to allocate extra spending for the management of the COVID-19 pandemic. The additional budget includes healthcare spending for the treatment of COVID-19 patients and medical devices, social assistance (such as subsidies, stimulus packages, and direct cash assistance for economically disadvantaged individuals), and spending for fulfilling the nation's education agenda.

How much budget has the government spent on COVID-19 management? According to Hartanto, Coordinating Minister for Economic Affairs, government expenditure on COVID-19 management until 2022 has reached 1,895.5 trillion rupiah.[8] This massive spending has caused serious impacts on fund allocation for other sectors of development as large amounts of planned expenditures at the various ministries and institutions were diverted for COVID-19 management, in line with the Presidential Regulation Number 54 Year 2020, which changed the posture of the state budget to be more accommodating toward the needs for handling COVID-19.[9] In fact, the total budget cuts at the various ministries and institutions stood at 50 trillion rupiah in 2020.[10] Interestingly, while other ministries and institutions ex-

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8. ekonomi.bisnis.com. (https://ekonomi.bisnis.com/read/20220606/9/1540281/airlangga-total-anggaran-penanganan-covid-19-ri-rp18955-triliun). Accessed 12 June 2022.

9. kemenkeu.go.id. (https://www.kemenkeu.go.id/en/publications/news/presidential-regulation-no722020-changes-the-posture-of-the-state-budget-to-be-more-accommodating-with-the-needs-for-handling-covid-19). Accessed 12 June 2022.

10. cnbcindonesia.com. (https://www.cnbcindonesia.com/news/20200507104943-4-156902/sri-mulyani-bakal-pangkas-lagi-anggaran-k-l-sebesar-rp-50-t). Accessed 12 June 2022.

perienced budget cuts as a consequence of the presidential regulation, the Ministry of Education and Ministry of Health received significant increases in their budgets (see Table 1 below).

Table 1: Budget Cuts and Fund Reallocation in 2020.

No	Ministry and Institution	Budget Change	
		Before	**After**
1	Ministry of Agriculture	IDR 21 trillion	IDR 17 trillion
2	Ministry of Transportation	IDR 43 trillion	IDR 36 trillion
3	Ministry of Defense	IDR 131 trillion	IDR 121 trillion
4	Ministry of Public Works and Housing	IDR 120 trillion	IDR 95 trillion
5	Ministry of Research and Technology	IDR 42 trillion	IDR 2 trillion
6	Ministry of Social Affairs	IDR 62 trillion	IDR 60 trillion
7	The Attorney General	IDR 7 trillion	IDR 6 trillion
8	The Supreme Court	IDR 10.5 trillion	IDR 10.1 trillion
9	Indonesian National Police	IDR 104 trillion	IDR 96 trillion
10	The Constitutional Court	IDR 246 billion	IDR 221 billion
11	Ministry of Education*	IDR 36 trillion	IDR 70 trillion
12	Ministry of Health*	IDR 57 trillion	IDR 76 trillion

Source: Tabulated from news.detik.com.[11]

The extra budget given to the Ministry of Health can be understood as the government's effort to accommodate the increasing budgetary requirements for combating the pandemic. Accelerating the handling of the COVID-19 pandemic is the top priority since economic development cannot be achieved if the state is still experiencing high rates of COVID-19 infections and deaths. The significant increase in educational spending indicates that the government highly acknowledges the key role of education in national development. Through allocating increased budgets for healthcare and education expenditures, the government has shown its commitment to achieving the sustainable development goals, increasing human resources capacity in particular.

Subsequent to changing the posture of the state budget, President Jokowi signed the Presidential Regulation Number 23 Year 2020 concerning the implemen-

11. detik.com. (https://news.detik.com/berita/d-4967314/alihkan-untuk-atasi-corona-jokowi-pangkas-anggaran-kemenristek-rp-40-triliun). Accessed 11 June 2022.

tation of the National Economic Recovery (PEN) programme.[12] This policy prescribes that the management of COVID-19 should be seen from a wider aspect because the pandemic is not only a health-related problem, but also an economic problem. The PEN programme aims to protect, preserve, and elevate the capacity of business actors in running their economic activities. It is hoped that this economic recovery package will both accelerate economic recovery by helping the business sectors, including the MSMEs, and save human lives. The Ministry of Finance has allocated 607.65 trillion rupiah for the PEN programme, covering the priority sectors as follows:

Table 2: PEN Budget and Priority Sectors.

No	Priority Sector	Spending
1	Health Programme	IDR 87.55 trillion
2	Social Protection	IDR 203.9 trillion
3	Business Incentives	IDR 120.61 trillion
4	Support for MSMEs	IDR 123.46 trillion
5	Corporate Financing	IDR 53.57 trillion
6	Local Government and Cross-Sectoral Cooperation among Ministries/Institutions	IDR 106.11 trillion

Source: Ministry of Finance.[13]

COMMITTED TO SDGS AGENDA AND HUMAN DEVELOPMENT

A growth decline in all sectors caused by the pandemic could put at risk the achievement of the Sustainable Development Goals (SDGs) agenda in Indonesia. Fortunately, several priority efforts taken by the government are among the major agenda items of the SDGs. The PEN programme, which includes a healthcare programme, social protection, and support for MSMEs, is one of the examples. Ensuring that every child in Indonesia continues to receive quality education while learning from home is another of the government's efforts that are in line with the 2030 SDGs agenda.

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12. setkab.go.id. (https://setkab.go.id/en/govt-issues-pp-23-2020-for-national-economic-recovery-programs/). Accessed 1 June 2022.

13. pen.kemenkeu.go.id. (https://pen.kemenkeu.go.id/in/post/mengapa-program-pen). Accessed 29 May 2022.

In his remarks in the UN Economic and Social Council annual meeting forum, President Joko Widodo stated Indonesia's high commitment to achieving the 2030 SDGs agenda, despite the serious challenges faced by Indonesia in managing the COVID-19 pandemic and its adverse impacts. He further proposed four steps the world community could take to accomplish the 2030 SDGs agenda.[14] First, the global community must work together to enable the world's quick recovery from the health crisis through fair and equitable vaccination programmes. Second, enhanced focus and assistance should be given to vulnerable groups due to the slowdown in economic activities, through social security and protection. Third, the world economy must recover together without compromising the healthcare aspects. Finally, the world community should strengthen global partnerships and the principle of "no one left behind" must be realised in a concrete manner. The four steps proposed by the president also signify the attempts his administration has taken to fulfil the agenda of development during the COVID-19 malady.

In terms of SDGs accomplishment, Indonesia ranked 97 out of 165 participating countries, with a score of 66.3 in 2021. This is still far below the other regional countries' achievements, with Thailand ranking 43, Vietnam ranking 51, Malaysia ranking 65, and Singapore ranking 76.[15] Indonesia's ranking and score indicate that the country needs to put more effort into improving its SDGs achievements. In the three years to come, elevating its SDGs score and ranking would be a tough challenge for Indonesia due to the impact of economic and social disruptions caused by the pandemic. However, the spirit of development promoted by the president matches the 2030 SDGs agenda, as seen in his 2020-2024 national medium-term development plan, in which he set five priorities of national development, including human resource development, infrastructure development, regulation simplification, bureaucracy simplification, and economic transformation.[16]

President Joko Widodo's decision to prioritise human development is in harmony with his administration's vision of "the realisation of an advanced Indonesia that is sovereign, independent and embraces a personality based on mutual coopera-

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14. youtube.com/c/SekretariatPresiden. 2021. President Joko Widodo's Speech at the UN Economic and Social Council Meeting, 13 July 2021. (https://youtu.be/_HA14Tn7DkA).

15. Cambridge University Press. 2021. The Decade of Action for the Sustainable Development Goals. Sustainable Development Report. (https://s3.amazonaws.com/sustainabledevelopment.report/2021/2021-sustainable-development-report.pdf).

16. Sekretariat Kabinet RI, Deputi Bidang Perekonomian. Narasi Rencana Pembangunan Jangka Menengah Nasional 2020-2024.

tion." Under his presidency, human resources development has shown an upward trend as indicated by Indonesia's human development index (HDI), as seen below.

Figure 1: Indonesia's Human Development Index between 2014-2018.
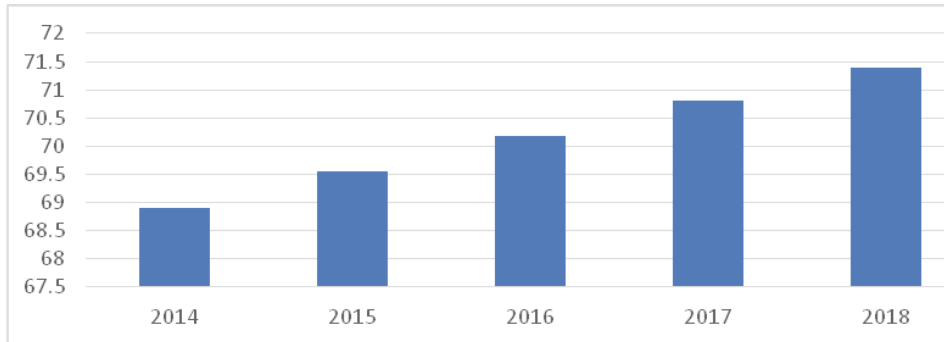
Source: Badan Pusat Statistik, 2018.[17]

In line with the above HDI increase, according to the latest UNDP report, Indonesia for the first time broke into the high category group in terms of human development.[18] HDI considers three dimensions of human development: health (assessed by life expectancy at birth), education (measured by the mean number of years of schooling and expected years of schooling), and standard of living (measured by per capita income).[19]

The increase in Indonesia's HDI is a significant achievement for the Indonesian government. It could indicate that the government has performed well in social and economic development, which affects how long and how well people can live. Importantly, HDI has now become one of the considerations for the Indonesian government in budgeting its development expenditures. Geographically, Indonesia is an archipelagic state, consisting of thousands of islands divided into several provinces, each of which has its own potency, natural resources, and diverse problems. A widely applicable indicator, like HDI, is needed so that the approach to development is more effective for all regions now and in the future. Scrutinised closely, it

17. Badan Pusat Statistik. 2018. Indeks Pembangunan Manusia 2018. (https://www.bps.go.id/publication/2019/08/27/34432798c6ae95c6751bfbba/indeks-pembangunan-manusia-2018.html).

18. undp.org. (https://www.undp.org/indonesia/press-releases/latest-undp-report-indonesia-retains-standing-high-human-development-category). Accessed 2 June 2022.

19. hdr.undp.org. (https://hdr.undp.org/data-center/human-development-index#/indicies/HDI). Accessed 13 June 2022.

can be seen that several of President Joko Widodo's instructions, i.e., the PEN programme and focus on HDI increase, coincide perfectly with the priorities of SDGs accomplishment in Indonesia, as written in the roadmap of SDGs Indonesia toward 2030, which focuses, among others, on infrastructure development, health, education, social protection, food security, good and clean governance, and order.

THE POLICY IMPACTS

Theoretically, the president's policies appear to be accurate and effective. However, how his major policies affect Indonesia's social and economic sectors is more important. We may not yet be able to look at the thorough impacts of the policies in the second quarter of 2022, for example, the impact of the PEN programme in boosting MSMEs operations. Yet, initial signs such as small changes could be present and are worth assessing as part of our participation in overseeing the implementation of the policies to help drive the achievement of the 2030 SDGs agenda and Indonesia's vision 2045. It is necessary for the government to convince the public that the large amounts of funds allocated for the PEN programme and for COVID-19 management have been spent in an effective and appropriate manner. In terms of COVID-19 management, the government has been able to suppress the transmission cases, and the vaccination rate has reached more than 280 million doses. Nevertheless, the question is how the government has responded to the hard hits caused by the pandemic on other basic dimensions of our lives. To answer this question, let us examine the various aspects as follows.

EFFECTIVENESS AND EFFICIENCY OF BUDGET ABSORPTION

As of June 2022, the budget absorption of the PEN programme has reached 95.13 trillion rupiah, which is 20.9 per cent of the total spending allocated. Table 3 below shows the detailed spendings on the programme.

Table 3: PEN Programme Spendings as of June 2022.

No	Sector	Allocation	Spending
1	Health Handling	• Tax incentives for vaccines/medical devices • COVID-19 management through village funds	IDR 24.46 trillion (20%)
2	Social Protection	• PKH programme • Food Card • Pre-Employment Card • Village Fund Direct Cash Assistance • Cooking Oil Direct Cash Assistance • Cash Assistance for Street Food Vendors, Stalls, Fishermen	IDR 55.85 trillion (36.1%)
3	Economic Recovery	• Tourism • Food • Interest Subsidy and Expenditure for Guarantee Fees (IJP) for MSMEs	IDR 14.83 trillion (8.3%)

Source: covid19.go.id.[20]

In the opinion of Misbakhun, a member of house commission XI, this absorption rate is considered still too low because the second quarter of 2022 ends soon and yet the programme has just absorbed one-fifth of the total budget. He has thus called for an evaluation of this matter.[21] From the efficiency side, academicians and economists have voiced the concern that the large amounts of funding for COVID-19 management will present inefficiency and corruption risks. This concern later proved to be valid; social assistance funds for people affected by COVID-19 were embezzled by the Minister of Social Affairs, the person who was supposed to be the leading figure in the management of social problems posed by the pandemic. Upsettingly, the embezzled funds reached 20 billion rupiah. Corruption risks

20. covid19.go.id. (https://covid19.go.id/artikel/2022/06/15/realisasi-program-pen-capai-9513-triliun). Accessed 13 June 2022.

21. dpr.go.id. (https://www.dpr.go.id/berita/detail/id/39403/t/Perlu+Dievaluasi%2C+Realisasi+Penyerapan+Anggaran+PEN+Baru+Seperlima+per+Kuartal+II+2022). Accessed 13 June 2022.

in emergency funding could possibly occur downstream as well. Local authorities who hold no sense of responsibility toward national crises may be prone to embezzling the COVID-19 relief funds. Thus, the above case revealed by the Corruption Eradication Commission (KPK) could just be the tip of the iceberg in the sea. A former senior KPK investigator, Novel Baswedan, estimates that corruption in the funding of COVID-19 management could reach 100 trillion rupiah.[22] Low absorption and corruption risks in almost all lines pose a serious threat to our social and economic recovery plan. Without systematic supervision and transparency, and good intentions, large amounts of budget are not enough to drive our socio-economic recovery.

Another issue that causes scepticism among the public concerning the positive impact of COVID-19 management on the social and economic sectors is the numerous reports of improper targeting of social assistance distribution in the community. Several community groups that were not entitled to receive the assistance were categorised to be entitled and thus received the social assistance. This inaccuracy was mainly caused by the validity of social assistance recipient data.[23] Valid and up-to-date recipient data is key to the proper distribution of social assistance to the community. Disgracefully, unscrupulous officials at the lower levels that distribute the assistance often manipulate social assistance recipient data. There has been anecdotal evidence that statistical data in Indonesia can be very dynamic when it comes to social assistance programmes; that is, the number of people living under poverty can spike significantly when there is a social assistance programme. Mistargeting in the distribution of social assistance to the community was also caused by a lack of infrastructure. For example, to help parents to provide sufficient internet quota for their children's online learning, the Ministry of Education disbursed internet quota assistance. Unfortunately, this assistance became ineffective and was mistargeted when received by students who had no mobile devices or internet access.

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22. cnbcindonesia.com. (https://www.cnbcindonesia.com/news/20210519081108-4-246534/korupsi-bansos-covid-triliunan-orang-miskin-dapat-berapa). Accessed 16 June 2022.

23. CSIS. 2020. Optimizing the Distribution of the Social Assistance Program during the COVID-19 Pandemic. CSIS Commentaries. (https://www.csis.or.id/download/281-post-2020-06-10-DMRU_081_EN_Hirawan.pdf).

ECONOMIC GROWTH

By and large, social assistance and stimulus programmes distributed to most vulnerable community groups and MSMEs have appeared to bring about positive impacts. BPS announced that Indonesia's economy expanded by 5.01 per cent in the first quarter of 2022.[24] The growth percentage was influenced by the increase in gross domestic product based on constant prices, compared to the same period last year. Meanwhile, MSMEs have started to recover after being hit hard by the pandemic. MSMEs at the local level have also intensified their business operations. The increase in activities in this sector was affirmed by the growth of credit for MSMEs, which expanded by 14.98 per cent in the first quarter of 2022.[25]

In the employment sector, Indonesia recorded a significant increase in the rate of employment since the pandemic outbreak in the beginning of 2020.[26] There have been 4.45 million people who have returned to work since February 2022. Agriculture was the greatest source of employment nationwide, with 1.86 million people employed in this sector. The industry was reported to be employing 840,000 people. In contrast, the trade sector provided 640,000 jobs in the same period. We all hope that this remarkable economic achievement will continue to show consistent growth over the next few years so that national economic recovery can be achieved faster and Indonesia can grow stronger in all aspects of socio-economic life.

EDUCATION SECTOR

The pandemic has made education the anchor to the Indonesian government's policy and development agenda. As a matter of fact, the government has increased the spending on education. In 2021, the Ministry of Research and Technology was merged with the Ministry of Education and Culture to form the Ministry of Education, Culture, Research and Technology (MoECRT). Tapping on a young figure and a digital technology entrepreneur, Nadiem Makarim, to lead the newly merged

24. setkab.go.id. (https://setkab.go.id/ekonomi-indonesia-tumbuh-501-persen-di-kuartal-i-2022/). Accessed 14 June 2022.

25. liputan6.com. (https://www.liputan6.com/bisnis/read/4964483/bank-indonesia-catat-kredit-umkm-tumbuh-1498-persen-di-kuartal-i-2022). Accessed 15 June 2022.

26. Badan Pusat Statistik. 2022. Labour Force Situation in Indonesia February 2022. The 2022 National Labour Force Survey. (https://www.bps.go.id/publication/2022/06/07/c81631f750ee1ece2c3eb276/keadaan-angkatan-kerja-di-indonesia-februari-2022.html).

ministry, President Joko Widodo showed his strong intention to ensure that quality education is provided to all during the pandemic through technology-based distance learning. To support the president's educational policy, more programmes were designed, including the issuance of the Emergency Curriculum, the Guru Penggerak (Teacher Professional Development) programme, the *Laman Guru Berbagi* (Platform for Teachers to Share) programme, the Learning from Home on TVRI (State-Own Television Station) programme, and the Internet Quota Subsidy for Teachers and Students programme.

Several key questions need to be raised regarding these educational programmes. Can the programmes prevent students from dropping out of school during the pandemic? Can the programmes prevent learning loss due to school closures? Can the programmes ensure equality of education services for all? The following data can be used to illustrate that the design of educational programmes and provision of learning resources during the pandemic have not been able to provide maximal quality education services:

1. Student dropout rate is still rising. According to the General Secretary of MoE-CRT, the elementary school dropout rate in 2022 was 10 times higher than that in 2019. This was caused by several factors, among which were parent dissatisfaction with learning from home, economic issues, and children's involvement in workplaces.[27]

2. Inequality in education services and learning loss risks due to inadequate infrastructure is widening. Remote learning was one of the policies taken by the government to safeguard education during the pandemic. This mode of learning relies heavily on the availability of the internet and learning devices. Unfortunately, when the pandemic hit, 8,522 schools were not powered by electricity and 42,159 schools were not equipped with internet connectivity.[28] We have no exact number yet but we believe hundreds of thousands of students at these schools were likely at risk of not receiving good education services or of even not having any access to education at all. Thus, this situation risks exacerbating existing inequalities in learning engagement and aca-

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27. kompas.com. (https://www.kompas.com/wiken/read/2022/01/16/200036281/putus-sekolah-akibat-pandemi-covid-19-naik-10-kali-lipat-ini-kata?page=all). Accessed 15 June 2022.

28. cnnindonesia.com. (https://www.cnnindonesia.com/nasional/20200726170636-20-529097/kemdikbud-sebut-8522-sekolah-belum-teraliri-listrik). Accessed 13 June 2022.

demic performance between rich and poor students and between developed and underdeveloped areas.

3. The essence of the educational policy is not entirely conveyed to the relevant stakeholders, teachers in particular. The survey by MoECRT[29] revealed that most teachers (87 per cent) reported sending only test questions and assignments to students and using no technology in explaining their lessons during the distance teaching they carried out. The survey also found that most students reported facing difficulties in understanding the contents of learning taught by online teaching because they struggled to maintain their focus and concentration.

4. Many teachers are not digitally literate.[30] Teachers were not prepared to teach online because they were deprived of adequate technological skills. They did not receive sufficient training that enable them to become competent in and receptive in information and communications technology (ICT) so that they can teach online effectively.

5. Hundreds of private schools are at risk of permanent closure. Low-cost private schools were hit hard by the pandemic and were facing significant financial difficulties because their major source of income was tuition fees from students. When the pandemic broke out, the enrolment rate abruptly declined, mainly because the schools operated without internet (or adequate internet) connectivity and were thus unable to provide online learning.

6. The MoECRT still does not have an ideal concept about online learning. This can be seen from the absence of specific curriculum designs and guidelines, lack of adequate education infrastructure, and inadequate training for teachers in the use of technologies for online teaching. This is understandable because the pandemic erupted in an abrupt manner and no country was fully prepared for the COVID-19 pandemic. However, this crisis can provide the momentum for the MoECRT to further enhance its online learning model. This emergency effort could be the answer to the needs of future educational design. Unpredictable threats such as natural disasters, pandemics and wars

29. news.detik.com. (https://news.detik.com/berita/d-5108510/survei-kemdikbud-siswa-sulit-pahami-pelajaran-saat-belajar-jarak-jauh/1). Accessed 13 June 2022.

30. cfds.fisipol.ugm.ac.id. (https://cfds.fisipol.ugm.ac.id/2017/08/22/indonesia-is-not-digitally-literate-enough/). Accessed 16 June 2022.

that may occur in the future will likely require a learning model with Internet of Things-based technology.

FUTURE AGENDA

The policies taken by the government of Indonesia have been on the right track. Nevertheless, consistency, supervision for effectiveness and efficiency, and sustainability of programmes must be maintained. The agenda of development in Indonesia is not yet on a sustainable path as a regime change in the country could bring about alterations in direction and priorities of development. Even a change of minister can lead to changes in policies in the ministry.

Looking over the management of the COVID-19 pandemic in Indonesia in light of the accomplishment of the SDGs agenda, we note a number of important points as follows:

1. Strong commitment to the 2030 SDGs agenda should help Indonesia drive a sustainable long-term development plan. Changes in previous regimes have led to interruptions in the state's development vision due to differences in the interests and ideology of the governing party. As a global agenda, the SDGs are not legally binding but are subject to whether the president-elect and the governing party will take ownership and establish the national frameworks for the accomplishment of the SDGs. It is necessary for political parties to start introducing their cadres to the SDGs agenda, including the role and contribution of Indonesia in achieving the goals. This induction is important for the cadres of political parties so that when they take leadership of the country in the future, they will already be better prepared for their responsibilities and roles.

2. In two years, Indonesia will embark on the 2024 presidential elections. There will likely be some vulnerable situations that we must pay attention to. One of these is related to the management of the COVID-19 pandemic. Political parties need to gain enough popularity in order to win the election and this requires large amounts of money. As of the second quarter of 2022, the government has spent just 20 per cent of its COVID-19 relief funding, leaving a huge amount of funds still unspent. The public must ensure that the remaining funds are used to directly address the negative effects caused by the pandemic in a timely manner. We must safeguard the unspent funds from misallocations and corruptions – for example, being used unlawfully for financing election and legislative candidate campaigns. If this happens, the agenda for

managing the impacts of the COVID-19 pandemic on the health, economic and education sectors will remain unfinished.

3. Interventions in economic sectors have brought about positive impacts, and economic activities have slowly returned to normal. This situation must be supported by a simplification of the bureaucracy involved in business permits and funding, and the price stability of agricultural, fishery, and livestock products.

4. In terms of education, while the government has taken serious actions to support learning from home, the pandemic still presents major problems for education in Indonesia. There still exist inequalities in educational services, whereby a large number of students still do not have easy access to quality education and its services. This is a serious issue that the government has to resolve in the near future. On top of that, the pandemic could be used by the MoECRT as a source of momentum to seriously reorganise the basic framework of national education and align it accurately with the needs and challenges of the future.

CONCLUSION

This paper reviews the efforts taken by the Indonesian government in addressing the challenges posed by the COVID-19 pandemic on social and economic life. The pandemic has hit the country hard, causing a contraction in the growth of the national economy, an increase in the poverty rate, and massive school closures. To recover from the lasting post-pandemic effects, serious attempts prioritising health, education, and economic recovery have been taken. The government has allocated more spending for the health, economic, and education sectors to work towards the sustainable development goals and to increase human resources capacity in particular, which is in line with the 2030 SDGs agenda. While the policies taken by the government have been on the right track, its agenda of development is not yet on a sustainable path. Strong commitment to the 2030 SDGs agenda should help Indonesia drive a sustainable long-term development plan. Intervention in the health and economic sectors has brought about positive impacts. However, the pandemic still presents major problems to education, including inequalities in educational services, absence of specific curriculum designs and guidelines, and inadequate training for teachers in the use of technologies for online teaching.

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STE(A)M Education for Southeast Asia

Riccardo Corrado and Patchanee Tungjan

INTRODUCTION: STEM IN THE SOUTHEAST ASIAN CONTEXT

The history of the acronym STEM (Science, Technology, Engineering, and Mathematics) started at the beginning of the last decade of the past century. The acronym was originally written as SMET (Science, Mathematics, Engineering, and Technology), before then being changed due to phonetic reasons to the well-known STEM.[1] The STEM movement gained momentum in the next decade, in 2005, when Virginia Tech University created a degree in STEM education.[2] STEM not only includes those disciplines commonly considered under the umbrella of STEM, such as physics, chemistry, and mathematics, but also includes disciplines in psychology and social sciences, such as political science, and economics.[3] Since 2005, many calls for enhancing STEM education have been voiced out, mostly from employers concerned about the lack of workplace-skilled professionals capable of answering the increasing demand for skilled labour from those companies, mostly related to

1. Martín-Páez, Tobías, David Aguilera, Francisco Javier Perales-Palacios, and José Miguel Vílchez-González. 2019. What are we talking about when we talk about STEM education? A review of literature. Science Education 103. (https://doi.org/https://doi.org/10.1002/sce.21522).

2. Martín-Páez, Tobías, Aguilera, David, Perales-Palacios, Francisco Javier and Vílchez-González, José Miguel. 2019. Science Education 103. (https://doi.org/https://doi.org/10.1002/sce.21522).

3. Li, Yeping, Ke Wang, Yu Xiao, and Jeffrey E. Froyd. 2020. Research and trends in STEM education: a systematic review of journal publications. International Journal of STEM Education 7. (https://doi.org/10.1186/s40594-020-00207-6).

innovation.[4] Today, there is no unique agreed definition of STEM education,[5] but one aspect to surely emerge is the transdisciplinary aspect of it, mostly when focusing on STEM integration in learning activities.[6]

With a focus on the Southeast Asian ecosystem, and to promote regional co-operation in education, science, and culture in the region, in 1965 the Southeast Asian Ministers of Education Organisation (SEAMEO) was established by (using the current names) Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. SEAMEO is a regional intergovernmental organisation that "maintains its work and aspirations for development with peoples of the region to make lives better in quality and equity in education, preventive health education, culture and tradition, information and communication technology, languages, poverty alleviation and agriculture, and natural resources".[7] Additionally, within SEAMEO, the SEAMEO STEM Education (STEM-ED) Centre started operations in 2019 and has since begun its mission of uplifting the capacity and capabilities of STEM education in the region,[8] pinpointing three main goals: (1) improving science and mathematics performance for students, benchmarking the improvement with the PISA scores, (2) shifting from a resource-intensive to a more balanced paradigm of development, and, finally, (3) attracting and obtaining science and technology expertise to escape the middle-income trap, leveraging on skills and equipment upgrading across the region.[9]

When focusing on the definition given by SEAMEO to STEM education, the current STEM-ED Centre's definition of it is: "a teaching and learning approach, which emphasises the connections among or the integration of knowledge and skills in science, technology, engineering, and mathematics to address problems facing our communities as well as larger global issues that require a skilled workforce and knowledgeable citizens who can apply these skills and knowledge to develop

4. Falloon, Garry, Maria Hatzigianni, Matt Bower, Anne Forbes, and Michael Stevenson. 2020. Understanding K-12 STEM Education: a Framework for Developing STEM Literacy. Journal of Science Education and Technology 29. (https://doi.org/10.1007/s10956-020-09823-x).

5. Falloon, Garry, Hatzigianni, Maria, Bower, Matt, Forbes, Anne and Stevenson, Michael. 2020. Journal of Science Education and Technology 29. (https://doi.org/10.1007/s10956-020-09823-x).

6. Takeuchi, Miwa A., Pratim Sengupta, Marie-Claire Shanahan, Jennifer D. Adams, and Maryam Hachem. 2020. Transdisciplinarity in STEM education: a critical review. Studies in Science Education 56. (https://doi.org/10.1080/03057267.2020.1755802).

7. SEAMEO. 2020. What is SEAMEO? SEAMEO STEM-ED Reports. (https://seameo-stemed.org/about/centre-profile).

8. SEAMEO. 2020. SEAMEO STEM-ED Reports.

9. SEAMEO. 2020. SEAMEO STEM-ED Reports.

solutions".[10] To evaluate the standards for STEM education, the STEM-ED Centre also introduced five indicators identifying what learners should know and be able to do, thus representing de facto learner learning levels and development processes.[11] Specifically, the five indicators are the following:

1. Identifying the problem.

2. Collecting data and ideas relevant to the problem.

3. Designing potential solutions by applying STEM knowledge and practical engineering methods.

4. Testing, assessing, and improving solution(s).

5. Presenting problem-solving methods and solution(s).

Furthermore, several review studies have highlighted that while STEM education in Asia began in 2013,[12] it has not been developed in a homogeneous way across regional countries, with, for example, Malaysia, Singapore, Thailand, and the Philippines having already implemented STEM in their curriculum, while others are still lagging behind.[13] Thus, accounting for this non-homogeneous STEM education ecosystem in the Southeast Asian context, in the following of this chapter, an overview of the current scenario is offered.

SOUTHEAST ASIA: A NON-HOMOGENEOUS ECOSYSTEM

Southeast Asia is a very diverse region, with a non-homogeneous regional digital divide issue which appears to be larger when compared to the rest of the world,[14] and with roots that can be found in the educational background. In this context, STEM education has attracted significant interest, in some countries more than

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10. SEAMEO STEM-ED. 2020. STEM Education Standards SEAMEO Regional STEM Education Center. (https://drive.google.com/file/d/1Mh83obK1CK73SvlDFVf9R3q3m1xGExjq/view).

11. SEAMEO STEM-ED. 2020.

12. Wahono, Bevo, Pei-Ling Lin, and Chun-Yen Chang. 2020. Evidence of STEM enactment effectiveness in Asian student learning outcomes. International Journal of STEM Education 7. (https://doi.org/10.1186/s40594-020-00236-1).

13. Wahono, Bevo, Lin, Pei-Ling and Chang, Chun-Yen. 2020. International Journal of STEM Education 7. (https://doi.org/10.1186/s40594-020-00236-1).

14. Corrado, Riccardo, and Audrey Liwan. 2021. E-Learning: Global Perspectives, Challenges and Educational Implications. In: Education in a Competitive and Globalizing World, edited by Donnie Adams, and Chuah Kee Man, 125-148. NY, USA: Nova Science Publishers. (https://doi.org/10.52305/QGNZ7440).

others, in parallel with the technological pervasion of the educational ecosystem across the region.[15]

For Malaysia, from 1957, after its independence, the country has experienced a remarkable improvement in the education sector, with increased spending that saw, in 2011, the country recording one of the highest educational expenditures (related to GDP) in the world.[16] The importance of STEM is not something new in Malaysia, with its government having emphasised the importance of science and technology since the 1970s.[17] In 2013, the Ministry of Education introduced the Malaysia Education Blueprint 2013-2025, defining three waves. The first one, ranging from 2013 to 2015, had the main goal of turning around the system by supporting teachers and focusing on core skills.[18] The second wave, from 2016 to 2020, had the goal of accelerating system improvements such as curriculum, English language exposure, Information Communications Technology (ICT) innovations, competency, and performance-based progression and international accreditations.[19] Finally, the current wave, from 2021 to 2025, focuses on moving toward excellence with increased operational flexibility, aiming to scale up innovation, cultivate professional excellence, and review school structure.[20] With this blueprint, the Ministry of Education implemented various strategies to strengthen the STEM-related subjects, aiming to boost the production and preparation of skilled professionals, and identified three main goals: (1) raising student interest through new learning approaches and adopting an enhanced curriculum, (2) sharpening the skills and abilities of teachers, and (3) building public and student awareness using national campaigns. The idea underpinning the vision to change the existing curriculum to the Standard Secondary School Curriculum (SSSC) was to make

15. Corrado, Riccardo and Liwan, Audrey 2021. Education in a Competitive and Globalizing World (https://doi.org/10.52305/QGNZ7440).

16. MOE. 2013. Malaysia Education Blueprint 2013-2025. Putrajaya, Malaysia: Kementerian Pendidikan Malaysia. (https://www.moe.gov.my/muat-turun/penerbitan-dan-jurnal/dasar/1207-malaysia-education-blueprint-2013-2025/file).

17. Kaur, Anisha Haveena, Sharmini Gopinathan, and Murail Raman. 2020. Work-in-Progress—Role of Innovative Teaching Strategies in Enhancing STEM Education in Malaysia. In: 6th International Conference of the Immersive Learning Research Network (iLRN). (https://doi.org/10.23919/iLRN47897.2020.9155174).

18. MOE. 2013.

19. MOE. 2013.

20. MOE. 2013.

STEM learning practices one of the pillars of the education system of Malaysia.[21] At the Virtual Kuala Lumpur Engineering Science Fair 2021 (e-KLESF 2021), an event supported by the Ministry of Education, the Academy of Sciences Malaysia (ASM), the Associated Chinese Chambers of Commerce and Industry of Malaysia (ACCCIM), and the Malaysian Institute of Physics (IFM), the Ministry of Education highlighted how various programmes and activities have been carried out in recent years in the country aimed at enhancing not only the interest of students but also the competence of teachers in STEM,[22] as well as changes in the curriculum, such as at the secondary school level, from the Integrated Curriculum for Secondary Schools (KBSM) to the Standard Curriculum for Secondary Schools (KSSM).[23] Additionally, campaigns have been organised and carried out in collaboration with government agencies, the private sector, and non-governmental organisations (NGO) to raise awareness of STEM-related opportunities, and educate both students and the general public about the wide spectrum of career opportunities in STEM disciplines.[24] Yet, despite initiatives undertaken by the Ministry of Education and the Ministry of Science, Technology, and Innovation (MOSTI) in Malaysia, the country is experiencing a steady decline in the number of students enrolling in STEM majors in tertiary education,[25] with the proportion of students enrolling in STEM-related majors having dropped from 48 per cent in 2012 to 44 per cent in 2017.[26]

Regarding Singapore, currently, there are many schools offering STEM education. Already in 2014, the Singaporean Ministry of Education had set up a partnership with Stem Inc, a unit established in January 2014 under Science Centre

21. Razali, Fazilah, Umi Kalthom Abdul Manaf, and Ahmad Fauzi Mohd Ayub. 2020. STEM Education in Malaysia towards Developing a Human Capital through Motivating Science Subject. International Journal of Learning, Teaching and Educational Research 19. (https://doi.org/10.26803/ijlter.19.5.25).

22. The Star. 2021. Sparking STEM interest in schools. (https://www.thestar.com.my/news/education/2021/11/14/sparking-stem-interest-in-schools).

23. Kong, Suik F., and Mohd E. Mohd Matore. 2022. Can a Science, Technology, Engineering, and Mathematics (STEM) Approach Enhance Students' Mathematics Performance? Sustainability 14. (https://doi.org/10.3390/su14010379).

24. SAMEO. 2020. Why STEM - 21st Century Skills in Southeast Asia's Education System. Seadstem: Southeast Asian Digital STEM Platform. (https://www.seameo-innotech.org/wp-content/uploads/2020/03/SEADSTEM-Project-Description-2019-2020_Short.pdf).

25. Palpanadan, Sarala Thulasi and Venosha Ravana. 2022. Future Trajectories in Teaching-Learning Practices for STEM Education in Malaysian Secondary Schools: A Scoping Review. Asia Proceedings of Social Sciences 9. (https://doi.org/10.31580/apss.v9i1.2273).

26. Kaur, Anisha Haveena, Gopinathan, Sharmini and Raman, Murail. 2020. 6th International Conference of the Immersive Learning Research Network (iLRN). (https://doi.org/10.23919/iLRN47897.2020.9155174).

Singapore (SCS), to support the flourishing of STEM learning activities.[27] Specifically, the STEM Applied Learning Programme (ALP) was idealised to foster interest in STEM and encourage students to pursue STEM-related careers, with a focus on "hands-on activities, making the relatedness between subjects explicit, encouraging learning through play as well as exploration, and the development of 21st-century competencies such as collaboration, communication, and problem-solving skills".[28] To be a school delivering STEM ALP programmes, a school had to submit a pro-posal for joint review by the Singaporean Ministry of Education and SCS, and then participate in a sharing session with both the bodies (the Singaporean Ministry of Education and SCS), involving the key personnel who would implement the STEM ALP, such as the principal and senior management.[29] The selected STEM educators, appointed for two and a half years in their position, had to provide on-site support, including conducting professional development workshops for teachers, technical guidance, and assistance in lessons delivery.[30] Additionally, STEM education was included in the curriculum, with approximately 20 hours of STEM ALP lessons for weekly delivery over a semester, with the first semester lasting 21 weeks, and the second one lasting 24.[31] Additional schools also partnered with other institutions. Examples include EtonHouse International School Singapore, XCL World Academy Singapore and Dover Court International School. The EtonHouse EdTech curriculum specifically includes programming, animation, cybersecurity, and 3D gaming as ac-tivities for students starting from kindergarten. The XCL World Academy Singapore, which has formed a partnership with Carnegie Mellon University and the CREATE Lab, is providing a clear focus on coding, Artificial Intelligence (AI), and robotics. Dover Court International School has partnered with the Massachusetts Institute of Technology (MIT), and is offering an annual visit to MIT, training for STEM teach-ers, and an interdisciplinary approach. These are just some of the examples of schools in Singapore providing STEM education and leveraging on international partnerships.

In the case of Thailand, STEM education was introduced in the country in 2012, at the dawn of another round of education reforms following the major one which

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27. ADB. 2021. Different Approaches to Learning Science, Technology, Engineering, and Mathematics: Case Studies from Thailand, the Republic of Korea, Singapore, and Finland. Asian Development Bank. (https://dx.doi.org/10.22617/SPR210041).

28. ADB. 2021. Asian Development Bank.

29. ADB. 2021. Asian Development Bank.

30. ADB. 2021. Asian Development Bank.

31. ADB. 2021. Asian Development Bank.

took place in 1999.[32] A series of forums for open discussion took place after the 6th Thai-US Education Roundtable at the University of Minnesota in 2012.[33] Currently, as an outgrowth of the 2012-2016 plan, the Kingdom has identified STEM education as a key feature of the education and workforce development policy.[34] Despite the country having a "solid background and infrastructure for STEM education", it can be said that Thailand does not have a unique definition of STEM.[35] Yet, currently, in the Thai ecosystem, the STEM topic has become a hot one among policymakers, academics, school teachers, science and mathematics educators, scientists, and engineers, and has quickly been adopted as a major policy by the National Science Technology and Innovation Policy Office (STI), the Institute for the Promotion of Science and Technology (IPST), the Ministry of Education, and the Ministry of Science and Technology.[36] To include STEM in formal education, IPST, together with STI and the National Economic and Social Development Board (NESDB), formulated a five-year plan (2014-2018) strategy for driving the development of STEM education in the country, including curriculum updates and teachers' professional development.[37] Currently, there are a number of schools implementing STEM programmes, such as Lamplaimat Pattana School (LPMP) in Buri Ram province, Mahidol Wittayanusorn School (MWIT), Princess's Chulabhorn Rajavidhayalai Schools, and the Science Classrooms in University-Affiliated School (SCiUS). But these institutions belong to the category of "alternative schools", which possess autonomy in administration, finance, and implementation of non-traditional teaching and learn-

32. Promboon, Sumonta, Fred N. Finley, and Kittisak Kaweekijmanee. 2018. The Evolution and Current Status of STEM Education in Thailand: Policy Directions and Recommendations. In: Education in Thailand: An Old Elephant in Search of a New Mahout, edited by Gerald W. Fry, 423-459. Singapore: Springer Singapore. (https://doi.org/10.1007/978-981-10-7857-6_17).

33. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

34. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

35. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

36. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

37. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

ing approaches, allowing them to move similarly to private schools.[38] Unlike these alternative schools, the publicly managed schools instead usually present a more resisting approach to innovation and changes. In fact, if it can be said that in the recent past, Thailand has been "highly successful in preparing top-performing students to compete in several world science and mathematics forums such as the International Mathematics and Science Olympiad", it is also essential to highlight that the vast majority of these students come from elite schools, with clearly a very large gap in overall performance compared with students from publicly managed schools.[39]

Like in Thailand, in Cambodia, there is not a unique official definition of STEM. Despite this, in the Cambodian context, there are a few private institutions leveraging on STEM education, such as E2STEM Education, a non-profit STEM education institution working with the Ministry of Education, Youth and Sport (MoEYS) in a public-private partnership, American University of Phnom Penh High School Foxcroft Academy (AUPPHS-FA), a private institution partnering with Foxcroft Academy (a private preparatory high school located in Dover-Foxcroft, US) and the Canadian International School of Phnom Penh (CIS), in addition to other private institutions in the country. Besides these private institutions, in the public sector, some actions have also been taken, with the introduction of Cambodia's New Generation Schools (NGS). The NGS was established with a new reform inaugurated by the MoEYS in 2014, with the goal of creating autonomous public schools with a mandate to innovate and improve educational quality.[40] The NGS specifically focuses on seven pillars, namely "(1) science and math achievement, (2) science and math self-efficacy, (3) science and math outcome expectations, (4) attitudes toward science, (5) interactive science and math lessons, (6) support from science and math teachers and (7) encouragement and support in science from family".[41] Yet, the effectiveness, in terms of results, of the NGS has still not been clearly investigated,

38. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

39. Promboon, Sumonta, Finley, Fred N. and Kaweekijmanee, Kittisak. 2018. Education in Thailand: An Old Elephant in Search of a New Mahout (https://doi.org/10.1007/978-981-10-7857-6_17).

40. KAPE. 2014. New Generation School (NGS). (http://www.kapekh.org/en/what-we-do/16/?pro_id=20).

41. Kao, Sovansophal. 2021. A quantitative investigation of the effects of new generation vs traditional upper secondary schools in Cambodia through the lens of STEM transfer model. International Journal of Comparative Education and Development 23. (https://doi.org/10.1108/IJCED-03-2021-0025).

and it has been pointed out that there have been both positive and negative results that have emerged from primary research on these schools.[42] Additionally, it is also important to understand that Cambodia, even if having improved in the past years, is still suffering from educational issues related to teachers' preparation and infra-structures.[43] In general, the absence of previous research work on STEM education in the Cambodian context[44] represents a gap to be filled to better drive the journey of Cambodia in terms of STEM education.

Regarding the case of Vietnam, among developing nations, the country pro-vides an "exotic case of the relationship between social factors and STEM education with its high economic growth rates and the top position in the Programme for International Student Assessment (PISA) ranking of average scores in Math, Science, and Reading".[45] These results have been connected to the investment in lifelong education by the government, a consequence of the Vietnamese culture where life-long studies have been historically normalised.[46] In Vietnam, STEM education and related activities have been fostered since 2012, mostly targeting high-end markets in large cities, and focusing on coding and robotics.[47] After joining the ASEAN com-munity and the World Trade Organisation, Vietnam found itself in need of shifting to a STEM-focused curriculum in K-12 and higher education, aiming to stay competi-tive in the rapidly growing global economy with the global workforce demanding

42. Kao, Sovansophal. 2021. International Journal of Comparative Education and Development 23. (https://doi.org/10.1108/IJCED-03-2021-0025).

43. Corrado, Riccardo, Robert E. Flinn, and Patchanee Tungjan. 2019. Can ICT Help Cambodian Students Become the Solution for Improving Education in the Country? Journal of Management, Economics, and Industrial Organization 3. (https://doi.org/10.31039/jomeino.2019.3.2.1).

44. Ban, Chanphalla. 2020. The Current State of Cambodia's STEM Education: A Case Study of the Preah Sisowath New Generation School. Future Forum. (https://www.futureforum.asia/_files/ugd/dffd34_20532a2f6dbf41c09b30498c77f167d7.pdf).

45. Vuong, Quan Hoang, Pham Thang Hang, Trung Tran, Thu-Trang Vuong, Nguyen Manh Cuong, Nguyen P. Khanh Linh, Viet-Phuong La, and Ho Manh-Toan. 2020. STEM Education and Outcomes in Vietnam: Views from the Social Gap and Gender Issues. SSRN Electronic Journal. (https://doi.org/10.2139/ssrn.3543346).

46. Vuong, Quan Hoang, Hang, Pham Thang, Tran, Trung, Vuong, Thu-Trang, Cuong, Nguyen Manh, Linh, Nguyen P. Khanh, La, Viet-Phuong and Manh-Toan, Ho. 2020. SSRN Electronic Journal. (https://doi.org/10.2139/ssrn.3543346).

47. Nguyen, Thanh-Tung, Dieu-Linh Hoang, Hoang-Thuy Linh Nguyen, and Thanh-Binh Nguyen. 2021. STEM-Oriented activities for improving student performance in Chu Van An secondary school, Thai Nguyen province, Vietnam. Journal of Physics: Conference Series 1835. (https://doi.org/10.1088/1742-6596/1835/1/012053).

skilled professionals.[48] Considering this, STEM education has been introduced into the country through many ways and initiatives, with one of the priority lanes represented through private education companies such as STEM Academy and Creative Academy S3.[49] Successful community events such as STEM Day saw the participation of many educational institutions and high schools such as Ta Quang Buu, Trung Vuong, and Olympia.[50] Yet, many teachers and parents still have little to no exposure and awareness of STEM education, and Vietnam still has to move forward in terms of developing more STEM teachers, applying more science and technology to management, enhancing community involvement, and building, directing, and implementing the educational goals of Vietnamese schools in every stage.[51]

In the case of Indonesia, the promotion of STEM education has been set as a priority by the government.[52] The curriculum used in Indonesia is known as Curriculum 2013, and its goal was to prepare Indonesians "to live as individuals and citizens who are productive, creative, innovative, effective, and able to contribute to the life of their society, nation, state, and civilisation".[53] The 2013 curriculum was developed with a clear aim of improving students' mindset, students-centred learning, "interactive learning, network learning, active-seeking learning, individual and group learning patterns, [and] multidisciplinary learning patterns, and strengthening critical learning patterns".[54] Additionally, in recent years, Indonesia has experienced a fast increase in the interest in STEM subjects in schools.[55] At

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48. Chen, Danying Janny, Anne Namatsi Lutomia, and Van Thi Hong Pham. 2021. STEM Education and STEM-Focused Career Development in Vietnam. In: Human Resource Development in Vietnam: Research and Practice, edited by Hien Thi Tran, Tam To Phuong, Huyen Thi Minh Van, Gary N. McLean, and Mark A. Ashwill, 173-198. Cham: Springer International Publishing. (https://doi.org/10.1007/978-3-030-51533-1_7).

49. Loan, Ta Thi Thanh. 2019. STEM Education in Taiwan - Lessons Learner for Vietnam. European Journal of Research and Reflection in Educational Sciences 7.

50. Loan, Ta Thi Thanh. 2019. European Journal of Research and Reflection in Educational Sciences 7.

51. Loan, Ta Thi Thanh. 2019. European Journal of Research and Reflection in Educational Sciences 7.

52. SAMEO. 2020. Seadstem: Southeast Asian Digital STEM Platform.

53. Sulaeman, Nurul, Shelly Efwinda, and Pramudya Dwi Aristya Putra. 2022. Teacher readiness in STEM education: Voices of Indonesian Physics teachers. Journal of Technology and Science Education 12. (https://doi.org/0.3926/jotse.1191).

54. Sulaeman, Nurul, Efwinda, Shelly and Putra, Pramudya Dwi Aristya. 2022. Journal of Technology and Science Education 12. (https://doi.org/0.3926/jotse.1191).

55. Nugroho, Oktian Fajar, Anna Permanasari, Harry Firman, and Riandi Riandi. 2021. The Urgency of STEM Education in Indonesia. Jurnal Penelitian Dan Pembelajaran IPA 7. (https://doi.org/10.30870/jppi.v7i2.5979).

the university level, universities that among others have focused on researching and developing STEM education are Universitas Pendidikan Indonesia, Syiah Kuala University, and Yogyakarta State University.[56] Specifically, Syiah Kuala University has built, in collaboration with an university in Malaysia, a STEM Center, while Universitas Pendidikan Indonesia is collaborating with the Indonesian government through P4TK (Pusat Pengembangan Pemberdayaan Pendidik dan Tenaga Kependidikan) and with SAMEO as a partner.[57] In the literature, there are a few research works on STEM implementation in the Indonesian context,[58] focusing on fostering students' creativity, critical thinking, causal reasoning, and engineering and technology literacy.[59] Finally, an interesting project was initiated in Indonesia to connect STEM education with the well-known issue of national disasters involving the country: STEM-D (STEM and disaster). STEM-D has been promoted as a strategy aiming to enable the integration of STEM with disaster-prevention education.[60] Through STEM-D, Indonesian students could be exposed to learning STEM-related experiences, while being prepared for natural disasters. Yet, research works have pointed out that at this stage, Indonesian science teachers have a very good level of attitude, a moderate level in application, and a poor level of knowledge regarding STEM education.[61]

Regarding the Philippines, STEM education has been a topic of interest for several years already. To illustrate this, in the past few years the Department of Education (DepEd) has already included STEM as one of the tracks of the senior high school curricula, preparing learners to take a higher education degree in any STEM-

56. Nugroho, Oktian Fajar, Anna Permanasari. Permanasari, and Harry Firman. 2019. The Movement of STEM Education in Indonesia: Science Teachers' Perspectives. Jurnal Pendidikan IPA Indonesia 8. (https://doi.org/10.15294/jpii.v8i3.19252).

57. Nugroho, Oktian Fajar, Permanasari, Anna Permanasari. and Firman, Harry. 2019. Jurnal Pendidikan IPA Indonesia 8. (https://doi.org/10.15294/jpii.v8i3.19252).

58. Permanasari, Anna. 2016. STEM Education: Inovasi dalam Pembelajaran Sains. In: Seminar Nasional Pendidikan Sains VI 2016. Sebelas Maret University. (https://www.neliti.com/publications/173124/).

59. Nugroho, Oktian Fajar, Permanasari, Anna Permanasari, and Firman, Harry. 2019. Jurnal Pendidikan IPA Indonesia 8. (https://doi.org/10.15294/jpii.v8i3.19252).

60. Sampurno, Pandu J., Yessi A. Sari, and Agusta D. Wijaya. 2015. Integrating STEM (Science, Technology, Engineering, Mathematics) and Disaster (STEM-D) Education for Building Students' Disaster Literacy. International Journal of Learning and Teaching 1. (https://doi.org/10.18178/ijlt.1.1.73-76).

61. Wahono, Bevo, and Chun-Yen Chang. 2019. Assessing Teacher's Attitude, Knowledge, and Application (AKA) on STEM: An Effort to Foster the Sustainable Development of STEM Education. Sustainability 11. (https://www.mdpi.com/2071-1050/11/4/950).

related discipline.[62] In 2019, the Center for Integrated STEM Education (CISTEM) was established by Unilab Foundation's STEM+PH in partnership with the University of the Philippines College of Education.[63] The goal of this project is to strengthen integrated STEM education "through capacity building for teachers and educational institutions, curricular innovations, maximised network linkages, and learner empowerment".[64] Additionally, in 2019, the Department of Science and Technology (DOST) Secretary, Fortunato de la Peña, and the US Ambassador to the Philippines, Sung Kim, signed an agreement on scientific and technological cooperation.[65] This agreement has been covering areas of collaboration in multiple domains, such as STEM education, marine and environmental sciences, climate change, and renewable energy.[66] This agreement proposed three main pillars, namely (1) remote scientific collaboration, (2) building relationships between their respective scientific institutions and communities, and (3) providing opportunities for capacity building and exchange of ideas.[67] It is also interesting to notice how in the Philippines context, there exists a clear interest specifically on STEAM (Science, Technology, Engineering, Arts, and Mathematics). In fact, already in 2015, the Commission on Higher Education (CHED) had initiated a strong meta-discipline revolving around STEM with the goal of strengthening the relationship of STEM with the agri-fisheries and arts fields, consequently establishing the STEAM meta-discipline in the Philippine context. Yet, similar to the Malaysian context, despite the efforts of the Filipino government, only 38.5 per cent out of the three and a half million collegiate enrolment in 2019 chose disciplines under STEAM, with a completion rate inferior to 22 per cent.[68]

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62. Sarmiento, Celina P., Marie Paz E. Morales, Levi E. Elipane, and Brando C. Palomar. 2020. Assessment practices in Philippine higher STEAM education. Journal of University Teaching & Learning Practice 17. (https://doi.org/10.53761/1.17.5.18).

63. Paderna, Edwehna Elinore S., and Sheryl Lyn C. Monterola. 2021. Advancing integrated STEM education in the Philippines through STEM curriculum implementation. In: STEM Education from Asia, edited by Tang Wee Teo, Aik-Ling Tan, and Paul Teng, Routledge.

64. Paderna, Edwehna Elinore S. and Monterola, Sheryl Lyn C. 2021. STEM Education from Asia.

65. Umali, Teresa. 3 August 2019. The Philippines and U.S. sign agreement on STEM education. OpenGov Asia. (https://opengovasia.com/the-philippines-and-u-s-sign-agreement-on-stem-education/).

66. Umali, Teresa. 3 August 2019. OpenGov Asia.

67. Umali, Teresa. 3 August 2019. OpenGov Asia.

68. Sarmiento, Celina P., Morales, Marie Paz E., Elipane, Levi E. and Palomar, Brando C. 2020. Journal of University Teaching & Learning Practice 17. (https://doi.org/10.53761/1.17.5.18).

In general, it can be said that research on STEM in the Southeast Asian context is not yet uniformly flourishing across the region, and there is a clear gap in STEM research in the whole Asian context.[69] Several of the regional governments have shown curiosity first, and commitment later, in enhancing STEM education, with mixed results. Furthermore, in addition to STEM, another educational discipline is also recently gaining momentum: STEAM. But what exactly is STEAM? And more importantly, what is the difference between STEM and STEAM?

STEAM, NOT ONLY STEM

In recent years, in many educational ecosystems, a new acronym has started to emerge and is partially replacing the well-known STEM: STEAM. STEAM is an acronym that stands for Science, Technology, Engineering, Arts, and Mathematics. STEAM can be defined as "an educational discipline that aims to spark an interest and lifelong love of the arts and sciences in children from an early age",[70] aiming to prepare students to become innovators in a fast-paced changing world. The modern world requires citizens capable of mastering content across fields and disciplines while using these skills to solve ill-defined problems, typical characteristics of real-world problems, through the use of reasoning, interpretation, assumption, strategy creation, and solutions verification.[71]

Historically, STEAM emerged from STEM, with the addition of the "A" component in the acronym, standing for arts. The aim is to fuse arts, sciences, mathematics, and humanities domains through real-world modern curricula that enhance learning potentials, creative possibilities, and adaptive growth mindsets in learners.[72] This process allows the interconnecting of modelling techniques and scientific/mathematical thinking.[73] The person credited for adding arts into STEM

69. Lee, Min-Hsien, Ching Sing Chai, and Huang-Yao Hong. 2019. STEM Education in Asia Pacific: Challenges and Development. The Asia-Pacific Education Researcher 28. (https://doi.org/10.1007/s40299-018-0424-z).

70. Lathan, Joseph. 2015. Why STEAM Is so Important to 21st Century Education. (https://onlinedegrees.sandiego.edu/steam-education-in-schools/).

71. OECD. 2019. PISA 2018 Results (Volume I): What Students Know and Can Do. The OECD's Programme for International Student Assessment's (PISA) periodic testing program on student performance. (https://www.oecd-ilibrary.org/education/pisa-2018-results-volume-i_5f07c754-en).

72. Harris, Anne, and Leon R. de Bruin. 2018. Secondary school creativity, teacher practice and STEAM education: An international study. Journal of Educational Change 19. (https://doi.org/10.1007/s10833-017-9311-2).

73. Lathan, Joseph. 2015.

to generate STEAM is Georgette Yakman, an engineering and technology teacher who is considered the founding researcher of the STEAM educational framework.[74] Officially, STEAM emerged as a new pedagogy in 2007 during the Americans for the Arts-National Policy Roundtable.[75] However, the use of STEAM compared to STEM was not about just adding something new (arts) to STEM, but is more about the convergence of arts and design thinking into STEM, in an intertwining process between the "who and why" and the "what and how".[76]

Thus, what is the difference between STEM and STEAM? In comparison to STEM education, STEAM introduces the arts component, fostering the creation of more opportunities for realistic transdisciplinary learning experiences, thanks to the arts and humanity component that enables creativity in the learning process.[77] This combination of arts and STEM can produce powerful and authentic learning opportunities,[78] while fostering creativity in many aspects.[79] Specifically, creative thought processes, creative problem-solving skills, creative thinking, creative learning, and creative skills are all natural components that result from the merging process between STEM and the arts.[80] Besides creativity, collaboration is another domain that has been highlighted as benefiting from this interconnection between the arts and the STEM domain. In fact, an important component of STEAM is collaboration, which encourages and fosters creativity and innovation for learners and educators.[81] Additionally, the integration of the arts in science teaching and learning enables learning experiences characterised by opportunities for learning that are unlikely to happen in traditional knowledge-transmission science lessons.

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74. Lee, Min-Hsien, Chai, Ching Sing and Hong, Huang-Yao. 2019. The Asia-Pacific Education Researcher 28. (https://doi.org/10.1007/s40299-018-0424-z).

75. Perignat, Elaine, and Jen Katz-Buonincontro. 2019. STEAM in practice and research: An integrative literature review. Thinking Skills and Creativity 31. (https://doi.org/https://doi.org/10.1016/j.tsc.2018.10.002).

76. Lathan, Joseph. 2015.

77. Herro, Danielle, and Cassie Quigley. 2017. Exploring teachers' perceptions of STEAM teaching through professional development: implications for teacher educators. Professional Development in Education 43. (https://doi.org/10.1080/19415257.2016.1205507).

78. Herro, Danielle, and Cassie Quigley. 2017. Exploring teachers' perceptions of STEAM teaching through professional development: implications for teacher educators. Professional Development in Education 43. (https://doi.org/10.1080/19415257.2016.1205507).

79. Harris, Anne and de Bruin, Leon R. 2018. Journal of Educational Change 19. (https://doi.org/10.1007/s10833-017-9311-2).

80. Harris, Anne and de Bruin, Leon R. 2018. Journal of Educational Change 19. (https://doi.org/10.1007/s10833-017-9311-2).

81. Hunter-Doniger, Tracey. 2018. Art Infusion: Ideal Conditions for STEAM. Art Education 71. (https://doi.org/10.1080/00043125.2018.1414534).

CHALLENGES AHEAD

Yet for the model of STEAM education to be successful, it must be embedded in a school that not only acknowledges the rigour in the arts but also encourages creativity and innovation.[82] Collaboration is key because it allows for everyone involved to share ideas and experiences relevant to art infusion, resulting in enhanced lessons and shared knowledge.[83] Effective implementation of STEM or STEAM education is a challenge, mostly when considering developing or less-developed ecosystems. Specifically, one of the common issues that emerge from many research works is teacher preparation and professional development, starting with a shift in teaching approaches. Changes in teaching approaches are often initiated outside the classroom, resulting from research, policy debates, and administrative support within schools and districts.[84] In fact, it is not only about skills, but also beliefs and attitudes. Specifically, "beliefs about the strength of their own knowledge base and resources can aid or impede their ability to plan and execute complex lessons", and negative attitudes toward STEM education due to a lack of knowledge about STEM fields have already been identified in preschool teachers.[85] Thus, a specific campaign for helping teachers understand first, and preparing and supporting them later, is advised.[86] Furthermore, designing and implementing effective STEAM-based learning experiences in regular curricula activities represent a further challenge, mostly in specific contexts, and many barriers need to be addressed. For instance, environmental factors, school-level factors, and student-level factors have all been identified as factors to be defined and addressed for effective STEAM integration in curricula.[87]

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82. Hunter-Doniger, Tracey. 2018. Art Education 71. (https://doi.org/10.1080/00043125.2018.1414534).

83. Hunter-Doniger, Tracey. 2018. Art Education 71. (https://doi.org/10.1080/00043125.2018.1414534).

84. Jamil, Faiza M., Sandra M. Linder, and Dolores A. Stegelin. 2018. Early Childhood Teacher Beliefs About STEAM Education After a Professional Development Conference. Early Childhood Education Journal 46. (https://doi.org/10.1007/s10643-017-0875-5).

85. Jamil, Faiza M., Linder, Sandra M. and Stegelin, Dolores A. 2018. Early Childhood Education Journal 46. (https://doi.org/10.1007/s10643-017-0875-5).

86. Yıldırım, Bekir. 2021. Preschool STEM Activities: Preschool Teachers' Preparation and Views. Early Childhood Education Journal 49. (https://doi.org/10.1007/s10643-020-01056-2).

87. Kayan-Fadlelmula, Fatma, Abdellatif Sellami, Nada Abdelkader, and Salman Umer. 2022. A systematic review of STEM education research in the GCC countries: trends, gaps and barriers. International Journal of STEM Education 9. (https://doi.org/10.1186/s40594-021-00319-7).

Furthermore, when thinking about STEAM, the design of learning activities may present even further challenges. In fact, in practice, until now, the field of education has struggled to realistically blend all the disciplines into a STEAM approach,[88] nurturing the very transdisciplinary aspect of STEAM education. Additionally, when aiming for STEAM education, an impediment to it has been found across countries in the rapid and aggressive move toward more standardised testing, a process that may hinder creative collaboration, creative thinking, and in general, creativity.[89] Another impediment was identified in school curriculum restrictions, which have been described as undermining elements to effective creative practice, and interaction between educators and pupils.[90]

Thus, considering the difficulties of effective STEM and STEAM education, what guidelines should educators follow to foster it in schools, particularly when financial affordances or human resources are not available?

PBL IS A GOOD FIRST STEP

In the first instance, it is essential to remark on the concept of interdisciplinarity as a core component of STEAM. Transdisciplinarity can be defined as "going beyond the disciplines to create new knowledge or ideas".[91] Fostering connections with the community to identify real issues so that student learning experiences can be situated in meaningful contexts has been suggested to learning designers interested in implementing STEAM activities in their curricula.[92] In fact, what makes transdisciplinarity important for problem-solving is that it specifically focuses on the content of one discipline while using contexts from different ones to make the content more

88. Jolly, Anna. 2016. STEM by Design: Strategies and Activities for Grades 4–8. New York: Routledge. (https://doi.org/10.4324/9781315679976).

89. Harris, Anne and de Bruin, Leon R. 2018. Journal of Educational Change 19. (https://doi.org/10.1007/s10833-017-9311-2).

90. Harris, Anne and de Bruin, Leon R. 2018. Journal of Educational Change 19. (https://doi.org/10.1007/s10833-017-9311-2).

91. Bush, Sarah B., and Kristin L. Cook. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. In: STEAM Education: Theory and Practice, edited by Myint Swe Khine and Areepattamannil Shaljan, 19-35. Cham: Springer International Publishing. (https://doi.org/10.1007/978-3-030-04003-1_2).

92. Bush, Sarah B. and Cook, Kristin L. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. (https://doi.org/10.1007/978-3-030-04003-1_2).

relevant and inclusive.[93] This process of designing learning experiences capable of reflecting real-life challenges and situations, which are rarely confined to the artificial boundaries of a specific academic discipline,[94] needs to be fostered in the skillsets of teachers and educators, once again highlighting the fundamental aspect of professional development for teachers,[95] something that represents a real challenge for STEAM applications, mostly in developing countries.[96]

Additionally, teachers cannot be left alone in the process. Several studies pointed out that educators need several implementations and a feedback loop in order to move towards a more integrated approach in STEAM integration.[97] The boundary-crossing nature of STEAM education, when promoted by teachers, showed itself to be able to enhance students' learning and their ability to change perspectives, synthesise knowledge of different disciplines and cope with complexity,[98] through incorporating content areas by merging different subjects and exposing students to authentic scenarios with wicked challenges.[99] The arts elements included in STEAM allow it to offer students a real natural platform for transdisciplinary inquiry.[100] But the process may represent a challenge to teachers. Yet, an identified possible solution has been presented with the adoption of Project-Based Learning (PBL).

93. Quigley, Cassie F., Dani Herro, and Abigail Baker. Moving Toward Transdisciplinary Instruction: A Longitudinal Examination of STEAM Teaching Practices. In: STEAM Education: Theory and Practice, edited by Myint Swe Khine and Shaljan Areepattamannil, 143-164. (https://doi.org/10.1007/978-3-030-04003-1_8).

94. Quigley, Cassie F., and Dani Herro. 2016. "Finding the Joy in the Unknown": Implementation of STEAM Teaching Practices in Middle School Science and Math Classrooms. Journal of Science Education and Technology 25. (https://doi.org/10.1007/s10956-016-9602-z).

95. Corrado, Riccardo, Patchanee Tungjan, and Meta Soy. 2021. Professoriate's Motivation in Cambodian Higher Education. The International Journal of Educational Organization and Leadership 28. (https://doi.org/10.18848/2329-1656/CGP/v28i02/59-74).

96. Geum, Young-Choong, and Seon-A Bae. 2012. The Recognition and Needs of Elementary School Teachers about STEAM Education. Korean Institute of Industrial Educations 37. (https://www.koreascience.or.kr/article/JAKO201232642192126.page).

97. Al Salami, Mubarak K., Carole J. Makela, and Michael A. de Miranda. 2017. Assessing changes in teachers' attitudes toward interdisciplinary STEM teaching. International Journal of Technology and Design Education 27. (https://doi.org/10.1007/s10798-015-9341-0).

98. Spelt, Elisabeth J. H., Harm J. A. Biemans, Hilde Tobi, Pieternel A. Luning, and Martin Mulder. 2009. Teaching and Learning in Interdisciplinary Higher Education: A Systematic Review. Educational Psychology Review 21. (https://doi.org/10.1007/s10648-009-9113-z).

99. Quigley, Cassie F. and Herro, Dani. 2016. Journal of Science Education and Technology 25. (https://doi.org/10.1007/s10956-016-9602-z).

100. Quigley, Cassie F. and Herro, Dani. 2016. Journal of Science Education and Technology 25. (https://doi.org/10.1007/s10956-016-9602-z).

PBL, in fact, perfectly aligns with the exploratory nature of STEAM education.[101] Explorations in STEAM PBL take time and require students to synthesise ideas and work collaboratively to solve real-world problems,[102] opening the space for collaboration also outside the classroom ecosystem, and exposing learners also to international peers.[103] Additionally, PBL also exposes students to challenges where solutions may easily fail, thus exposing them to real scenarios where failing is part of the learning path.[104] With constructivism-based teaching-learning approaches, research works have pointed out that educators who adopted this approach have later perceived their students' learning as being more enjoyable, with the learners expressing more excitement, curiosity, and motivation, compared with participating in an old-fashioned curriculum based on instructional lessons.[105] Furthermore, additional suggestions have been offered in: (1) combining STEAM teaching with the 6E learning model,[106] and with the PBL approach, (2) involving the local culture in STEAM lessons, and (3) including a substantial component of time toward application (hands-on activities), with a specific suggestion of two hours spread over two or more class periods.[107] Another suggestion for teachers is to seek support from experts outside of their content area.[108]

Furthermore, other suggestions have been identified in: (1) providing practical, on-the-go resources to help busy teachers get started in creating purpose-driven STEAM instruction; (2) allowing educators to interact deeply with the content and

101. Bush, Sarah B. and Cook, Kristin L. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. (https://doi.org/10.1007/978-3-030-04003-1_2).

102. Bush, Sarah B. and Cook, Kristin L. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. (https://doi.org/10.1007/978-3-030-04003-1_2).

103. Chen, Juebei, Anette Kolmos, and Xiangyun Du. 2021. Forms of implementation and challenges of PBL in engineering education: a review of literature. European Journal of Engineering Education 46. (https://doi.org/10.1080/03043797.2020.1718615).

104. Bush, Sarah B. and Cook, Kristin L. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. (https://doi.org/10.1007/978-3-030-04003-1_2).

105. Amo, Daniel, Paul Fox, David Fonseca, and Cesar Poyatos. 2020. Systematic Review on Which Analytics and Learning Methodologies Are Applied in Primary and Secondary Education in the Learning of Robotics Sensors. Sensors (Basel) 21. (https://doi.org/10.3390/s21010153).

106. Lin, Kuen-Yi, Hsien-Sheng Hsiao, P. John Williams, and Yu-Han Chen. 2020. Effects of 6E-oriented STEM practical activities in cultivating middle school students' attitudes toward technology and technological inquiry ability. Research in Science & Technological Education 38. (https://doi.org/10.1080/02635143.2018.1561432).

107. Wahono, Bevo, Lin, Pei-Ling and Chang, Chun-Yen. 2020. International Journal of STEM Education 7. (https://doi.org/10.1186/s40594-020-00236-1).

108. Quigley, Cassie F. and Herro, Dani. 2016. Journal of Science Education and Technology 25. (https://doi.org/10.1007/s10956-016-9602-z).

create equitable STEAM experiences that blend community and societal interests; and (3) including online companion printable resources to help educators jump-start or deepen STEAM learning throughout a school or district, supporting STEAM professional development.[109]

Finally, as a final suggestion, each country should consider the creation of a national framework to guide schools, following specific phases, in the adoption of STEAM PBL in the curricula,[110] accompanied by a monitoring and evaluation framework. Schools left alone will simply not focus on STEAM or implement it in a non-homogeneous manner, with ineffective and un-monitored approaches. A common regional framework, with national frameworks customised to each ecosystem, could support and guide the steady and effective implementation of STEAM-based learning experiences across each country, without benefiting only elite schools, and thus aggravating the already existent educational gap across countries.

CONCLUSIONS

In the past 15 years, STEM education has gained momentum across many regions of the world, transitioning in the recent years to a more holistic transdisciplinary version, named STEAM, integrating the arts in the STEM paradigm. STEM was born with the idea to prepare learners for a fast-paced changing world, hungry for skilled professionals able to answer to the growing number of companies operating across sectors, and with a specific focus on innovation. Focusing on the Southeast Asian region, the ecosystem there is presenting itself as a non-homogeneous one, with some countries like Malaysia, Thailand, Singapore, and the Philippines having already committed to enhancing STEM education, by running projects, implementing collaboration projects between the private and public sectors, and by developing schools, mainly private ones offering STEM and sometimes also STEAM programmes. On the other hand, there are other countries just now starting, like Cambodia, and other realities still behind.

STEAM, bred from the combination of arts and STEM, can produce powerful and authentic learning opportunities while fostering creativity and collaboration, all essential elements to have in the skillsets of future professionals. Effective implementation of STEAM education is not an easy process, particularly in developing

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109. Bush, Sarah B. and Cook, Kristin L. 2019. Structuring STEAM Inquiries: Lessons Learned from Practice. (https://doi.org/10.1007/978-3-030-04003-1_2).

110. Amo, Daniel, Fox, Paul, Fonseca, David and Poyatos, Cesar. 2020. Sensors (Basel) 21. (https://doi.org/10.3390/s21010153).

countries. A good starting point is represented by a campaign to shift the mindset of teachers from a negative view on STEM topics, and professionally developing their skillsets to enhance their ability to create learning design activities capable of fostering collaborations among students, while supporting and unleashing creative problem-solving skills, and while being exposed to interdisciplinary learning activities. Additionally, PBL represents a possible effective approach aligned to the nature of STEAM-based learning experiences, opening the doors to experiences crossing the boundaries of the classroom. Finally, an important step to take is represented by the creation of regional and national frameworks capable of offering guidelines to schools and educators, thus guiding them in the journey for a step-by-step implementation of STEAM activities in the national curriculum across each country.

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COVID-19 and Its Impact on South Asia's Education Systems: Learning from the Crisis

Aashiyana Adhikari

1. INTRODUCTION

The South Asian region, which includes Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, is home to almost 25 per cent of the world's population. 1.8 billion of its population are below the age of 24, making it one of the youngest regions in the world. Despite the region's expanding economic relevance, its need for effective higher education systems still needs to be addressed. The Global North consistently ranks first for the majority of educational indicators according to the normative framework of measurement; South Asia and sub-Saharan Africa, on the other hand, are always attempting to catch up.[1] And with the onset of the COVID-19 pandemic, global educations system went through unprecedented disruptions. According to UNESCO, school closures arising from the COVID-19 pandemic had an impact on 87 per cent of the world's student population. Over 1.5 billion students in 195 countries were impacted by COVID-19-related school closures, according to UNESCO.[2]

As governments restrained their economies to slow the spread of infections, the economic shock was felt initially in many developing nations. As a result, South Asian developing countries experienced their sharpest economic collapse in many decades and the closures of their educational institutions.[3] This article will provide

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1. Sarangapani, Padma, and Rekha Pappu. 2021. Education systems in South Asia: An introduction. Handbook of Education Systems in South Asia 1–26. (https://doi.org/10.1007/978-981-13-3309-5_77-1).

2. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Sub-regional report. (https://www.unicef.org/rosa/media/16451/file/Situation%20Analysis%20Report%20-%20South%20Asia.pdf).

3. Haleem, Abid, and Mohd Javaid. 2020. Effects of COVID-19 Pandemic in Daily Life. Current Medicine Research and Practice 78-79. (https://doi.org/10.1016/j.cmrp.2020.03.011).

insights into the state of South Asian educational systems following the COVID-19 pandemic. It will also critically examine the steps taken by governmental agencies, civil society organisations, and individuals to lessen the negative effects on the younger generation. Based on this analysis, some recommendations for dealing with future crises in the education sector will be established. The South Asian educational sector was not without challenges even before the pandemic; it was just that policymakers were not paying close attention to them. This article will solely examine the changes to the formal South Asian education systems following the COVID-19 epidemic due to the diversity of educational systems in the South Asian region.

2. SOUTH ASIA'S EDUCATIONAL SCENARIO BEFORE COVID-19

Only around half of primary-school-aged South Asian children received education that meets minimum learning levels, according to data from UNICEF from May 2018.[4] As per the report in 2018 by *World Development*, India was first on the list of nations in which a grade two student could not execute two-digit subtraction and second on the list of nations in which a grade two student could not read a single word of a short text. According to a World Bank Policy Research Working Paper from 2006, fewer than 20 per cent of Pakistani youngsters were able to understand a straightforward paragraph, with the majority of them being unable to read.[5]

Despite the fact that these statistics provide a preliminary snapshot of the level of education in these nations, a closer examination of the educational priorities of South Asian governments reveals that "learning outcomes" are given only a passing mention. The majority of governments place a higher priority on access, enrolment, and completion rates. Learning outcomes are not being sufficiently measured. Only one out of every twelve performance indicators set by the government in Bangladesh, for instance, is focused on learning. The evaluation of the Education For All initiative in Nepal found that there were no systems in place to keep track of classroom conditions and student learning growth. Learning is not prioritised in

4. UNICEF. 7 May 2018. South Asia leaders meet in Nepal to radically improve education in the region. (https://www.unicef.org/rosa/press-releases/south-asia-leaders-meet-nepal-radically-improve-education-region).

5. Patel, Dipa. 12 September 2018. Combating the learning crisis in South Asia. LSE. (https://blogs.lse.ac.uk/internationaldevelopment/2018/09/12/combating-the-learning-crisis-in-south-asia/)..

plans and strategies to improve education in South Asia. The rising budget share of education in nations such as Pakistan and Nepal, along with a continuing lack of learning quality, attests to the neglect of the "learning" part of education. Despite recurrent warnings from the Annual Status of Education Reports about low learning levels, India has made little progress in changing the status quo.

A World Bank report[6] noted that numerous governments in South Asia (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka) had made significant investments in education to meet the Millennium Development Goal of providing universal primary education for all children by 2015. From 2000 to 2010, this investment caused the net enrolment rate in South Asia's primary schools to rise from 75 per cent to 89 per cent. But access to education varies significantly between South Asian nations as well as between various socio-economic and demographic categories within each nation. With nearly all children receiving primary education, Sri Lanka stands out as a glaring anomaly. Pakistan and Afghanistan continue to lag well behind other South Asian nations. As a result, even before the COVID-19 pandemic, Afghanistan, Sri Lanka, and Bhutan, among other nations in the region, reported poor levels of education, despite a relative growth in literacy rates.

3. IMPACT OF COVID-19 ON EDUCATION IN SOUTH ASIA

The aforementioned section highlighted that there were issues with the education systems in the region even before COVID-19. For instance, even when there are fewer children who are not in school and there are more girls enrolled, there are still many children, particularly young children, children with disabilities, and members of poor groups, who are not receiving a proper education. This was further exacerbated by the COVID-19 pandemic and the accompanying governmental measures since frequent absences from school significantly increased the dropout rates at all levels of schooling. Following the closure of schools due to COVID-19, every nation in the region quickly formed plans and took action to help children continue their education and to enable education to reach a large number of learners.

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6. Dudar, Halil, and Anil Deolalikar. 2014. Student Learning in South Asia: Challenges, Opportunities, and Policy Priorities. (10.1596/978-1-4648-0160-0).

Although there were prompt reactions by the respective governments, many children in the region nevertheless experienced significant learning loss.[7] The most vulnerable populations were determined to be girls and young children from underserved communities with little access to technology. There is also a huge gender digital divide, with females being far less likely to own or have access to digital devices, as well as having far fewer opportunities to gain computer literacy skills. This has limited their ability to obtain a high-quality education.

According to UNICEF, over half of pupils between the ages of 6 and 13 reported "not using any sort of remote learning during school closures" in India, where schools are still closed in some areas and only recently partially reopened in others.[8] One-fourth of the younger children in Pakistan were unable to use any equipment that supported remote learning. Only three out of ten Nepalese children, according to earlier UNICEF evaluations, have access to any type of equipment for remote learning. But it was found that access did not translate to usage, either because one device was shared by several members of the family, because textbooks suited for home study and other necessary materials were not provided, or because some communities were unaware of the options that were accessible.

4. COPING STRATEGIES BY GOVERNMENT INSTITUTIONS

Changing the way education systems work is a global priority, especially in South Asia, given the region's pre-COVID-19 literacy levels and the projected learning loss for many children as a result of the pandemic. Governments throughout the region used varied strategies to deal with the educational needs that arose as a result of the COVID-19 pandemic.

Afghanistan

During the COVID-19 pandemic in Afghanistan, the government's inability to offer appropriate and equitable access to learning opportunities was a significant obstacle to providing quality education. Many children lived in families with illiterate parents, and even more resided in homes without access to television, radio, or the

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7. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Sub-regional report. (https://www.unicef.org/rosa/media/16451/file/Situation%20Analysis%20Report%20-%20South%20Asia.pdf).

8. Ibid.

internet. Due to insufficient funds, the government was unable to print and deliver educational materials to all students. In addition, the government was unable to supply home learning packages to ungoverned regions of the country. The UNICEF office in Afghanistan received a Graduate Psychology Education (GPE) grant of $70,000 at the end of March 2020 to assist the Afghan Ministry of Education in developing a comprehensive COVID-19 response strategy to address the immediate, medium-term, and long-term effects of the pandemic on the education system.[9]

The Alternative Education Plan offered three learning options in an attempt to meet the home situations of students. The three channels were: a"Self-learning" via radio, literate parents, and mobile applications aimed at lower and upper secondary, as well as building up the capacity of teachers and principals; a"Distance learning" via television, literate parents, mullahs of mosques, upper secondary pupils, and mobile applications, interactive voice response (IVR)/phones, mobile applications, and the internet, aimed at primary Grades 1 to 3 students, and lower and upper secondary students; and "small learning groups" for youngsters in areas without internet, television, or radio and where parents could not support learning.[10]

In general, children's access to and involvement in learning during the school closures caused by COVID-19 were heavily influenced by where they lived and whether their families had access to resources, factors which were likely correlated with their socioeconomic level.

Bangladesh

In Bangladesh, the education ministries responded to the pandemic by launching an online teaching platform called the "teacher" portal, which had over 400,000 registered users, the majority of whom were school instructors[11] (ShikkhokBatayan 2020). This website provided digital content for the complete school curriculum

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9. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Afghanistan Case Study. (https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usmarcdef_0000379505&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_36463a20-d604-4f60-a9f5-a124d0e99db5%3F_%3D379505eng.pdf&updateUrl=updateUrl1979&ark=/ark:/48223/pf0000379505/PDF/379505eng.pdf.multi&fullScreen=true&locale=en#UNICEF_Afganistan_F5.indd%3A.20986%3A1580).

10. Ibid.

11. Ahmed, Neelofar, and Prerana Bhatnagar. 2020. COVID-19 and Unconventional Leadership Strategies to Support Student Learning in South Asia: Commentaries From Bangladesh, India and Pakistan. Journal of the Commonwealth Council for Educational Administration & Management.

(K-12).[12] Furthermore, the Government of Bangladesh (GOB) had a dedicated Parliament Television channel to broadcast classes offered by renowned instructors and experts in order to increase the reach of online instruction. This television channel does not require a cable TV connection and has a capacity for nationwide terrestrial transmission. Only parliamentary proceedings were previously televised using it. All of the classes that are broadcast on this TV channel were jointly created by the ministries of education and Bangladesh Open University.

Over the past few decades, Bangladesh has made great strides to raise school enrolment, reaching 98 per cent net enrolment in elementary schools[13]. Despite progress in expanding access to education, Bangladesh still faces difficulties in raising educational standards. The most important indicator of a school system's quality is whether or not its kids are mastering the fundamental subjects of math and reading. The reading trajectory of a student begins in the early primary grades, and according to available statistics in Bangladesh, the majority of early primary students have not mastered reading fluency and comprehension. The government's 2015 National Student Assessment found that less than one-quarter of fifth-graders could read at the required level and with Bangla knowledge.[14] A comparable situation involving arithmetic skills is indicative of low accomplishment.

Given these innate difficulties, it is impossible to predict how well children will be able to study and display their learning competencies. Furthermore, many children do not have access to television or YouTube videos, which are only accessible via internet-enabled cellphones. People with poor income status in Bangladesh are excluded from the online education facilities, even if there are no official figures available.

Bhutan

In accordance with the government's strategy for COVID-19 containment, all schools were closed as soon as the virus reached Bhutan. The national government has made considerable strides in ensuring that mobile and internet networks are accessible in all corners of the nation. The country's internet and broadband penetration was 75 per cent in 2017 (although subscribers only numbered 28,955 – less than 4

12. Ibid.

13. Directorate of Primary Education. 2020. Bangladesh Primary Education Annual Sector Performance Report 2019.

14. Directorate of Primary Education. 2016. The National Student Assessment 2015: Grades 3 and 5. Dhaka, Bangladesh.

per cent of the population). 92 per cent of people have access to a mobile device, and 532,089 people (about 69 per cent of the population) are 3G, Gg, and GPRS/EDGE customers. A fibre network covered 20 Dzongkhag in 2019.[15]

Despite this typically extensive coverage, only 60 per cent of homes have internet access. Forty-five per cent of rural families do not have access to television. The digital gap had a significant impact on kids who did not have access to Information and Communications Technology (ICT) or television because of an education strategy that highly emphasised using technology. Despite the growing rate of smartphone ownership, learning is best done on large-screen devices with strong functionality. In addition, there is no assurance that students will have frequent access to their phones. Many families could not afford modern technology, such as smartphones and computers, so as to be able to benefit from connectivity. Children in remote locations not only lacked access to technology, but also lacked parental support to use the self-educational tools effectively. Some students maintained touch with their teachers, but the decreased contact hours prevented them from receiving enough educational support.

The Bhutan Ministry of Health updates its daily-updated website with information about the pandemic so that the general public may keep track of the virus's status and the intensity of the response. These health messages are reinforced on the Bhutan Ministry of Education's website; the National Situation Update prepared by the Ministry of Health is presented on the Ministry of Education homepage along with a voice-over outlining how the virus can be spread by children on their way to and in school as well as the steps each child should take to minimise the spread.

Pakistan

Public, private, non-governmental organisation (NGO), and Madaris[16] schools all provide elementary and secondary education in Pakistan. In response to the COVID-19 pandemic and the implementation of lockdowns, the provincial ministries of education made the decision to close schools, taking into account the difficulties of social isolation and a lack of adequate hygienic support in the majority of

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15. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Bhutan Case Study. (https://unesdoc.unesco.org/in/documentViewer.xhtml?v=2.1.196&id=p::usmarcdef_0000379507&file=/in/rest/annotationSVC/DownloadWatermarkedAttachment/attach_import_6140d3b6-bf61-4ace-a052-ddda0cf0e5d4%3F_%3D379507eng.pdf&locale=en&multi=true&ark=/ark:/48223/pf0000379507/PDF/379507eng.pdf#UNICEF_Bhutan_F5.indd%3A.18297%3A1490).

16. Faith-based public and private schools operating with the aid of donations and the local community under the society act.

private and public schools. In order to provide online learning to children in grades 1 through 12, the Federal Ministry of Education launched a television channel called "TeleSchool" through the public broadcasting system on 1 April 2020[17]. While the situation continued to evolve, public schools remained closed until 15 September 2020; however, private schools finished the academic year using online and offline virtual education modules.

Despite the fact that public schools were still closed, the administration of each district's or province's ministry of education presented challenges to the school directors in terms of policy direction and technological assistance. For remote rural locations where instructors and pupils could not purchase technological devices due to their poor socioeconomic condition, this scenario was disturbing. The creation of TeleSchool offered a solution to the problems that were present. However, there were questions regarding whether it would further isolate disadvantaged groups through the inadvertent creation of a digital divide due to its limited visibility in remote places, the calibre of the courses, and the nature of non-reciprocal learning.

India

While India has achieved significant success in increasing gross primary school enrolment to 122,960,000 as of 2017[18], the National Sample Survey Office and other annual studies have found that 32 million Indian youngsters have never attended school.[19] Over 50 per cent of fifth-grade kids cannot read an introductory text or answer elementary arithmetic problems. With the burden of structural inequalities such as poverty, child labour, low-income status, scarcity of resources, educational inequality, and a widening rural-urban divide, the Indian government provided remote learning, subsidised internet connections, and cancelled end-of-year exams in some states.

The unexpected shutdown placed both private and government-run schools in an emergency remote teaching situation as pre-primary/nursery school admissions,

17. Ahmed, Neelofar, and Prerana Bhatnagar. 2020. COVID-19 and Unconventional Leadership Strategies to Support Student Learning in South Asia: Commentaries From Bangladesh, India and Pakistan. Journal of the Commonwealth Council for Educational Administration & Management.

18. UNESCO. 2020. Data for Sustainable Development Goals: India. (http://uis. unesco.org/ en/country/in).

19. Annual Status of Education Report. 2018. ASER centre. (https://img.asercentre.org/docs/ ASER%202018/Release%20Material/aserreport2018.pdf).

entrance examinations of various colleges, and competitive examinations were all held at the same time that the pandemic was spreading throughout India.[20] While the digital shift in teaching and learning has primarily benefited private schools, it has failed to permeate the grassroots level, causing low-income pupils to be excluded from the education system. As quarantine procedures became operational, state education ministries attempted to handle the crisis by developing efficient digital learning systems to assist students, teachers, and parents in maintaining educational continuity and navigating the hurdles presented by the epidemic.[21] In response to the dilemma, the Indian government and the Ministry of Human Resource Development embraced a multimodal strategy of innovative e-learning, online education, and distance-education solutions.

Similarly, numerous virtual learning aids were produced for higher education students, including a television-based education programme to reach a larger audience – the Swayam Prabha, a collection of 32 direct-to-home channels available to students across the nation.[22] Nonetheless, few private schools were able to successfully utilise online technologies, and school administrators struggled to integrate them in other school sectors. In these difficult times, the online shift in education created a digital divide that has disenfranchised underserved pupils even further.

Maldives

Initial attempts at providing continuity in education were impeded by the sudden closure of key TV production facilities and government offices when Malé went into lockdown due to the arrival of COVID-19 cases, despite the fact that remote learning had been planned and operationalised. Mobile networks and internet services reach every island in the Maldives, yet there were issues with technological infrastructure and internet access. A March 2020 survey conducted by the Ministry

20. Wadia, Leena. 2020. Online school education in India during and beyond the pandemic. Observer Research Foundation. (https://www.orfonline.org/expert-speak/online-school-education-india-during-beyond-pandemic-69317/).

21. Erpula, Suresh. 6 July 2020. Covid crisis has showcased the resilience and innovation of the education system. The Indian Express. (https://indianexpress.com/article/opinion/columns/indian-education-system-ekalavya-model-residential-schools-coronavirus-virtual-classes-6491697/).

22. World Bank. 2020. The COVID-19 Pandemic: Shocks to Education and Policy Responses. (https://www.worldbank.org/en/topic/education/publication/the-covid19-pandemic-shocks-to-education-and-policy-responses).

of Education revealed that 31 per cent of the prospective audience[23] for school education distance-learning programmes lacked internet or WiFi connection at home. In the absence of a home internet connection, data was particularly expensive when purchased as mobile data.

As a way forward, in May 2020, the Maldives created an Education Response Plan (ERP) for COVID-19. This document served as the foundation for formulating a comprehensive and budgeted response strategy, and it included a thorough analysis of the Maldives' historical context as well as the difficulties, financial ramifications, and effects of COVID-19 on the school education sector. The ERP took into account the probable effects of COVID-19 on the school education sector in its background and analytic parts.[24]

The COVID-19 ERP deemed the ICT master plan indispensable for the further growth of ICT use. A budget of $48,000 was granted to assist the initiative, and a unit would be created to enable its execution. Through Maldives Education Management Information System (MEMIS), data collection and distribution were improved. This involved optimising processes in schools and Ministry of Education units, guaranteeing data accuracy and verification, and disaggregating data in order to identify gender, special education needs (SEN), and disability status. The plan also entailed the establishment of a cost-effective and sustainable solution for the provision of virtual learning to enable the continuance of education throughout future emergencies and disasters.

Nepal

Similar to other low-income nations, Nepal has significant socioeconomic and educational/literacy inequalities among its population. With the advent of COVID-19, the digital divide and unequal access to e-learning and e-resources will exacerbate the inequities between privileged and underprivileged children, which have been largely attributed to the current education system and its uneven distribution of resources. Due to the closure of schools, the government had to determine how to ensure that students continued to receive their education. Accessibility and ability to provide regular (virtual) updates were two benefits of online education. To reach

23. Students, teachers and parents.

24. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Maldives Case Study. (https://www.unicef.org/rosa/media/16526/file/Maldives%20Case%20Study%20.pdf).

as many children as possible despite limited internet access, the administration was conscious of the necessity for alternative methods.

Based on the children's access to energy and connectivity, they devised a multi-pronged strategy with varied modalities for different age groups. Multiple local governments launched radio and television learning programmes and offered self-learning kits to persons without internet access. Using their knowledge of local obstacles, a number of municipalities have altered their strategies to meet specific needs. In response to the realisation that not enough radios were available to households, for instance, they provided self-learning packets to students[25]. However, there are still unique obstacles to reaching the most vulnerable and disadvantaged populations, and the local governments need greater assistance to execute inclusive activities for quality education.

Sri Lanka

Sri Lanka's reaction to the COVID-19 pandemic has been prompt, decisive, and organised, employing a whole-of-society strategy. This participative strategy entailed multisectoral ministerial coordination at all levels of government, with specific responsibilities to combat the epidemic. Strong direction was provided by the government, with assistance from the Ministry of Health, Indigenous Medical Services and the World Health Organisation. Sri Lanka's government took prompt steps to safeguard the safety of its population.

During the period of school closures in Sri Lanka, its Ministry of Education and provincial education departments (PDE) at the national and subnational levels have endeavoured to provide pupils with continuous education. The Ministry of Education, in collaboration with internet service providers, has activated its web-based learning platform E-thaksalawa and devoted two public television channels to instructional programming. Some private television stations also allotted one to three hours every day to run government-created instructional programming.[26]

In order to increase utilisation of E-thaksalawa and assure wider access, the government of Sri Lanka took steps to provide free access to the website via any

25. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Nepal Case Study. (https://www.unicef.org/rosa/media/16616/file/Nepal%20Case%20Study%20.pdf).

26. UNESCO. 2021. Situation Analysis on the Effects of and Responses to COVID-19 on the Education Sector in South Asia. Sri Lanka Case Study. (https://www.unicef.org/srilanka/media/2296/file/Situation%20Analysis%20on%20the%20effects%20of%20and%20Responses%20to%20COVID-19%20on%20the%20Education%20Sector%20in%20Asia.pdf).

telephone network. Given the fluid nature of preparation, the majority of teachers utilised mobile applications such as WhatsApp and Viber to maintain regular communication with their students, fellow teachers, and school administration. The education administration structure was not as adaptable as the teaching-learning side of the industry. The monitoring and school support operations failed to capture the impact of what was occurring in the education sector because they could not keep up with the rate of change.

5. MOVING TOWARDS SUSTAINABLE DEVELOPMENT GOAL 4: A UNIQUE OPPORTUNITY TO CHANGE

The case studies of South Asian countries shown in the preceding section demonstrate that local expertise and experience are crucial for reaching all children in the most effective manner, and that the finest solutions to providing continuity of education during the COVID-19 pandemic have occurred at the local level. This, along with the recognition that learning occurs outside of school, is fundamental to building a new system and has implications for ensuring that each country not only develops the appropriate framework policies (e.g., blended learning), but also delegates authority to districts and sub-districts to tailor their learning plans to the youngest and most marginalised children in their area.

By leveraging the benefits of technology through a hybrid approach, education may become more accessible and egalitarian, learner-centred, flexible, and of higher quality for students of all ages and geographic locations. This will feature a combination of face-to-face and distant-learning modalities that are suited to each learner's context and can be accessed online or through low-tech means. The implications of COVID-19 on how people live, study, and work have demonstrated that learning may take place at any time and in any location, and that physical schools are not the only places where learning occurs. This will aid the advancement towards Sustainable Development Goal 4, which seeks to "provide inclusive and equitable quality education and encourage opportunities for lifelong learning for everyone."

As technology makes it possible to provide all children with access to high-quality information through effective, interesting, and appealing online learning solutions, these may be utilised to align formal and non-formal education results and to cultivate technical and vocational competencies. When it comes to secondary school completion, post-secondary and higher education, and technical and vocation training, all of these can benefit greatly from online learning because of the convenience of online validation of learning or competences. Despite the fact

that COVID-19 has accelerated the transition timeline for many countries and made the need for change more apparent, it has also demonstrated the potential for change and proved that it is possible.

6. RECOMMENDATIONS

The COVID-19 pandemic has exposed system weaknesses, highlighted system strengths, and ironically provided a key moment in history to effect change. As digitalisation has increased throughout the region, one must not forget that children living under poverty were further marginalised by the pandemic. Digitalising education brings the region closer to SDG 4 by making education more inexpensive, accessible, and inclusive, but there are currently no concrete plans or programmes that incorporate children from marginalised populations. Here are some recommendations to increase regional education quality and sustainability.

1. The needs of disadvantaged and underprivileged children, such as those with disabilities, minority mother-tongues, and other minorities, are more complex than simple "national" remedies can meet. All children require more local contextualisation and capacity mobilisation to have adequate educational options. Teachers will need training on gender-responsive and inclusive methods to best serve all students. Teachers need improved training to recognise disabled youngsters. Formative assessment in the classroom allows for proper support of all students.

2. As indicated previously, many hard-to-reach children were further marginalised during the pandemic and will require additional, focused help to avoid falling farther behind their peers. To make targeted, costed investments and prioritise initiatives, continual, thorough monitoring is required to acquire real-time data. Specific community surveys and learning assessments will be required to inform planning. Attendance tracking will be essential and should feed into EMIS Early Warning Systems so that students who have dropped out or are at risk of dropping out can be identified and given the required support to prevent this from occurring. As nations consider adopting a blended learning strategy, monitoring should include information on school infrastructure, particularly the quality of electricity supply and internet connection and the availability of various types of technology.

3. Access to mental health and psychosocial care that is timely and effective is also essential for the development of resilient and healthy communities. Therefore, pandemic response plans should address the pathways for the

delivery of vital health and social services to pre-school, elementary, and secondary school children and adolescents, and ensure that these services are safeguarded. This involves the fulfilment of bodily, mental, and psychosocial requirements.

4. In response to COVID-19, there have been instances of international collaboration between government and non-government entities. The same level of collaboration is required to comprehensively assess, cost, and develop pandemic preparedness efforts that address the health, welfare, and nutrition needs of pre-school and school-aged children, in addition to their learning needs, in order to rebuild and safeguard their development.

5. Many children living under poverty or in marginalised communities were further marginalised by the pandemic and thus will require additional, focused support so that they do not fall further behind their classmates. Governments in the region must ensure that the poorest and most marginalised children are not disproportionately affected by the pandemic over the long term. In the near term, they must emphasise the provision of social protection measures to the most disadvantaged households. This will necessitate cross-sector cooperation between the health, education, and social welfare ministries. Priority should be given to children, particularly females and those with disabilities, who are at the greatest risk of dropping out of school in order to provide them with cash transfers and other forms of help.

7. CONCLUSION

South Asian countries were making progress toward the SDG education targets before the pandemic, but access and quality remained severe concerns and it is doubtful all countries will be able to attain SDG 4 by 2030. Since 2000, enrolment has risen, with more girls attending school and the dropout rate falling. Despite this progress, 31.8 million children, mostly of secondary-school age, are out of school. Current progress in enrolling out-of-school children is inadequate to fulfil the 2030 SDG objective for primary or lower secondary school. Only 69 per cent of young children in the region have access to pre-primary schooling. Pre-pandemic, 58 per cent of youngsters could not read an age-appropriate literature text by age ten. This is despite the fact that all Education Sector Plans and national education priorities contain a quality pillar that outlines how the nation should address low learning results.

When countries began responding to the threat of COVID-19 and went into lockdown, it was inevitable that the majority of learners would be impacted by the closure of schools, and that learning from home would be a difficult alternative for many students due to the digital divide, a lack of quiet spaces to study in, and external pressures on families that negatively impacted the amount of time learners were able to devote to studying. As a result of school closures and a lack of access to distant learning resources, countries' future cognitive capital were weakened. In a similar fashion, money planned for the education sector have been redirected to other areas, such as health, while support from other nations will be curtailed due to the strains on their own budgets. South Asia faces a double obstacle in generating the additional funds required to remedy the consequences of COVID-19 on education systems that were already off track with respect to meeting SDG 4 goals.

In general, nations responded swiftly to the pandemic by closing schools and finding distant learning alternatives. Nonetheless, this research found that there were significant disparities in the quality of education service, and that the absence of monitoring posed a difficulty for governments attempting to reach all children with the response and to determine participation and learning levels. Therefore, enhanced relationships with the NGO and commercial sectors, as well as cross-sectoral collaboration, are important for comprehensive provisions in the future.

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Whole School Approaches to Sustainability – Critical Case Studies from Europe

Arjen E. J. Wals and Rosalie G. Mathie

In Europe, at the moment many children are fearing a future marked by environmental catastrophes, such as mass extinction and runaway climate change, social ills, such as rising inequality and the risk of war. Some of these worries were expressed during the 2018 school strikes for the climate in Sweden, which spread shortly thereafter to other countries mobilising thousands of students. In the spring of 2019, according to the organisers, more than 1.4 million students worldwide took part in the demonstrations (Carrington, 2019). At the same time many parents also worry that their children's lives won't be as good as their own or, in communities already struggling, even worse than theirs.

In light of the present urgent global challenges, many schools in Europe are struggling to find an educational response. How can they become more relevant, responsive and responsible in times of systemic global dysfunction and provide more hopeful futures, and the competencies and qualities young people need, not just to survive but to thrive within planetary boundaries? Whilst this is a complex question without simple answers, this article outlines three approaches found in schools, which can be put on a continuum from light green to deep green responses. It then provides some critical case studies from different European-based schools that have committed to the deep-green side of the continuum. The article, based in part on an international critical case study report on Whole School Approaches to sustainability (Mathie and Wals, 2022), concludes with a synthesis and some reflections on the way forward.

ADD-ON, BUILD-IN OR WHOLE SYSTEM RE-DESIGN?

There are three main approaches to engaging with sustainability education: "add-on", "build-in", and "whole system redesign". Sterling (2004), who distinguished these three responses initially, also identified a fourth response, "denial", which

referred to schools that ignored the call for engaging with issues around sustainability for different reasons (e.g., not important, there are many other important issues, we are over-committed already, it's not part of the national curriculum, etc.). While the "denial" response was undoubtedly present, and perhaps even dominant, during the time Sterling wrote his important book, virtually all schools now realise that they must engage with sustainability issues in one way or another. We will briefly describe the first two responses and then zoom in on the third one, moving from the light green "add-on" to the deep green "whole system redesign". All these responses can be found in European schools now, where the first two seem to be dominant, the third response is still more at the margins.

Approach No. 1: Add to existing curricula

Educators and school districts worldwide are considering ways to incorporate the 17 sustainable development goals proposed by the United Nations (UN) in its 2030 Agenda for Sustainable Development. The UN Agenda includes social goals (no poverty; gender equality; zero hunger; good health and well-being; reduced inequality; and peace, justice and strong institutions); ecological goals (clean water and sanitation; climate action; life below water; and life on land); economic goals (decent work and economic growth; industry, innovation and infrastructure; and responsible consumption and production); goals requiring social, ecological and economic reforms (affordable and clean energy; and sustainable cities and communities); and mechanisms to achieve all these goals (quality education and partnerships for the goals).

Teaching students about the UN goals span multiple disciplines and requires social and emotional learning that encourages reflection on ethics and values. But previous studies on education innovations have demonstrated that we cannot keep adding to existing curricula. Schools cannot become the dumping grounds for solving all societal ills. Were we to add every topic covered by the UN goals, which are all equally important, the curriculum would overload teachers who are challenged enough covering conventional basic subjects. In the worst case the add-on approach can do more harm than good as interest groups compete for their pieces of the curriculum pie. As a result, topics may not be addressed in sufficient depth, and teaching materials developed by interest groups may lack educational quality. Many schools working in the "add-on" vein choose to do more ad-hoc projects on specific sustainability-related topics like climate change or health and well-being, as long as it does not distract too much from the regular curriculum, which is mainly seen as separate.

Examples include organising extra-curricular activities, forming school clubs with interested students, focusing on greening the school grounds or building, or doing a combination thereof.

Approach No. 2: Build-in

In this approach, educators, curriculum developers and textbook publishers are exploring ways to incorporate sustainability concepts into existing topics, thereby using sustainability-related topics as a rich context for teaching what they traditionally have been teaching. For example, chemistry students can learn the composition and toxicity of plastics and how they react with salt water, whereupon they become a plastic soup. Biology courses can teach how aquatic life and food chains are affected by toxic pollutants. Mathematics can be used to understand the exponential growth of plastic soup in the ocean, the exponential decay of biodiversity, or the way statistics are used in the latest Intergovernmental Panel on Climate Change (IPCC) report on climate change. Schools working in this mode look for opportunities to link sustainability issues with the curriculum and typically pay attention to the sustainability-related practices of the school itself, "walking the talk". In a way, they do what schools in Approach 1 do, but they do not see it as a distraction from what formally needs to be taught but rather as an opportunity to make education more relevant and responsive.

Approach No. 3: Whole system re-design

In this approach, there is a shared vision in the school community that today's world calls for a different way of teaching and learning altogether. The approach links with a Whole School Approach (WSA), which implies that a school's DNA needs to reflect and invite sustainability, good health and well-being, and democratic citizenship. The assumption is that this can only be realised in a meaningful way when all essential aspects of a school are in play (Figure 1):

- *School ethos, culture, leadership and governance* (including student voice and participation)

- *Curriculum* that is more localised and includes cross-cutting themes and interdisciplinary work

- *Pedagogy*, opening up new forms of learning (e.g., place-based learning, experiential learning, challenge-based learning, transformative learning)

- *Building and operations,* where the school becomes a living practice of sustainability, good health and well-being and democratic citizenship (e.g., where the

whole school community contemplates and implements sustainable forms of energy use, responsible and healthy food, green and playful school grounds, a repair café, etc, always seeking connections with the curriculum)

- *Professional development of staff*, not just the teachers and the management, but also others working in and around the school (e.g., the concierge, cleaners, maintenance workers, etc.)

- *Relationships with the wider community,* where the whole community becomes a living laboratory for meaningful learning and community engagement

Figure 1: Interrelated components of a Whole School Approach to sustainability.

Source: Mathie and Wals, 2022, pp. 6

A Whole School Approach is presently gaining attention, for instance, in the 2021 strategic document on Education for Sustainable Development (ESD) of the United Nations Economic Commission for Europe (UNECE, 2021), in UNESCO's

Berlin declaration ESD 2030 (UNESCO, 2021), and in the European Commission (EC) Council recommendation on learning for environmental sustainability (European Commission, 2022; Tilbury and Galvin, 2022). A WSA has become a key concept in international policy discourse around education and Sustainable Development (SD), and in some European countries is also gaining traction in national and regional educational policy frameworks (e.g., in Norway, The Netherlands and Germany). Many European schools seeking to take on a WSA are part of Foundation for Environmental Education's Eco-Schools programme (estimated about 35,000), but within the schools participating, there can be found different "shades of green" as well.

EUROPEAN SCHOOLS ENGAGING IN SUSTAINABILITY USING A WHOLE SCHOOL APPROACH

Here we will feature some of the critical case studies that are from European schools – a mix of primary, secondary and vocational schools – who are enacting a WSA in an attempt to develop an integrated approach to sustainability. The case studies are abbreviated from the more detailed case studies found in Mathie and Wals (2022). Through an international call for such examples – via international networks like Eco-Schools, United Nations Educational, Scientific and Cultural Organisation (UNESCO) and United Nations Economic Commission for Europe (UNECE), as well as social media (LinkedIn, Twitter and blogs) – potential cases were received which were then screened for suitability. The selection criteria focus was to identify a broad selection (both geographically and school types) of primary, secondary, or upper secondary schools (including vocational ones) that provided practical examples of how a WSA is being utilised in practice. Any type of primary or secondary school was considered if they provided current and practical examples of holistic and integrated approaches to sustainability-oriented education and were willing to be critically reflective.

Some of the schools are Eco-Schools and have benefitted from the guidance provided by the Foundation for Environmental Education (FEE) and the seven step model used by Eco-Schools (Figure 2), but some are not, which is to acknowledge that a school can also work towards becoming more sustainable and contributing to a more sustainable world without having to be an Eco-School.

Figure 2: Eco-Schools' Seven Step Model.

Source: https://eco-schools.nl/en/about-eco-schools/how-it-works

Figure 3: Graphic illustration of a Whole School Approach to Health, Sustainability and Global Citizenship.

Illustration by Nicolette Tauecchio (Nicniq)
Source: Mathie and Wals, 2022

It should be acknowledged that the cases presented here were made possible thanks to the help of a significant number of teachers, school leaders and sustainability coordinators.[1] The cases are "critical" in the sense that they are not just "feel good" celebratory case studies but explicitly include reflections on the challenges and barriers these schools encounter when trying to develop a more inclusive and integrated approach to sustainability. Here we will present snap-shots from Europe (for the full case studies, including those from other continents, see: www.wur.nl/wholeschoolapproach).

The cases featured here come from Cyprus, Norway, The Netherlands, Northern Ireland, Finland and England.

THE NETHERLANDS – GREEN VOCATIONAL SCHOOLS COMMITTED TO A WSA

(Overview is taken from a case study originally written with Sandra Menkhorst and Vivian Siebering, pp. 18-21.)

In the Netherlands, the development of ESD in primary and secondary education was initially informed by Environmental Education (EE). In the Dutch language, this is referred to as *Natuur-en-Milieueducatie*, or Nature and Environmental Education. Whereas EE was well understood in educational practices, ESD was not. EE organisations played a significant role in developing lesson plans, curricula, modules, projects, etc., covering SD-related topics to be added on or infused into the regular curriculum. During the early years of ESD development, more schools started paying attention to reducing their ecological footprint. In recent years, for reasons varying from increased societal concern around climate change, health and well-being to the desire to make education more relevant and responsive in light of the rapidly changing and confusing world, some schools have started to see SD and the SDGs as a trigger to rethink schooling, teaching and learning altogether.

Zone College, Doetinchem, located in a semi-rural area, is a public green vocational secondary school consisting of just over 1,000 students between the ages of 12 and 17 years. Students are mostly native Dutch with a non-immigrant background and tend to have an agricultural or rural background. In 2017, Zone College started the work to become an Eco-School through the Eco-Schools programme. The school developed its own "Green Profile" curriculum. During the first

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1. The names of these contributors can all be found in the full WSA case study report (Mathie and Wals, 2022), which is available via: (www.wur.nl/wholeschoolapproach).

two years, students participate in "Green World Orientation", a practice-oriented course focusing on cross-cutting green vocational themes: animals, nutrition, landscaping and creative vocations. In the final two years, the students can combine one of these themes of their own choosing with a sphere or world in which they want to explore the theme in more depth. These worlds are the living world, the active world, the healthy world, the creative world, and the green technology world.

Working with these four domains and five different worlds throughout the entire four-year programme assures students are actively engaged in hands-on sustainability-related issues every school week. Still, the curriculum greening could go deeper when playing by the rules of the Natural Step (https://thenaturalstep.org/), which inspire the staff at Zone College. One area of improvement is the purchasing of the materials students use for their creative design and construction work. Often these materials are bought at a local discount store without paying much attention to the ecological and social footprints of the materials.

Another example comes from the animal domain, where students learn about the well-being of domesticated rabbits and their natural behaviour. However, how the rabbits are housed at the school does not necessarily reflect what is taught. Often teachers want to do better but need time to investigate and resources to act accordingly. Both are often lacking. Another area of struggle or contention is how to navigate the tension between what society is increasingly demanding from farmers in terms of sustainability and animal well-being and how the parents of the students – many students grow up on a farm – manage the farm, which does not always correspond. Teachers are confronted with these tensions and emotions that intense discussions might evoke, and dealing with them in the classroom is challenging. On the other hand, the school does also try to walk the talk, for instance, in the energy domain, by creating a climate-neutral building with the support of Eco-Schools.

Key WSA Principles in action at *Doetinchem secondary school*

Vision, Ethos, Leadership & Coordination

The vision of our school is clear, visible in school and known by teachers. Sustainability is part of it

Zone college has 8 locations in a large area. Since a year, there is a sustainability coordinator who is developing now a vision and strategic goals for sustainability for the whole organisation of Zone college

Curriculum

We believe that sustainability is in the heart of our curriculum, but we want to improve it and develop circularity in our school through our curriculum. For example, by using the coffee grounds to grow oyster mushrooms, using the harvest of our kitchen gardens in the cooking lessons, selling the things we make, in other words: giving things another life by closing cycles

Pedagogy & Learning

Tailor-made hours (Maatwerkuren) and moments of interest (Interessemomenten) - give our students the opportunity to choose what they are interested in

Our MECA week is a good example, but we want to develop more of this kind

Head, heart & hands philosophy

Institutional Practices

We try to connect all technical installations to the curriculum and involve teachers to work with them

The design of the building invites sustainability

Capacity building

There is no separate programme, but the staff learns a lot by doing: by speaking with the companies that install the technical installations for example, by speaking with the sustainability coordinator, there are stimulated reading books and learn a lot by preparing projects like the *Make Earth Cool Again* week

Community Connections

Business collaborations with small- and medium enterprises traditionally already exist in green agricultural schools

Strengths/Prospects

The ECO-School scheme and the support provided through SME-Advies provide concrete steps and support for developing a WSA

The role of the educational advisor to develop new projects and connect the ideas of the different working groups of teachers. Teachers alone don't have the time to work out things like the MECA project week

The focus on circularity, closing cycles, and creating a local 'micro economy' that generates funding for future sustainability efforts

Vocational and place-based aspect of the college means a fits well with a WSA due the pre-existing values and environmental focus of the college

The organisation of special curriculum activities – like the sustainability project week – that include all teachers and all students

Challenges

Sometime sustainable solutions cost more and time to explore what is the best choice is needed. Time and money remain a challenge

To engage every teacher in the school and ensuring that sustainability is implemented in other lessons

Pedagogically it can be challenging to navigate tensions around different forms of agriculture when having students who are closely connected to the agricultural sector in the same classroom as students who do not have an agricultural background

Sustainability has to become in everyone's DNA before it is in every lesson!

Hard to keep track of all the progress and have a clear action plan when there is so much going on throughout multiple aspects of the college. This needs to link better to monitoring, evaluation and assessment

CYPRUS – A CROSS CURRICULAR HOLISTIC APPROACH INVOLVING SCHOOL, FAMILY AND WIDER COMMUNITY

(Overview is taken from a case study originally written by Diamando Georgiou, Vasilis Papastavrou and Aravella Zachariou, pp. 33-37.)

Cyprus, uniquely, has a Sustainable Environmental Education Policy (SEEP) in pre-primary and primary education that aims to integrate the Whole School Approach in every school. Geroskipou A' Primary School is an example of a SEEP in action. The school is located in the Geroskipou municipality and has a population of about 8,000 people and even though it is considered a rural school, it is near Paphos city. Most of the students are local; however, there is a considerable number of students who are emigrants. This primary school continues to develop its own SEEP, which has been implemented in the curriculum since 2013, when ESD was officially introduced in Cyprus schools.

SEEP is a school-led long-term policy that is usually planned for two or three years. Through SEEP, Geroskipou A' Primary School currently investigates the biodiversity in Cyprus in relation to the country's culture. This is done in a coordinated way by both the school and members of the local community with the aim of creating a school and community culture for protecting the biodiversity of Cyprus.

All the stakeholders in the school (students, teachers, parents, other school personnel, community members, and representatives of NGOs) come together to plan the school SEEP. At first, teachers guide students to identify environmental and sustainable issues that impact the well-being, quality of life and sustainability of their school and community. The issues are identified and discussed, and the participants in SEEP jointly agree on the issue that will be investigated. In the SEEP, justification as to the selection of the specific issue to be studied is provided, with reference to the reasons why it was chosen, its importance and the learning outcomes for the students regarding knowledge, awareness, skills, attitudes and competencies. The SEEP is implemented by everyone in the school. Each class (teachers with their students) organises its own plan, which includes the way that the class is going to work to contribute to the achievement of the school's SEEP (activities, subjects that will be used, etc.). The plan of the class is monitored by both the teachers and students. At the end of the school year, a self-reflection – self-assessment – takes place for each class and for the school SEEP as a whole. This assessment is based on qualitative criteria on organisational, pedagogical, technical, and social levels, and operates as a tool for helping the school and the community identify what has been

achieved, what difficulties and obstacles emerged, as well as what measures can be taken for a better implementation of the SEEP.

The cross-curricular approach reflects the school's attempt to apply a holistic approach. The interdisciplinary approach to the issue, in addition to collaboration with parents, children, grandparents and community members, facilitates the school's attempt to operate as an open community of learning to improve the quality of life in the school and in the community. At the same time, the school aspires to operate as an example of a school that applies ESD in everyday school life. To this end the school regularly invite students and teachers from a neighbouring school to share their experiences working with SEEP.

Key WSA Principles in action at *Geroskipou A' primary school*

Vision, Ethos, Leadership & Coordination
School vision includes input from the wider community, promoting intergenerational communication and learning outside the class

All the school plan developed jointly with the school, the community, and the professionals

The Sustainable Environmental Education Policy (SEEP) in pre-primary and primary education, aims to integrate Whole School Approach in every school

A WSA to ESD vision supported nationally by the government

Curriculum
The national curriculum has an ESD focus including 12 thematic unit

This is also connected to the SEEP initiative (above)

Pedagogy & Learning
Project based learning - the community and its environment as a place of learning. In cooperation with municipal authorities, students, teachers, and parents worked together

Institutional Practices
Utilisation of rainwater for watering pots and plants in the corridors. Every time it rained, we collected rainwater from the roof tabs in buckets and during the break, children watered the pots that were in a covered area

The biodiversity park has sparked many behavioural changes in the school beyond the garden

Capacity building
Peer to peer teacher training scheme

Top-down support for example from - the Unit of Education for the Environment and Sustainable Development

Parents teachers and professionals from the local community have been engaged with running workshops to support the primary biodiversity park the school manage

Community Connections
meaningful relationships and cooperation among the school community and local society because of SEEP and the biodiversity park project

The school with the community explored the issue "protecting the biodiversity of our land through the culture and civilization" – the outcome being - To create a green park for biodiversity next to the school which for its maintenance responsible is the school and the community together

Strengths/Prospects
All the subjects are used as tools for ESD in this example and this in turn strengthens teacher cooperation

Top-down commitment from the national curriculum to support a WSA to ESD through the enactment of a Sustainable Environmental Education Policy (SEEP) in pre-primary and primary education, which aims to integrate Whole School Approach in every school

Community connections – examples from this primary school show how the whole community can be involved

Challenges
More work needs to be done – an assessment and accreditation structure for following up the ESD national curriculum and SEEP is missing

Finding staff who want to take on the coordination role – this is a specific skill

Organising the schedule so teachers can have the time to plan together

Preparation of new materials despite a lot already being made available

ENGLAND, UK – RUSKIN MILL - A WHOLE SCHOOL, FOR THE WHOLE CHILD, IN A WHOLE COMMUNITY

(Overview taken from a case study originally written by Matt Briggs, Aonghus Gordon and Keith Griffiths, pp. 38-42.)

Ruskin Mill is a trust that runs nine primary, secondary and upper-secondary schools in the UK and provides a comprehensive example of relational place-based education for children with special needs in practice. In essence, these schools are an example of a "WSA in action" within the context of Specialist Independent Education for children and adults with complex needs, including learning difficulties and autistic spectrum conditions. However, its key philosophy, principles and practices are relevant for all type of schools, especially its utilisation of creativity, the arts and learning rooted in the local community. The co-developed curriculum, not hindered by national curriculum requirements, supports each student in finding their own route to self-generated conscious action through experiencing meaningful relationships with the universe, Earth and people. Therefore, each curriculum is co-designed with the students to suit their needs.

The vision, values and methods at Ruskin Mill involve a strong emphasis on the self, the community, environmental development and renewal. The method developed, called *Practical Skills Therapeutic Education,* helps learners overcome barriers to learning, become skilled and contribute to the community. Ruskin Mill aims to help individuals to re-imagine their potential by working with hand, head, heart and place, through practical activities, performing arts, therapies, culture and social enterprise.

Uniquely, staff and students work in a biodynamic school garden using the research-based method Practical Skills Therapeutic Education (PSTE) comprised of seven steps: 1. Genius loci (spirit of place), 2. Practical skills, 3. Biodynamic ecology, 4. Therapeutic education, 5. Holistic support and care, 6. Holistic medicine and 7. Transformative leadership. In terms of place-based learning and community connections, the first field of practice (connected to Genius loci) is an example of how a school can become further embedded in its local community and surroundings.

Each student is provided with an individualised and tailored curriculum such that the practical skills they will engage with are specifically chosen to meet their own developmental needs. By providing students with the tools to transform materials, they transform themselves. The students transform materials and food into purposeful, sustainable, and community-oriented items and meals that offer

meaningful encounters that promote self-generated ecological and sustainable thinking and innovation.

The school has a strong connection to the garden and the land, providing outdoor spaces for pupils to learn and grow in. The school grounds are managed following sustainable and ecological biodynamic principles, which aim to create holistic symbiotic cycles, to enhance not only the land, soil, food and materials, but also improve the surrounding biosphere and environments by harmonising and increasing the capacity for life and nature. By placing students within these environments, they witness the role modelling of sustainable practices and holistic cycles that benefit themselves, the ecology and the community through the production of sustainable and natural growing and animal rearing practices (organic, non-intensive, non-toxic). Through this process, meaningful relationships and values are fostered between humans, ecologies and communities, which allow the students to experience real-life sustainability first-hand. Researching and sourcing sustainable locally available sources (where possible) for materials used within crafts and subjects allows students to make informed moral decisions and choices around the scarcity and sustainability of local and planetary resources and the direct consequences to the world of such choices.

One of Ruskin Mills' core purposes is to aid integration into the community and contribute to society. The focus towards the community is paramount in the PSTE methodology as it creates a pull (as opposed to push) for the students to gently self-generate their own desire to engage with the community, society and world. Multiple opportunities for students to engage and develop both the local communities and wider society are experienced: farms/land (contributing produce to local communities via veggie boxes and shops), cafes (using the grown produce from the land/farms), shops (selling and showcasing school-grown and locally made, sustainably sourced produce) and exhibition spaces (where established artists, crafts people and students can exhibit and showcase their work alongside and for the local communities).

Key WSA Principles in action at *Ruskin Mill primary & secondary schools*

Pedagogy & Learning

The Practical Skills Therapeutic Education offers innovative WSA learning and assessment methods

Co-developed individualised curriculum for each student

Curriculum

Craft based curriculum offers examples of how social, economic, and environmental pillars of ESD can be taught in theory as well as experienced in practice

A Whole Child, Whole School, Whole Community based Curriculum

Curriculum connected to social enterprise

Vision, Ethos, Leadership & Coordination

The vision, values and methods involve a strong emphasis on self, community and environmental developmental and renewal

Seven Fields of Practice first step is a Genius loci audit. This ensures each school identifies a holistic place-based practical curriculum

Institutional Practices

School grounds are managed following sustainable and ecological Biodynamic principals

School farms and gardens produce food for the students' meals, sold in local community, and is used in some of the schools' outward facing cafes

Sustainability policies in place, for example, for sourcing materials and products

Community Connections

Ruskin Mill Trust's core purposes is to aid integration into community and contribute to society

Students are encouraged to lead community and charity orientated projects such as restoration of community/heritage spaces

Capacity building

Training and development opportunities for all staff and wider community is provided by the trust, from induction to a newly accredited master's degree

The trust running the schools also support continual research and professional development opportunities for their staff through the 'Field Centre'

Challenges

Any land-based initiative requires forward thinking and a sense of entrepreneurship as it is based on a non-standard approach

There is a training requirement which requires practitioners to increase their self-reflexive process. The development of action research can be a guiding principal

Practitioners need to approach the content with a collaborative attitude and teachers need to risk entering a domain of unfamiliarity to enter the practitioner mind set, however the rewards for teaching and practitioner-based learning are immense

Requires external funding and grants (and large fundraising team) which are mostly attained through its charity status

Collaborating with the local community and various stake holders can be challenging, expensive and time consuming. This element takes a lot of considered coordination, but vital in both its implementation and impact

Strengths/prospects

Harnessing and harmonising with the local ecology, cultures and history (via a Genius loci audit) can help reveal and acknowledge both negative and positive practices and approaches to help create a more sustainable and community orientated curriculum that meets the needs of both the people and earth

A holistic practical focused curriculum involving land, craft work and nutrition, using sustainably sourced and local materials where possible, encourages situated and embodied learning for the whole human being and community

Creating sustainable 'seed to table' systems for food and material production that involves learners (using Biodynamic/whole system principals) encourages sustainable, ecological and environmental practices and thinking

The will and support for a holistic integrated approach as it is essential to the schools and not-for-profit charity vision

FINLAND - TERÄLAHTI A NATURE-SCHOOL HOLISTIC INTEGRATED APPROACH

(Overview taken from a case study originally written by Jenni Skaffari and Katri Korpi, pp. 61-64.)

The concept of a "sustainable future" is mentioned 48 times in the Finnish curriculum. The so-called eco-social education is central to the value base of primary and secondary school curricula as well as in early childhood education. *"The guiding principle of ecosocial civilisation is to create a way of life and a culture that cherishes the inviolability of human dignity, the diversity and resilience of ecosystems, and at the same time builds a knowledge base for a resource-based circular economy"*[2]. The Finnish curriculum therefore requires that a sustainable future is considered in teaching. It also encourages the Whole School Approach as a learning process for everybody in the school building (or surroundings). An eco-social approach is to be included in all school subjects according to the curriculum.

Educational professionals, e.g., the recruitment of teachers, have a big impact on the functioning of sustainable education in schools. It is up to the teacher to put these values into practice. For example, school meals provide a great opportunity to discuss with students the importance of their own choices and food waste. It is also possible to get vegetarian food at the school. The autonomy provided by the curriculum allows for teaching using different teaching methods and for teachers to act on their own preferences and on those put forward by the students.

Terälahti Primary School

Terälahti School is a primary school in Tampere, located about 40 km from the city centre, surrounded by a lovely rural landscape with forests, fields and waterways. The school has about 75 students, aged 6-12. The same building also houses a kindergarten, a library and the Nature School of Tampere, named Korento. There are about 14 adults working in the school building. The Terälahti school has been involved in the Green Flag programme (the Finnish version of an Eco-Schools programme)[3] since 2002. Many things have taken root over the years in the daily life of the school, so there is little need to pay attention to them. These include sorting

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2. Finnish curriculum, ePerusteet. Retrieved from: (https://eperusteet. opintopolku.fi/#/fi/perusopetus/419550/tekstikappale/426523).

3. Green Flag (Eco-Schools) Foundation for Environmental Education, Finland. (https://feesuomi.fi/).

and recycling rubbish, saving energy and water, using recycled materials in fine arts and crafts, and using nearby nature as a learning environment. The aim is to make purchases as sustainable as possible.

However, there are some challenges (see also Mykrä, 2021). The biggest challenge of everyday life is time. It is difficult for a teacher to be away from their own class to hold, for example, an Eco-School committee meeting, but students would not be very excited if the meetings were always at their break times. This is a problem that almost all schools are struggling with. Some have made bold decisions, such as the Rovastinkangas school in Orivesi, where joining the school's environmental council is one of the electives that students can choose from. Each school class, each autumn, votes for two class representatives to be on the Eco-School committee. The task of the student representatives is to bring the ideas and thoughts of other students to the attention of the adults in the school. Together the committee tries to grasp feasible ideas and solutions to the issues.

In almost all municipalities in Finland, Eco-Schools participation fees are paid from the common budget for basic education, not directly from the budgets of the schools. This is a good incentive to participate in the Eco-Schools programme. Teachers are, however, burdened by the fragmentation of work. Many see environmental issues and sustainable development as just one additional obligation, among other things. While these dilemmas exist, nature schools are great examples of how basic education and early childhood education are supported in Finland in ESD. The nature school is part of the Tampere basic education. There are two environmental educators working at the nature school. There are no full-time pupils/students at the nature school, but the nature school operates as an additional service for Tampere schools and kindergartens, especially in reinforcing the pedagogy of outdoor learning and ESD. Every day, the nature school has different groups visiting Terälahti from other Tampere schools and kindergartens/preschools.

The pedagogy of learning outdoors has a strong connection to environmental education. In both, the emphasis is on strengthening the ecological dimension. The methods also emphasise experientiality and functionality. Students work hands-on. In fact, by searching, researching, and finding themselves students will have a better imprint on the theme of the day. At the same time, the relationship with nature is being strengthened. Studies have also shown that learning in a green natural environment is more effective, whatever the subject is. Teachers also benefit from outdoor-teaching with students, e.g., because of the calming effect of nature and the effects on well-being (Mykrä, 2021).

Key WSA Principles in action at *Terälahti primary school*

Vision, Ethos, Leadership & Coordination
As a nature-school a holistic integrated approach is central to the school's vision

The school head teacher is hands on and support the teachers to meaningfully integrate sustainability into everyday school practice

Curriculum
The national curriculum provides guidelines, but schools are independent in implementing the objectives of the curriculum through different teaching methods

School arranges elective course for Eco-School pupil members

Pupils have the opportunity to use their course time each week to work on individualised curriculums

The sustainable future and eco-social education are cross-cutting values in Finland's curricula. Therefore, it is easy to organize such courses

Pedagogy & Learning
The pedagogy of learning outdoors helps children to concretize challenges the world carries. In this way, students have better memories of learning and the connection between learning and their own lives

One of the teachers dog acts as a school dog with pedagogical roles in the classroom

Institutional Practices
Outdoor education is a central part of the school's everyday life

Learning from nature is central to the school

The Sustainability Education Development Project supports the change in the operating culture of education and training towards a more ecologically sustainable future

Sorting garbage and saving energy is the minimum that all children and adults should be involved in

Community Connections
A hut in Terälahti school field near to the river and an open shelter with fireplace can be found in the forest serve as meeting and relaxation places for nearby residents and pupils

Capacity building
Many external actors provide training for educators and teachers online on SDG

Strengths/prospects
The curriculum provides guidelines and encourages sustainability education. Teachers can decide the methods independently

Students' enthusiasm to study with diverse learning methods and in learning environment

The power of cooperation. For example, when teachers truly have time to plan together, there is a better chance on success of actions

The municipality allows for independent support. Sometimes financial support, e.g. Green Flag (Eco school) participation fee

Wonderful nature surroundings near the school

Challenges
Teachers are burdened by the fragmentation of work

Schools need the feedback on what they do for ESD. Otherwise, they can think of it as a burden and extra work. That is why sustainable development should also include administration as well as the field workers

Engaging everybody with ESD is a challenge

There is no time resourcing in schools. It is the biggest challenge to the work of ESD

There isn´t enough time to work with the subjects the teachers would rather work with

NORWAY – A UNIVERSITY-SCHOOL PARTNERSHIP ON ESD IN PRACTICE

(This is taken from a case study originally written with Snorre Nordal, Berit Ørjasæter, Ingrid Eikeland and Hans Erik Lefdal, pp. 79-83.)

Norway, a country with a strong tradition of environmental and nature-based education, offers up multiple examples of ESD in practice, yet many schools have not yet integrated ESD into their everyday practice (Andresen et al., 2015). It is arguable that Norway's challenge for some time has been and still is to figure out "[...] how education, schools and policymakers could go beyond successful pilot projects and create the necessary culture of legitimacy, the organisational framework, the competences and the financial mechanisms to ensure that pupils experienced effective ESD" (Sandås, 2018, p. 89). However, today's national curriculum renewal aims to create space for in-depth learning; promote interdisciplinary teaching; introduce students to prevailing societal challenges; foster critical thinking; and form stronger links between the subjects and the core curriculum.

In Viken, a county based in the southeast of Norway, there is a multi-stakeholder partnership which consists of four upper secondary schools (Hvam, Ski, Frogn and Ås – a mixture of academic and vocational courses), the public-school owner (Viken County) and the Norwegian University of Life Sciences (NMBU) Educational Science department. This partnership is a long-term commitment from all stakeholders to develop ways to meaningfully integrate a whole school approach to ESD. The partnership includes researchers and university staff, the school owner (municipality), school leaders and teachers. Furthermore, school students and teacher are involved in various specific projects. The philosophy of the university's Educational Science department is to simultaneously support research, development and competency building.

It is critical that the public funding of the University-School partnership also employs an overarching coordinator (50 per cent position) and one teacher coordinator from each school (20 per cent position). Because of this structure, the schools are supported both internally and externally to make connections and new partnerships (within the university, the municipality, the local community and schools). Although funding plays a key role in executing this multi-stakeholder collaboration, it has been done in a way that can be replicable. The WSA has been an important aspect in the partnership to avoid a compartmentalised approach to ESD that focuses just on curriculum content. To integrate ESD meaningfully in the schools, the

focus is to promote, develop and support integrating ESD into all aspects of the school, not just the classroom.

The four schools involved represent mainstream public schools in Norway that can best be described as approaching ESD somewhere in between the "add-on" and "build-in" stages of integrating sustainability education. For example, many sustainability-orientated education initiatives happening in all the schools, some of which have failed (and therefore a lot to be learned from!), could be described as "add-on" or "build-in" additions to the current curriculum. While ESD-related initiatives had been present in the schools from before the University-School partnership began, early on it became clear that these were mostly related to theoretically learning about ESD and little "ESD" was actually experienced outside of the classroom.

Finding a balance between bottom-up and top-down engagement is also seen as an essential part of engaging with a WSA. Today the University-School partnership sees a commitment to working with sustainability-oriented education in a holistic integrated way present at many levels in all four schools: from the school leaders to engaged teachers, and other key committed staff (such as the school's social workers and school nurse), all of whom have the capacity to facilitate the interconnections needed between the curriculum and institutional practices that are necessary to fully embrace a WSA. The key here is that ownership of these institutional changes can be felt by all staff.

In the table below the key WSA principles in action identified in two of the schools that are a part of the University-School partnership in Viken County are listed. In the following table, the identified strengths and challenges come from all the participating schools.

Key WSA Principles in action at *Ski and Hvam upper secondary*

Capacity building

ESD competencies at multiple levels (pupils, students, teachers, school leaders, school owners and other university employees) through research and development projects, seminars, meetings, field trips and professional development-courses

Ongoing CPD national remits such as DEKOMP, University Schools, and NMBU's pre-existing teacher training courses, for example their school garden courses are utilised by all schools in this partnership that support different aspects of a WSA

Researchers, teachers, and school leaders are together co-designing how the WSA can be utilised as a thinking tool to support both teaching and school development

Research at the schools is being disseminated both within the schools, and further afield, locally and nationally

Vision, Ethos, Leadership & Coordination

Schools are committed to utilising the WSA as a thinking tool and strategy for school development

Government funding supports ESD coordinators and provides money to support this partnership in various ways

Pedagogy & Learning

Developing interdisciplinary teaching practices is a focus of these four schools with many lessons learned of what hinders and promotes this approach. The outcome of this is key strategies are being developed as to how teachers can be better supported to work in this way

Curriculum

National curriculum renewal gives space for holistic ESD practices to be developed, however at this stage ESD is still very teacher led and it is not yet clear if the exams will fully reflect the curriculum renewal changes

Institutional Practices

Each school has the autonomy to choose their specific focus, for example by creating more sustainable Organic canteens/cafeteria supported by Matvalget and the RØRE project

Hvam Agricultural school provides practical examples of how the schools' on-site greenhouses, stables, barns, workshops and other outdoor areas can be used as sustainable education learning arenas

Energy efficient buildings (new builds and retrofitting)

National certifications such as Miljøfyrtårn, are ways the schools are utilising the campus as a learning arena and learning slowly how they can 'walk the talk'

National clothes swapping day arranged by students and staff

Learning about composting and soil health is established at multiple schools a starting point for sustainability education

Community Connections

Multiple examples of community connections exist throughout each school. For example, students work with and visit local recycling and renewable energy businesses, local assisted living homes, local NGO's and local parks and museums. However, this is the WSA strand that so far is least developed

Strengths/prospects

The collaboration is longitudinal, so that ideas and experiences have room to develop over time

Funding for coordinators is a vital part of this multi-stakeholder partnership

Top-down (regional and national) and bottom-up commitment to long-term developments

Solid connections to NMBU, including embedded researchers and students on teacher training

Collegial partnerships and support between the four NMBU university schools

Professional mentoring from external actors. For example, for Ski School has had support for the cafeteria project from specialists about sustainable food - Matvalget, and health - RØRE

National curriculum renewal (2020), and other national initiatives, like Eco Lighthouse certification and Climate Prize, make room for a WSA to be developed

Challenges

Takes time – while there is a commitment to a WSA, there is still a long way to go to embed a WSA in the whole organisation involving all staff and all student

Challenging to develop ownership among all departments at the school, including non-teaching staff members

Establishing authentic collaborations between the university and schools based on different needs and interests

Funding and human resources - easier to get funds for (and dedicated people to) starting ESD initiatives than for running them long-term

Exams and curriculum mismatch – alternative forms of assessment still holding back ESD being fully embedded

Inconsistencies are still present in terms of sustainable 'actions' and policies not always matching up with what is being taught

A bolt-on approach is still an issue in teaching and sustainability-based projects. For example, admin duties and one-off projects connected to external actor collaborations take time away from creating internal long-term initiatives and changes

Necessary to enhance the teachers' mentoring capacity, and challenging to find good and rational evaluation methods for interdisciplinary projects

NORTHERN IRELAND, UK - SCHOOL - COMMUNITY PARTNERSHIPS IN ACTION

(This is taken from a case study originally written with Sandra Patterson, pp. 93-98.)

Northern Ireland's curriculum (introduced in 2007) covers 12 years of compulsory education. As the Council for the Curriculum, Examinations and Assessment (CCEA) describes:

> *"It's a curriculum that focuses on the learning process and learners' needs, as well as their knowledge, understanding and skills. [...] This guidance expands upon the Education (Curriculum Minimum Content) Order (2007 No. 46), by setting out the minimum requirements of the Northern Ireland Curriculum that should be taught at Key Stage 3, with examples, and supplements it by providing a detailed rationale to guide its interpretation. It represents the final approved outcomes of a series of proposals and consultations which informed revisions to the Northern Ireland Curriculum (2006)2. As a result of these each school now has additional flexibility to make decisions about how best to interpret and combine minimum requirements so as to provide a broad and balanced curriculum that will prepare each young person for a rapidly changing world."* (CEA, 2022)

Ulidia Integrated College is situated in Carrickfergus along the rural urban fringe of Belfast. It is an Integrated School, meaning that it educates together students from Protestant, Catholic, other religions and nonreligious backgrounds. The school has been engaged with sustainability-related education since 2007, when the school first engaged with the Eco-Schools programme. The Eco-Schools framework[4] provides a structure that supports the school's decision making and planning. The school has engaged in a range of projects to enhance environmental education and whole school sustainability. This range has been decided by the national focus areas of Eco-Schools and by student interest as time has evolved. Students decide the areas of focus in the school's committee meetings. The school has identified the following vision statement: "Highest standards of global education for all to create tomorrow's sustainable society". This vision has informed planning and decision making throughout the whole school. Environmental education is integrated into the whole school curriculum and is regularly audited to measure coverage. The school also works with other community organisations and other schools to increase engagement and interactions. The vision provides guidance and direction for the school's actions. This vision is reaffirmed every year within the eco-team and displayed prominently in the school.

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4. Eco-Schools Northern Ireland. (https://www.eco-schoolsni.org).

Environmental education is fully integrated into the whole school curriculum. However, this is spearheaded by the school, and not through the national curriculum requirements. The school does so through the mapping and mirroring of curriculum links against the Eco-Schools' areas of focus and then uses this to identify any areas of weakness that need to be addressed. This is done collaboratively as a whole school.

In terms of professional development, the school takes advantage of any training available. For example, staff have undertaken UN Climate Change teacher training to gain UN accreditation status, and Global Learning Programme training[5], and some members have taken advantage of carbon literacy training provided by Eco-Schools Northern Ireland. Staff work collaboratively both during the training times and during planning time.

Key WSA Principles in action at *Ulidia Integrated College (upper-secondary school)*

Vision, Ethos, Leadership & Coordination
Whole school community are part of forming and signing the schools eco-code which is update on a regular basis

Curriculum
ESD mainstreamed in curricula of secondary education schools in Mongolia reaching out to over 500.000 students and 26.000 teachers

School text textbooks and examination formats adjusted and aligned to ESD principles

Pedagogy & Learning
Environmental education has been built into the whole curriculum (teacher lead not national curriculum)

Cross Curricular engagement with environmental education

Institutional Practices
Reducing waste and energy consumption has been a big focus of the school

Sustainable transport is also a key focus which it taught throughout the curriculum and links to community events

Whole school engagements with Eco Code

Community Connections
Costal surveys connected to the local landscape (Carrickfergus Castle) giving the students em-pathy for the local land, wildlife and coastline

Eco-Mentoring programme connects the school's sustainability efforts and students to multiple community organisations and other local schools

National teacher networks used to share ideas

International networks used to develop school pairing projects

Capacity building
Eco-Schools Northern Ireland are a major support

Training is available from multiple providers including Eco Schools NI

Grants are available from multiple providers including Keep NI Beautiful

Strengths/prospects
ESD at the school is supported by teachers and governors as well as teaching staff. This enabled a holistic approach to be taken

Eco Schools NI have been a tower of strength and provided excellent resources and advice over the years, giving many opportunities for developing and expanding ESD

Having local 'sister schools' makes inspiring collaboration opportunities

Not being afraid to lead with passion!

Challenges
A centralised government approach to ESD is lacking and not supportive of a WSA, so top down support from the curriculum is needed

There are always some students who doesn't want to be involved, this is a challenge but shouldn't be a discouragement

There will always be a shortage of time

Financial resources

5. Global Learning case study. (https://www.globallearningni.com/case-studies/ulidia-integrated-college).

SYNTHESIS[6]

The European exemplary cases presented here when reviewed alongside other cases in the report from around the world reveal some striking similarities as well as noticeable differences with regard to the way the schools enact a WSA. The similarities lie in the commitment of staff in providing education that is relevant to the students and today's challenges, but also in practising education that is responsible in its aim to contribute towards a more caring, healthier and sustainable world. Such education typically implies boundary crossing between disciplines, school and community, perspectives, timescales (past-present-future), and spatial scales (local-regional-global). All schools emphasise the importance of students' agency, their ability to make change, and their participation in decision-making. Many of the schools also mention benefiting from a supporting framework and/or network like Eco-Schools.

There are also differences. Some of these are a result of the context in which schools are nested, which varies; from more rural to heavily urbanised; from more privately funded to more publicly funded; from being nested in a healthy policy-environment conducive to a WSA to being deprived of any policy support; some are even hindered by educational policies. Instead, they are working on their own, with support from NGOs, networks and others, relying heavily on internal assistance and the support of the local community. Some schools work on a small scale from the ground up, while others work on a much bigger scale nested in a long school tradition that creates both top-down accountability and bottom-up commitment.

Perhaps a missing strand in the WSA flower is one that refers to the policy environment in which a school is nested. This policy environment can be a barrier or a lever in creating sustainable schools. Efforts can be seen throughout the world in curriculum reforms and school policy changes supporting a WSA. Terms like a Whole Government Approach to Sustainable Development are found beyond educational institutions, such as The European Commission's 2019-2024 policy for the 2030 SDG agenda (European Commission, no date). However, even in countries where the political and policy climate opens for WSA to be realised, many barriers still remain. For example, many schools highlight the constraining effects of a national curriculum, where the focus is on testing and measurement of mainly cognitively oriented learning goals, a culture of accountability, and a lack of time

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6. The synthesis is based on Mathie and Wals (2022), which pertains to the non-European schools featured in their report as well. The full report with a more elaborate synthesis is accessible via: (www.wur.nl/wholeschoolapproach).

for experimenting and doing research, to name a few. Figure 4 identifies the type of healthy policies that are identified for enabling a WSA. The case study schools featured have either found ways to overcome such constraints, or they have the fortune of being in a policy environment that encourages multiple forms of learning, engagement in community, doing research as a part of professional development and creating a more localised curriculum.

Figure 4: Healthy policies for enabling a Whole School Approach.

Support whole child, whole school and whole community approaches

Source: Mathie and Wals, 2022, pp. 102

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Innovation and Digitalisation of Education in Germany

Carolyn Blume

INTRODUCTION

"There is no need for 5G [high-speed Internet] on every corner." Long before the COVID-19 pandemic reached Europe, this offhand comment in March of 2019 by the German education minister led to widespread consternation.[1] Although a substantial amount of the immediate backlash came from economic circles, the import of this statement for the educational sector became starkly clear when schools were physically closed almost precisely one year later.[2] Limited or insufficient Internet access, as one element of digital inclusion, has turned out to be a significant factor in subsequent political, social, and educational developments. Access to, and the quality of, digitally-mediated remote teaching and learning have become prominent concerns. Along with Internet connectivity, inadequate digital opportunities in the form of limited hardware availability, absent infrastructure, and low levels of teachers' digital competence during the 2020 school closings have likely contributed to the current mantra to now keep schools physically open at all costs.[3] This commitment has, in turn, led to measures to facilitate educational digitalisation, backed in part by financial commitments. It has also contributed to an emerging discourse about what such digitalisation should encompass, the competences required by educators and pupils to achieve this digitalisation, and how digitalisation can be

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1. N.N. 11 March 2019. Warum 5G nicht an jeder Milchkanne verfügbar sein wird. Die Zeit. (https://www.zeit.de/news/2019-03/11/warum-5g-nicht-an-jeder-milchkanne-verfuegbar-sein-wird-190311-99-327560).

2. Dalg, Paul. 24 March 2020. In der Coronakrise rächt sich der lahmende Netzausbau. Tagesspiegel. (https://www.tagesspiegel.de/wirtschaft/zu-schlechtes-internet-fuer-homeoffice-in-der-coronakrise-raecht-sich-der-lahmende-netzausbau/25676508.html).

3. Grill, Markus, and Klaus Ott. 22 June 2022. Pandemie-Maßnahmen: Das steht im "Sieben-Punkte-Plan". Süddeutsche Zeitung. (https://www.sueddeutsche.de/politik/corona-sieben-punkte-plan-lauterbach-1.5606775).

made accessible. At the same time, however, pre-existing policy conventions and cultural assumptions, combined with a long-standing lack of investment, threaten to undermine innovative initiatives hoping to capitalise on the "opportunity of the century"[4] some saw in the pandemic.

While it is too early to assess the impact of any programmes or projects that have emerged over the last two years, current trends simultaneously point towards, and away from, digitalisation and innovation in German education. Rather than attempting to be comprehensive, this article describes selected examples of technological, bureaucratic, and normative issues pertaining to educational digitalisation as illustrative of emerging trends and issues regarding both technologies themselves, and how they are embedded within policy and cultural contexts that shape their reception.

POLICY RESPONSES

Policy responses emerging from the COVID-19 disruption can be found in both theoretical and practical initiatives that highlight the oft-times radical re-thinking wrought by the events of 2020. An illustration of such a theoretical development can be found in the 2021 addendum to the 2016 strategic mission statement regarding education in the digital world, published by the standing conference of the ministers of education and cultural affairs (*Kultusministerkonferenz*) responsible for providing direction regarding federal-level educational policy. In the introduction to their paper, which addresses system-wide, school-based, and teacher education issues pertaining to digitalisation, the corporate authors refer to the impetus provided by the pandemic and the attendant digital leap forward.[5] The document highlights a contemporary understanding of the digital environment, focusing on the notion of digitality, emphasising how digital communication and interaction, and algorithmic processes inform wide-reaching societal changes.[6] In doing so, the conference heralds a shift from "...'teaching and learning with digital media and tools' to learning and teaching in a constantly changing digital reality, that is

4. Schratz, Michael. 29 March 2020. Corona-Krise: Das ver-rückte Klassenzimmer. Der Standard. (https://www.derstandard.at/story/2000116250722/corona-krise-das-ver-rueckte-klassenzimmer).

5. Kultusministerkonferenz. 2021. Lehren und Lernen in der digitalen Welt: Ergänzung zur Strategie der Kultusministerkonferenz "Bildung in der digitalen Welt". (https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2021/2021_12_09-Lehren-und-Lernen-Digi.pdf)

6. Felix Stalder. 2016. Kultur der Digitalität. Berlin: Suhrkamp.

recognisable as a culture of digitality, especially in cultural, social, and professional contexts and that fosters digitalisation processes" (p. 3). Shifting the focus from digital tools and media that merely facilitate participation of all learners in long-standing educational processes,[7] this new conceptualisation relies on notions of digital mediation that have largely emerged since the previous publication of the standing conference five years earlier. The *Kultusministerkonferenz* uses the framework of digitality as a lens through which to highlight issues in educational policy, school administration, professional development, and ultimately, pedagogy.

While this 2021 strategic paper thus elaborates on the implications of digitality for structural and didactic reform, it does not provide any roadmaps for pursuing systematic change. A more concrete path forward is provided by the 2020/2021 addenda to the 2019 "Digital Pact for Schools." Whereas the original digital pact intended to cover digitalisation needs up through 2024, providing 5 billion euros for schools to improve infrastructure and purchase hardware and software, the 2020 codicil uniquely addresses the human resources needed to manage these tools, by providing funding for IT administrators and their training. Even more significant than the additional 500 million euros that this subsequent digital pact added to the previously dedicated monies is the explicit emphasis on funding personnel to administer school-based hardware and software. Additional agreements also made another billion euros available for individual devices for teachers and students. While previous data indicate that teachers were already adequately equipped with personal digital devices prior to the pandemic,[8] the message sent by the latter digital pacts was an acknowledgement of the complexity of the undertaking, the need for institutional support for teachers, and the inadequate resources available to many pupils.[9]

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7. Kultusministerkonferenz. 2021. Lehren und Lernen in der digitalen Welt: Ergänzung zur Strategie der Kultusministerkonferenz "Bildung in der digitalen Welt". (https://www.kmk.org/fileadmin/veroeffentlichungen_beschluesse/2021/2021_12_09-Lehren-und-Lernen-Digi.pdf).

8. GEW. 2020. Digitalpakt und Digitalisierung an Schulen: Ergebnisse einer GEW-Mitgliederbefragung (https://www.gew.de/fileadmin/media/publikationen/hv/Bildung-digital/202004-Mitgliederbefr-Digitalisierung.pdf).

9. BPV. 5 June 2020. Kommt der Systemadministrator an die Schule? (https://www.bpv.de/presse-aktuelles/pressearchiv/presse-2020/kommt-der-systemadministrator-an-die-schulen.html).

DIGITAL INFRASTRUCTURE

The digital pacts highlighted longstanding inadequacies in Germany, aptly described as being a country of "high-tech innovators, ed-tech laggards".[10] COVID-19 made it clear, despite the education minister's earlier pronouncements, that high-speed Internet is indeed a prerequisite for what has been termed emergency remote teaching.[11] In 2021, a year after the pandemic began, less than half of all schools in Germany reportedly had Internet available for students.[12] Other aspects of digital infrastructure, such as learning platforms or learning management systems, are likewise unevenly distributed.[13, 14, 15] Drawing correlations between the socioeconomic status of the schools' population and their digital infrastructure are complicated, with Rundel and Salemink describing the situation as a "geographical lottery"[16] that particularly disadvantages small and rural schools. This stands in contrast to data regarding private Internet access, which is more clearly delineated by income differences.[17] The "digital gulf" Mußmann et al. describe in relation to schools that are well-equipped and those that have limited digital infrastructure is similarly influenced by the demographics of a school's student population, but is also a result of the resources of the local school authority, the initiative of local educational leaders, and the size of the school. School form further plays a mediatory role, with students in college-preparatory gymnasia more likely to have access to digitally-mediated instruction during the pandemic than students in other school

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10. Kerres, Michael. 2020. Against all Odds: Education in Germany Coping with Covid-19. Postdigital Science and Education 2. p. 690. (https://doi.org/10.1007/s42438-020-00130-7).

11. Hodges, Charles, Stephanie Moore, Barb Lockee, Torrey Trust, and Aaron Bond. 2020. The Difference between Emergency Remote Teaching and Online Learning. EDUCAUSE Review 27. (https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning).

12. Mußmann, Frank, Thomas Hardwig, Martin Riethmüller, and Stefan Klötzer. 2021. Digitalisierung im Schulsystem 2021. (https://doi.org/10.3249/UGOE-PUBL-10).

13. Eickelmann, Birgit, and Kerstin Drossel. 2020. Schule auf Distanz: Perspektiven und Empfehlungen für den neuen Schulalltag. Vodafone Stiftung Deutschland. (https://www.vodafone-stiftung.de/umfrage-coronakrise-lehrer/).

14. Mußmann et al.

15. Huber, Stephan Gerhard, Paula Sophie Günther, Nadine Schneider, Christoph Helm, Marius Schwander, Julia Alexandra Schneider, and Jane Pruitt. 2020. Covid-19 - Aktuelle Herausforderungen in Schule und Bildung. Münster: Waxmann.

16. Rundel, Christina, and Koen Salemink. 2021. Bridging Digital Inequalities in Rural Schools in Germany: A Geographical Lottery? Education Sciences 11, 4. p. 181.

17. Initiative D21 e.V. 2022. D21 Digital Index 2021/2022 – Jährliches Lagebild zur digitalen Gesellschaft. (https://initiatived21.de/d21index21-22/).

types.[18] The emerging data highlight the fact that even neighbouring schools operate in exceedingly different contexts from one another. While one school might have individual tablets for every student and teacher, able to take advantage of wireless data transfers and cloud-based networks,[19] other schools have severely limited Internet capabilities and neither devices nor applications to support teachers' and pupils' integration of online resources.[20] Other institutions have implemented "bring-your-own-device (BYOD)" policies that variously offer centralised support or benign neglect, largely ignoring issues of individual accessibility, system security, or educational appropriacy. In such varying contexts, the nuances of who has access to what, and in what quality, make it difficult to characterise the current state of affairs. These differences also pose a significant challenge to attempts at developing and implementing appropriately targeted and relevant initiatives.[21]

Although improvements to infrastructure are often associated with lengthy bureaucratic processes and slow implementation, initiatives to provide digital access to schools since the beginning of the pandemic have demonstrated the potential of rapid response in some cases. While 52 per cent of teachers reported having adequate digital infrastructure in schools in 2020, this number jumped to 61 per cent only a year later.[22] In many cases, the emphasis has been on establishing access to servers, hosting platforms, and communication systems. Widely reported, for example, was the 72-hour marathon in Baden-Württemberg that resulted in almost 4000 primary and secondary schools being connected to a server and a learning management system over the course of one weekend.[23] In Lower Saxony, a statewide school cloud was pressed into action a few weeks later and a year ahead of schedule.[24] Between 2018 and 2021, the use of learning platforms among German

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18. Eickelmann and Drossel.

19. Roenneke, Dominik. 6 May 2022. Ein Beispiel macht Schule: Monheim am Rhein. (https://www.professional-system.de/education/ein-beispiel-macht-schule-monheim-am-rhein/).

20. Krein, Ulrike. 2022. 'Hätten wir keinen Digitalpakt, hätten wir eine bessere Ausstattung': Schulische Infrastruktur zwischen politischen Versprechungen und netzfreier Realität. Medienpädagogik Zeitschrift für Theorie und Praxis der Medienbildung 49.

21. Ibid.

22. Mußmann et al.

23. Neuner, Sebastian. 2 February 2022. Moodle für BW in 72 Stunden. (https://media.ccc.de/v/meetup-2021-01-114-moodle-fr-bw-in-72-stunden).

24. Gütsel Online. 10 October 20. HPI-Schul-Cloud geht in Regelbetrieb Über und verlässt das HPI. (https://www.guetsel.de/content/23604/2524420.html).

teachers increased from 12 per cent to 58 per cent.[25] These examples are evidence of timely innovation and rapid crisis responses.

While these developments are dramatic and suggest that the pandemic might be "a real game changer",[26] there are other indications that these innovations are not sustainable. In fact, in some cases, gains in access made during the early days of the pandemic have been rolled back. In Baden-Württemberg, over five thousand schools – 80 per cent of whom gained online access during the aforementioned 72-hour undertaking – have been notified that their connections via the state-subsidised network will be rescinded by 2023, with only costly and incompatible commercial alternatives suggested in its stead.[27] Such administrative wrangling not only slows the momentum that the pandemic provided; it actively thwarts any gains made in the last two years. The technological harm that results is mirrored by pedagogical resignation on the part of school leaders and educators who devoted substantial efforts to acquiring the competences necessary to implement digitally-mediated teaching and learning.

DATA PRIVACY CONCERNS

Continued lack of clarity regarding the legality of particular tools likewise reveals how the promise of the pandemic, in terms of digital innovation, is threatened. Arising in response to the misuse of data during its fascist and communist eras – empowered by new technologies of the time – concerns regarding data privacy in Germany are historically rooted. Individuals and bureaucracies are thus exceedingly cautious with regard to potential abuses of data.[28] The reticence regarding data use is compounded by European data privacy regulations, which are interpreted narrowly and applied broadly in the German educational context.[29] Germany funds

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25. Mußmann et al. p. 239.

26. Kals, Ursula, and Sarah Obertreise. 18 September 2021. 'Ein echter Gamechanger'. Frankfurter Allgemeine.

27. Heise Online. 12 June 2022. Landeshochschulnetz Belwü: Netzzugänge für Schulen im Ländle vor dem aus. (https://www.heise.de/news/Landeshochschulnetz-BelWue-Netzzugaenge-fuer-Schulen-im-Laendle-vor-dem-Aus-7137907.html).

28. Buntins, Katja, Svenja Bedenlier, Melissa Bond, Michael Kerres, and Olaf Zawacki-Richter. 2020. Mediendidaktische Forschung aus Deutschland im Kontext der internationalen Diskussion. Eine Auswertung englischsprachiger Publikationsorgane von 2008 bis 2017. In: Reinhard Bauer, Jörg Hafer, Sandra Hofhues, Mandy Schiefner-Rohs, Anne Thillosen, Benno Volk. and Klaus Wannemacher (eds.). Vom e-learning zur Digitalisierung: Mythen, Realitäten, Perspektiven. Münster: Waxmann.

29. Kerres, Michael. 2020.

its data protection authorities with 85.7 million euros annually at a rate seven times the European average of 12.1 million euros.[30] While this discrepancy can stem from a variety of circumstances, its size offers some indication of the awareness that exists regarding issues of data privacy in Germany compared to its neighbours. This sensitivity has resulted in the rejection or reluctant toleration of digital platforms, tools, and videoconferencing services, or cloud-based applications, especially those located outside of the European Union. The impact on digitalisation in schools has been significant, with concerns about data privacy perceived to outweigh ones regarding functionality.[31]

While some German states have made allowances due to the COVID-19 situation, lifting restrictions on the use of nonconforming applications, these exceptions are frequently labelled with expiration dates with varying degrees of flexibility.[32, 33] This generates substantial uncertainty among administrators who are tasked with determining whether a particular digital tool conforms to data privacy regulations,[34] and who need to decide whether to invest time and money in purchasing licenses or equipment that may be disallowed in the near future, and for training and management processes that need to be developed and potentially ultimately discarded. Fears of committing to a system that will subsequently have to be abandoned raise implementation barriers at the school level. Teachers are likewise inhibited by this state of affairs, reluctant to invest their sparse time and energy in temporary peda-

30. Chander, Anupam. Meaza Abraham, Sandeep Chandy, Yuan Fang, Dayoung Park, and Isabel Yu. 202. Achieving Privacy: Costs of Compliance and Enforcement of Data Protection Regulation. World Bank's World Development Report 2021 Team in collaboration with the Macroeconomics, Trade and Investment Global Practice. Policy Research Working Paper No. 9594. p. 28. (https://scholarship.law.georgetown.edu/facpub/2374).

31. Denker, Bastian, Nikolai Horn, and Tim Vallée. May 2021. Datenschutz und Digitale Schule: Impulse zur Entlastung und Unterstützung von Schulen. Forum Bildung Digitalisierung. (https://www.forumbd.de/publikationen/impulspapier-datenschutz-und-digitale-schule/).

32. Krempl, Stefan. 4 March 2021. Rheinland-Pfalz: Schulen dürfen Microsoft Teams länger nutzen. (https://www.heise.de/news/Rheinland-Pfalz-Schulen-duerfen-Microsoft-Teams-laenger-nutzen-5072486.html).

33. News4Teachers. 27 June 2022. Hubig verbietet Schulen, die Microsoft-Software Teams zu nutzen (den Berufskollegs aber vorerst nicht) – CDU: „verstörend". (https://www.news4teachers.de/2022/06/hubig-verbietet-schulen-die-microsoft-software-teams-zu-nutzen-berufskollegs-aber-vorerst-nicht-cdu-verstoerend/).

34. Moir, Joshua and Michael Wrase. 29 January 2022. Rechtliche Anforderungen an den digitalen (Distanz-)Unterricht von Schulen (Parlamentarischer Beratungs- und Gutachterdienst des Landtags Nordrhein-Westfalen). (https://www.landtag.nrw.de/portal/WWW/dokumentenarchiv/Dokument/MMI17-355.pdf).

gogies, especially in light of generally overwhelming obligations.[35] The majority feels inadequately supported by educational authorities in regard to issues of data privacy and data security, and the practice of relying on school-based laypersons to supervise data management practices is inadequate.[36] Anxiety regarding potential legal recourse if teachers use a tool for which approval has been withdrawn is compounded by the supposed individual responsibility they bear in this regard and the lack of consistent and clear communication regarding individual tools or uses.[37]

The situation is further muddied by the autonomy of the German states – again a result of its history – each of whom has its own data protection agencies and state educational authorities that do not necessarily cooperate closely intrastate, and have historically had little incentive or recourse to do so interstate.[38] This situation is slowly changing, with growing recognition that the necessary investment of fiscal resources and expertise to develop sound digital solutions is beyond the capacity of individual states.[39] Generally, a lack of clear guidance hampers efforts to introduce digital innovations, with one educational official tasked with assessing data privacy concerns in relation to digitally-mediated initiatives arguing that he could not approve *any* applications for the integration of digital tools, since there was no written policy for his state upon which to base such a decision.[40]

The situation regarding digital devices for educators exemplifies the dilemmas raised by digitalisation and data security. In recognition of the fact that teachers' use of private devices for professional purposes meant that teachers were storing protected data on unregulated computers, many schools used the funding provided by the second digital pact to outfit educators with laptops for school-related business, as was intended by the monies and recommended by data protection experts. However, due to concerns about data security, the official laptops and tablets

35. Cordes, Michael, Klaus, Hurrelmann, and Selin Tüysüz. 2022. Wie belastet sind die Lehrkräfte in Berlin? Eine Studie zur Arbeitssituation und zum Bedarf an professioneller Unterstützung. FiBS-Forum No. 77. (http://hdl.handle.net/10419/251769).

36. Denker, Bastian, Nikolai Horn, and Tim Vallée.

37. Wawrzyniak, Jessica. 23 June 2020. Datenschutzverstöße im Homeschooling und Bußgelder. (https://digitalcourage.de/blog/2020/datenschutzverstoesse-im-homeschooling-und-bussgelder).

38. Wollmann, Hellmut. 2020. Entwicklungs- und Konfliktlinien des Bildungssektors im deutschen Föderalismus: Neue Dynamik durch Digitalisierung in Zeiten des Coronavirus? In: Wolfgang Roters, Horst Gräf, and Hellmut Wollmann (eds.). Zukunft denken und verantworten. Wiesbaden: Springer Fachmedien. pp. 253–283.

39. Bitkom Research GmbH. 2020. Last call: Germany! Die Bitkom-Digitalstrategie 2025. (https://www.bitkom.org/Bitkom/Bitkom-Digitalstrategie2025).

40. Personal communication. 2022.

were restricted to a small selection of approved applications, or secured to prevent teachers from customising their devices – or both.[41] Questions regarding responsibility for administration and updates, as well as training, frequently remain to this day unresolved.[42] Given the lack of functionality, teachers have quickly resorted to using their private devices. With regard to data security, the tension between practicality and safety is indicative of the challenges faced in regard to educational digitalisation and innovation.

At the same time, these dilemmas have been drivers of innovation, leading to the kind of educational technology investments and advancements that were slow to be adopted pre-pandemic. In response to the problematic nature of many commercial applications, for example, open source and European alternatives to digital tools from outside the European Union have flourished in both development and acceptance. While some of these applications were available prior to 2020, interest in them was limited. In the interim, both internationally recognised open source products and small-scale innovations have become widely known and welcomed. Learning management systems and video-conferencing systems are only two examples of open source projects that have gained widespread traction in schools and universities. Alternatives to commercial tools for collaboration have been developed both under the aegis of state-led agencies and by individuals or small teams at a grassroots level. While the latter are increasingly making their source code publicly available for transparency and adaptation, many of the former are restricted to use in one German state. This is the case both with "BiParcours",[43] only available for educational purposes in North Rhine-Westphalia, and the "Online-Pinnwand Schleswig-Holstein",[44] developed as an alternative to a commercial bulletin board tool. While these tools address the problem of data privacy on the one hand, they inadvertently underscore the way in which the federal system acts as an obstacle to innovation on the other.

In response to the challenges faced by school leaders and teachers in having to individually assess every application and the contradictory assessments of

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41. Blume, Bob. 7 March 2021. Diskussion: Wir sind es nicht wert. (https://bobblume.de/2021/03/07/diskussion-wir-sind-es-nicht-wert/).

42. Krauß, Bärbel. 12 February 2022. Müssen Lehrer im Land ihre Laptops Ende 2022 zurückgeben? Stuttgarter Zeitung. (https://www.stuttgarter-zeitung.de/inhalt.digitalpakt-problem-in-baden-wuerttemberg-muessen-lehrer-im-land-ihre-laptops-ende-2022-zurueckgeben.77d8a4dd-ea2e-4946-ac66-d4b1827834c6.html?reduced=true).

43. Bildungspartner NRW. Biparcours. (https://biparcours.de/).

44. IQSH. Online-Pinnwand Schleswig-Holstein. Institut für Qualitätsentwicklung an Schulen Schleswig-Holstein. (https://opsh.lernnetz.de/).

educational and data privacy agencies within and between states, the German Federal Ministry of Education and Research in 2021 provided funding for the research project "Directions: Data Protection Certification for Educational Information Systems",[45] which has as its goal a voluntary certification process for software based on consistent criteria related to data privacy and data security. This is complemented by "EduCheck Digital" (EDCD),[46] a project designed to develop consistent standards and evaluation processes, specifically for educational applications, with regard to legal, technical, and accessibility guidelines. Funded by the aforementioned digital pacts with monies designated for all sixteen states, the initiative is an illustration of how their unified efforts in a federal system can spur innovation through cooperation.

ARTIFICIAL INTELLIGENCE

Another area that is affected by the scepticism towards data is in the development or use of artificial intelligence (AI) for educational purposes. More accurately defined by one of a number of underlying processes, including machine learning, deep learning, or natural language processes, the reliance of AI on user data has led to its reluctant acceptance as an educational technology – not just in Germany. Rather, public awareness of the potential uses and misuses of AI is growing internationally. In 2021, the European Union proposed guidelines on the ethical use of AI which, if implemented as drafted, would impose significant restrictions on the use of AI, specifically as it pertains to minors.[47] Analogous to the European general data privacy regulations (GDPR) in both its informed awareness of the risks of new technologies and its potential inhibitory effect on innovation, the regulations seek to balance technological prowess with individual self-determination.[48] Educational data mining, learning analytics, adaptive applications, and intelligent tutoring systems rely on similar or overlapping underlying processes with different emphases.

45. Directions: Data Protection Certification for Educational Information Systems. (https://directions-cert.de/).

46. EduCheckDigital. (https://educheck.schule/).

47. European Commission. 21 April 2021. Regulatory Framework Proposal on Artificial Intelligence. (https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai).

48. Holmes, Wayne, Kaska Porayska-Pomsta, Ken Holstein, Emma Sutherland, Toby Baker, Simon Buckingham Shum, Olga C. Santos, Mercedes T. Rodrigo, Mutlu Cukurova, Ig Ibert Bittencourt, and Kenneth R. Koedinger. 2021. Ethics of AI in Education: Towards a Community-Wide Framework. International Journal of Artificial Intelligence in Education. (https://doi.org/10.1007/s40593-021-00239-1).

As such, the concerns related to them reflect common themes, but also necessitate individualised responses. Whereas data mining applications, for example, raise foremost questions of privacy, adaptive applications relying on such data have the potential to individualise learning materials in ways that can influence educational trajectories. These need to be considered, not just from generic ethical perspectives, but in the context of the purposes of education in democratic contexts. Transparency, privacy, automated decision-making, biased algorithmic models, data accumulation, and user consent are all issues that pertain specifically to educational AI.[49] In light of the complexity of AI as a technology and the implications for teaching and learning environments, Germany's federalism and its conservative attitudes towards data collection and application have contributed to the slow pace of innovation in this area.

Despite these reservations, however, research groups working on AI for educational purposes have garnered more attention in the last few years. Motivated initially by the challenges of individualising instruction adequately for increasingly diverse pupil populations, a further impetus emerged in the wake of COVID-19. Several things came together at this juncture that have led to a comparative boom in this area. Firstly, emerging recognition of the appropriate roles of AI in the classroom has allayed dystopian fears of robots as teachers. Instead, there has emerged a consensus around the "didactic perspective, resting on scientific consensus, that AI-supported systems are not to be implemented as a replacement for physical presence in classrooms, but rather in supportive or complementary ways ("Co-teaching" and "assisted learning" in hybrid learning situations and flipped-classroom settings, etc.)" (Translation by the author).[50] More palatable from both a humanistic and technological perspective, an emerging understanding of AI's capabilities and limitations recognises its roles in supporting educators in what they currently do: Use different kinds of data to identify learners' needs and address them in pedagogically appropriate ways.[51] Secondly, many teachers' experiences in the early stages of the pandemic revealed that expectations regarding feedback surpassed their

49. Ibid.

50. Schmid, Ulrich, Berit Blanc, and Michael Toepel. 2021. KI@Bildung: Lehren und Lernen in der Schule mit Werkzeugen künstlicher Intelligenz – Schlussbericht. Deutsche Telekom Stiftung. (https://www.telekom-stiftung.de/sites/default/files/files/media/publications/KI%20 Bildung%20Schlussbericht.pdf).

51. Blume, Carolyn, Lisa Middelanis, and Torben Schmidt. In preparation. Where Tasks, Technology, and Textbooks Meet: An Exploratory Analysis of EFL Teachers' Perceived Affordances of an ILTS. In: Almut Ketzer-Nöltge and Nicola Würffel (eds.) Lehrwerke 4.0. Berlin: Peter Lang.

capacity to design, assign, evaluate, and respond to the largely written work that pupils were completing in record speeds at their desks at home. With schooling reduced to a few videoconferences a week at most, educators and parents resorted to more conventional ideas about schooling, relying on (digital or analog) exercises and assignments that pupils complete more or less independently, and more or less quickly, and submit for teachers' feedback.[52] Various studies indicate a significant desire among pupils and parents for feedback, an expectation that was met by teachers to varying degrees. While Helm and Huber report that pupils in Germany, Austria, and Switzerland agreed or strongly agreed with the statement that their teachers provided feedback and checked their work approximately half of the time (mean = 3.23 out of 6), the standard deviation of 1.17 suggests that a wide range of feedback practices could be found[53], a finding corroborated by Wacker et al. in a separate survey.[54] At the same time, there was a significant correlation between whether teachers engaged in these practices and pupils' perceptions of the quality of their emergency remote learning experiences.[55] Data from Eickelmann and Drossel corroborate the impression that addressing pupils' assignments was a key issue in the early weeks of the pandemic, with the German teachers in their study indicating that they felt most overwhelmed during this time by the need to give feedback to their pupils (62.3 per cent) and check their work (59.4 per cent), the two items named most frequently.[56]

These experiences may have contributed to a greater receptivity to automated processes for comparatively simpler exercises and assignments that best lend themselves to AI support. Intelligent tutoring systems for secondary English language learning (Feedbook) and maths (bettermarks) are two applications developed for the German school sector. Initiated prior to the pandemic, both projects saw

52. Wößmann, Ludger, Vera Freundl, Elisabeth Grewenig, Philipp Lergetporer, Katharina Werner, and Larissa Zierow. 2020. Bildung in der Coronakrise: Wie haben die Schulkinder die Zeit der Schulschließungen verbracht, und welche Bildungsmaßnahmen befürworten die Deutschen? IFO Schnelldienst 73, pp. 25–39. (http://hdl.handle.net/10419/225170).

53. Huber, Stephan Gerhard, and Christoph Helm. 2020. Lernen in Zeiten der Corona-Pandemie Die Rolle familiärer Merkmale für das Lernen von Schüler*innen: Befunde vom Schul-Barometer in Deutschland, Österreich und der Schweiz. In: Detlef Fickermann and Benjamin Edelstein (Eds.). „Langsam vermisse ich die Schule …" Schule während und nach der Corona-Pandemie. DDS – Die Deutsche Schule. No. 16, pp. 37–60.

54. Wacker, Albrecht, Alexander Unger, and Thomas Rey. 2020. „Sind doch Corona-Ferien, oder nicht?" Befunde einer Schüler*innenbefragung zum „Fernunterricht". In: Detlef Fickermann and Benjamin Edelstein (Eds.). „Langsam vermisse ich die Schule …" Schule während und nach der Corona-Pandemie. DDS – Die Deutsche Schule. No.16, pp. 79–94.

55. Huber, Stephan Gerhard, and Christoph Helm.

56. Eickelmann and Drossel.

increased interest as a result of the need for digital tools to bridge the physical distance between teachers and pupils.[57] Developed in cooperation with computational linguists, educational psychologists, and experts in digitally-mediated English language learning with funding provided by the German Federal Ministry of Education and Research, FeedBook is currently being tested in three states with over 1000 participants.[58] Bettermarks is a commercial product currently available without cost to schools in seven German states and German overseas schools.[59] While bettermarks began development in 2008, with initial evaluation studies published in 2014,[60, 61] it is only since the 2020/2021 academic year that these cooperations have been established, highlighting the changes in attitudes and needs that the pandemic fostered. With its embedding in various learning management systems or learning platforms, it also illustrates the need for fundamental technologies to enable integration.

CONCLUSION

The COVID-19 pandemic illuminated for public audiences long-standing problems regarding digitalisation in German schools and universities. What appears at first glance to be a technological issue of inadequate infrastructure that can be resolved with substantial monies, a closer look reveals the ways in which political and educational systems contribute to this state of affairs. These systems in turn are informed by attitudes arising from historical experiences as they encounter rapid changes in fundamental political, economic, cultural, technological and public health realities.

57. Spitzer, Markus Wolfgang Hermann, and Sebastian Musslick. 2021. Academic Performance of K-12 Students in an Online-Learning Environment for Mathematics Increased During the Shutdown of Schools in Wake of the Covid-19 Pandemic. PloS One. 16, 8. e0255629.

58. Parrisius, Cora, Ines Pieronczyk, Carolyn Blume, Katharina Wendebourg, Diana Pili-Moss, Mirjam Assmann, Sabine Beilharz, Stephen Bodnar, Leona Colling, Heiko Holz, Lisa Middelanis, Florian Nuxoll, Julia Schmidt-Peterson, Detmar Meurers, Benjamin Nagengast, Torben Schmidt, and Ulrich Trautwein. 2022. Using an Intelligent Tutoring System within a Task-Based Learning Approach in English as a Foreign Language Classes to Foster Motivation and Learning Outcome (Interact4School): Pre-registration of the Study Design. PsychArchives. (10.23668/psycharchives.5366).

59. Bettermarks. bettermarks GmbH. (https://de.bettermarks.com/).

60. Daberkow, Andreas, and Oliver Klein. 2014. Yes, it's Possible – Online Mathematics for First-Semester Students. Fifth National Workshop and Conference – Technology and Innovation in Maths Education. (https://journal.ph-noe.ac.at/index.php/resource/article/view/152/157).

61. Scharnagl, Susanne, Petra Evanschitzky, Judith Streb, Manfred Spitzer, and Katrin Hille. 2014. Sixth Graders Benefit from Educational Software When Learning About Fractions: A Controlled Classroom Study. Numeracy 7, 1.

The resulting tensions, seen in initiatives that facilitate digital innovation and circumstances that hinder it, make it difficult to describe the current situation in broad strokes. Moving forward, microanalyses of particular contexts can provide a fuller understanding of the ways in which digital innovation is mediated by federal, state, and local conditions.

What remains constant regardless of differences due to socioeconomic, demographic, or attitudinal factors are the necessary elements for successful digital innovation in the educational sector. As can briefly be shown in the preceding examples, policy initiatives must be both broad enough to encompass far-flung expertise and economies of scale, and precise enough to reflect local priorities. The ability of school leaders and teachers to rely on state agencies with regard to infrastructure and legal ramifications vis-à-vis educational platforms or tools is likewise of paramount importance if they are to invest professional and fiscal resources into the development of administrative systems, pedagogical procedures, or didactic scenarios for these applications. Realistic solutions for the thorny issues raised by data privacy or AI cannot be developed on a teacher-by-teacher basis, but need to be addressed by experts who understand the ways in which educators have always – and continue to – considered the potential benefits or problems associated with a pedagogical approach, regardless of the medium. At the same time, teachers need to be empowered to understand the ramifications of these particular media, addressing both underlying beliefs and attitudes and digital-pedagogical competences.

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Six Principles to Advance Technical and Vocational Education for Sustainable Development

Manuel Souto-Otero

1. INTRODUCTION

The term *sustainability* was first coined by a German forester, Hans Carl von Carlowitz, who in the early 18th century discussed "sustainable use" of the forest, faced with the disastrous consequences of timber shortages on Saxony's silver mining and metallurgy industries. It is highly significant that von Carlowitz's discussion of the term focused already on both natural (forest) and economic elements. Environmental and economic components continue to be at the core of discussions around sustainability today, but consideration to its social component has been added. These three elements are incorporated into the concept of the "triple bottom line" that sustainable organisations, Elkington proposes, should consider in their decisions, instead of focussing only on profit[1].

While the intellectual history of sustainability can therefore be traced far back, the term *sustainability* (an objective) and *sustainable development* (the means to achieve that objective) did not achieve wide currency until the second half of the 20th century, in the context of public debates about unsustainable patterns of production and consumption, limits to economic growth and the emergence of strong environmental movements. "Our Common Future", an influential World Commission on Environment and Development report also known as the "Brundtland report" – after the commission's chair, former prime minister of Norway Gro Brundtland – defined sustainable development as: "development that meets the needs of the

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1. Elkington, John. 1999. Triple bottom line revolution: reporting for the third millennium. Australian CPA, vol. 69, pp. 75-77; Elkington, John. 2018. 25 years ago I coined the phrase "triple bottom line." Here's why it's time to rethink it. Harvard Business Review, 25, pp. 2-5.

present without compromising the ability of future generations to meet their own needs"[2].

The concept of sustainability is very widely used today[3]. The Sustainable Development Goals (SDGs[4]), which attempt to coordinate countries' response to pressing common challenges, played no small role in placing sustainability high in the political and public agenda. Education has a key role in facilitating sustainable economic, environmental and social development, and has a supportive role in the achievement of various SDGs by empowering society to take informed and responsible decisions. There is, in addition, a specific goal (SDG4) related to education, which makes reference to vocational education and training (VET). This contrasts with the almost total absence of VET in earlier international agendas like the Millennium Development Goals and Education for All[5].

The SDGs were approved in 2015, and while some progress has been achieved in relation to SDG4, the challenges faced by sustainability in education are as great as ever. In particular, since the approval of the SDGs the resilience of education systems has been put to the test during the COVID-19 pandemic and as a result of growing geo-political tensions. The emergency situation brought about by the pandemic presented tremendous challenges for education across the globe. These included widespread school closures, which affected learning and increased educational inequalities, and increasing strains on public finances as a result of emergency economic support packages that were mobilised in many countries. Today, renewed geopolitical instability, most visible in the war in Ukraine, presents a new set of challenges related to access to energy (oil and gas). This has increased the demand for greener energy sources, and VET has an important role to play in confronting this challenge, by providing the necessary skills to implement change. This is just one example in which sustainable development needs a labour force with the technical and vocational skills for a green transition. Challenges also extend to the integration of refugees, where the provision of education and training has a central role. Against this backdrop, it is important to reflect on sustainable development's role, practice and approaches in VET.

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2. World Commission on environment and Development. 1987. Our Common Future: Report of the World Commission on Environment and Development. Oxford: Oxford University Press, p. 43.

3. Scones, Ian. 2007. Sustainability, Development in Practice 17:4-5, 589-596.

4. There are 17 SDG and over 150 associated targets.

5. See McGrath, Simon, Alla-Mensah, Joyceline and Langthaler, Margarita. 2018. Skills for decent work, life and sustainable development: Vocational education and the sustainable development goals. Austrian Foundation for Development Research.

2. SUSTAINABLE DEVELOPMENT IN VOCATIONAL EDUCATION AND TRAINING

It is not easy to know where we are and what progress we have made with regard to sustainable development in education. The SDGs provide a valuable attempt to do so, and much data has been compiled to that aim[6]. The 17 SDGs have over 150 associated targets, and progress against the SDGs is provided regularly by the United Nations[7]. There is also notable activity in the selection and dissemination of good practices in their implementation – with almost 200 good practices related to SDG4 approved by the UN in 2020/21[8]. SDG4 refers, specifically, to achieving inclusive and equitable quality education and promoting lifelong learning opportunities for all. The targets associated with SDG4 are numerous, but they could be grouped under the three central elements of participation in education (access and outcomes), quality/relevance and investment. They cover core elements of sustainability in education. But it can also be said that the targets do not cover the three elements of sustainability (environmental, economic and social) equally well. Moreover, the conceptual relation between the various SDG4 targets and the SDG4 objectives is at points tenuous[9]. In any case, it is clear that nations across the world approach sustainability in different ways. There is no single definition or model to "do" sustainability. Below, I reflect on six guiding principles, rather than prescriptions for action, related to curriculum, pedagogy and philosophy that should be given consideration for the achievement of sustainable development in vocational education and training, both initial and continuing, at secondary and higher level.

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6. See, for SGD4, (https://tcg.uis.unesco.org/data-resources/ https://tcg.uis.unesco.org/). Checked on 28 August 2022.

7. United Nations. 2022. The Sustainable Development Goals 2022. (https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf). Checked on 28 August 2022.

8. See (https://sdgs.un.org/publications/sdg-good-practices-2nd-edition-2022); (https://sdgs.un.org/events/2022-sdgs-learning-training-and-practice); (https://sdgs.un.org/events/session-9-innovative-tools-target-setting-peer-learning-and-policy-dialogue-sdg-4-and-sdg); (https://sdgs.un.org/partnerships/browse). Checked on 30 August 2022.

9. See McGrath, Simon, Alla-Mensah, Joyceline and Langthaler, Margarita. 2018. Skills for decent work, life and sustainable development: Vocational education and the sustainable development goals. Austrian Foundation for Development Research.

A. Holistic

A holistic approach to VET sustainability requires attention on its environmental, economic and social dimensions. Discussions on sustainability can quickly become dominated by environmental concerns. There is, indeed, a need to make VET "greener" (e.g., consider climate change, use of resources, sustainable urbanisation, etc.) and to further promote the development of environmental sustainability skills in the curriculum. The German Federal Institute for Vocational Education and Training (BIBB) has a long trajectory in promoting valuable VET-related sustainable development pilot projects[10]. However, environmental aspects are not yet generally a priority in VET, like in education more generally. A recent review by UNESCO found that around half of the national curriculum frameworks of the 100 countries it reviewed made no reference to climate change, whereas those who did usually included minimal references only. Inclusion, moreover, was more frequent in those regions that are more vulnerable to the impacts of climate change than in those that have greater responsibility for the emissions related to climate change[11]. While sustainability-related aspects may be included in curricula under other headings the above findings are not promising.

While the environmental dimension is important, it is insufficient. To be sustainable, VET needs to also consider economic rationales and provide skills that are relevant to the labour market – a topic to which I return later. For education systems to be sustainable, learners also must have a diverse set of options to choose from, including high-quality vocational routes that lead to quality employment opportunities. That has traditionally been the situation in countries like Germany or Denmark. But in other countries, like Spain, without a strong VET tradition a significant share of graduates now enhance their employability by undertaking VET programmes after they complete their university studies. The economic rationale is, in fact, the focus on SDGs targets. Environmental and social concerns may be secondary to economic development concerns, in particular in less affluent areas, but not only in those[12].

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10. See (https://www.bibb.de/en/33716.php). Accessed on 03 September 2022.

11. UNESCO. 2021. Getting every school climate ready. How countries are integrating climate change in their education. UNESCO, Paris. (https://www.uncclearn.org/wp-content/uploads/library/379591eng.pdf).

12. Pavlova, Margarita. 2008. Technology and vocational education for sustainable development: Empowering individuals for the future. Springer Science & Business Media.

The human and social dimension is less visible in SDG4 and across countries. Yet, social sustainability is essential and inextricably linked to our survival. It recognises that learners not only exist in their relation to employment, but also to others[13], as well as in relation to the environment. Social sustainability is related to the development of certain values and views of the world. Learning about human rights, peace and security, equality, appreciation of diversity and intercultural understanding or global citizenship, sustainable consumption, supply chains, biodiversity, disaster reduction and poverty reduction can be included under the social dimension of sustainability. Collaboration, critical thinking or problem solving, systems thinking and anticipatory competencies have been proposed as part of it too. Sustainable VET should develop and advance a wider set of knowledge, skills and attitudes beyond technical competencies and develop individuals in a holistic way to support them in the achievement of what they want to become. But this is easier said than done. There has been some progress towards enhancing the provision of transferable skills in VET in various countries and also increasing interest in the role of VET in the production of civic outcomes[14]. But there are challenges in relation to these aspects[15], and they fall short of a comprehensive approach to social sustainability in VET.

Latvia's Education Development Guidelines 2021-2027[16] have given a visible place to sustainability as a central objective and incorporate reference to the development of digital transversal competences, including critical thinking, collaboration and civic participation. "Green skills" have entered the VET curricula and sustainability has been associated with transversal skills requirements in the country. There are also government guidelines, and provision of continuous professional develop-

13. Langthaler, Margarita, Simon McGrath, and Presha Ramsarup. 2021. Skills for green and just transitions: Reflecting on the role of vocational education and training for sustainable development. No. 30. ÖFSE Briefing Paper.

14. Mennes, Hester I., Herman G. van de Werfhorst, Anne Bert Dijkstra, and Anke Munniksma. 2022. Are schools' qualification and civic outcomes related? The role of schools' student composition and tracking. Education, Citizenship and Social Justice. Online First; Leeman, Yvonne and Monique Volman. 2021. Citizenship in prevocational education: Professional pride as a source. Education, Citizenship and Social Justice 16(1): 17-30.

15. Gekara, Victor and Snell, Darren. 2018. Designing and delivering skills transferability and employment mobility: The challenges of a market-driven vocational education and training system. Journal of Vocational Education & Training, 70(1), pp. 107-129.

16. (https://eprasmes.lv/wp-content/uploads/2022/02/Latvijas-Izglitibas-attsitibas-pamatnostadnes-2021-2027.pdf). Accessed on 5 September 2022.

ment for teaching staff on greening investment by VET institutions[17]. More broadly, also in Europe, the 2020 "Council of the European Union Recommendation on VET for sustainable competitiveness, social fairness and resilience" calls for VET institutions to embed environmental and social sustainability in their programmes and in their organisational management in line with the UN SDGs[18]. There are also valuable initiatives in Asia. For example, actions on Greening Technical and Vocational Education and Training (TVET) in Viet Nam aimed to build a green culture[19] in TVET institutes[20] – greening campus, curricula and research and technology. Green good practices from TVET institutions in Singapore are being disseminated to other countries (Cambodia, Lao PDR, Myanmar and Viet Nam) under Singapore's initiative for Asean integration[21].

But while discourses around sustainability have gained prominence in VET and initiatives have been put in place in certain countries, generally sustainability – beyond its economic elements – is not yet high in countries' VET implementation agendas, course handbooks and examination regulations[22]. Evidence coming from Asia suggests that this derives, in part, from institutions' belief that demand for green skills from industry is not high enough, lack of accepted standards and certification systems, and insufficient time for the integration of sustainable development in the curriculum. VET staff also require further professional development in this area[23] – a point developed in more detail below.

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17. Cedefop. 2021. Latvia: New momentum for green approaches in VET. (https://www.cedefop.europa.eu/en/news/latvia-new-momentum-green-approaches-vet). Checked on 4 July 2022.

18. Council of the European Union. 2020. Council Recommendation of 24th of November 2020 on vocational education and training (VET) for sustainable competitiveness, social fairness and resilience 2020/C 417/01. (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020H1202(01)&from=EN). Checked on 6 July 2022.

19. See also Majumdar, Shyamal. 2011.. Developing a Greening TVET Framework. In: UNESCO-UNEVOC, CSP, GIZ: Transforming TVET for Meeting the Challenges of the Green Economy. Report of the International Consultation Meeting. 27-30 October 2011, Bonn.

20. (https://www.tvet-vietnam.org/greening-tvet ; https://unevoc.unesco.org/pub/greening-vcmi-reform-vietnam.pdf). Checked on 9 September 2022.

21. (https://scp.gov.sg/startpublic/#!/courses/clusters/CLS_8/%23/0/0). Checked on 6 July 2022.

22. See, for an analysis of the German case Holst, Jorrit, Antje Brock, Mandy Singer-Brodowski, and Gerhard de Haan. 2020. Monitoring progress of change: Implementation of Education for Sustainable Development (ESD) within documents of the German education system. Sustainability 12, 10: 4306.

23. Maclean, Rupert, Shanti Jagannathan, and Brajesh Panth. 2018. Education and skills for inclusive growth, green jobs and the greening of economies in Asia: case study summaries of India, Indonesia, Sri Lanka and Viet Nam. Springer Nature.

B. Inclusive

Sustainable VET needs to be inclusive, in terms of access, treatment during the VET experience and achievement. Access measures need to target vulnerable groups, including "persons with disabilities, indigenous peoples and children in vulnerable situations", as noted by SDG4 targets, but also people from lower socio-economic backgrounds, females or learners living in rural areas. Age inclusiveness – which has implications for aspects such as the flexibility of delivery or financing – becomes more relevant as demographic changes (ageing of the population) accelerate in many countries, making inclusiveness not only a moral duty, but also a necessity. Two thirds of the world's population live in a country or area where lifetime fertility is below zero growth levels (2.1 births per woman)[24]. Population growth has declined. In 2023, China, the most populous country in the world, is expected to experience an absolute decline in its population. Automation can contribute to getting things done, but people of all ages are required too.

The VET experience is fundamentally influenced by infrastructure and pedagogies. Infrastructure, in terms of estate (new buildings, existing estate, use of energy resources) and digital, needs to take sustainability into account, as noted by the UK's sustainability strategy for education[25]. In terms of pedagogy, education for sustainable development is often associated with a shift towards task-based instruction, problem orientation, interdisciplinarity and the use of digital tools and approaches to develop competencies for sustainable development and to cater for the needs of a diverse learner population[26] (including through the use of adaptative technologies). Inclusion also needs to be considered in the definition of programme learning outcomes and assessment strategies.

24. United Nations. 2022. World Population Prospects 2022: Summary of Results. (https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/undesa_pd_2022_wpp_key-messages.pdf). Checked on 4 August 2022.

25. See Department for Education. 2022. Sustainability and climate change: a strategy for the education and children's services systems. (https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems#action-area-3-education-estate-and-digital-infrastructure).

26. Lambini, Cosmas Kombat, Angelina Goeschl, Max Wäsch, and Martin Wittau. 2021. Achieving the Sustainable Development Goals through Company Staff Vocational Training—The Case of the Federal Institute for Vocational Education and Training (BIBB) INEBB Project. Education Sciences 11(4): 179.

C. Responsive: Individual, Economy, Community and Environment

To be sustainable VET needs to be of high quality, agile and responsive. It needs to respond to learners' goals and needs, accommodating different ways of learning, letting learners explore and apply according to their interests. It also needs to be responsive to the economy, by developing skills that can be deployed in the labour market and lead to decent jobs – the Singaporean SkillsFutures[27] initiative has rolled out a set of initiatives to this aim. While much of the literature on the future of work paints a rather bleak picture of the prospects of the middle of the labour market, shortages persist in various intermediate skilled positions. VET has traditionally catered for this segment of the labour market. Clearly VET continues to be relevant. But there is a far-from-perfect field match between the VET programmes learners undertake and their later occupations in the labour market. Moreover, labour market trajectories have become increasingly fluid. Being responsive, in this context, may mean, increasingly, to prepare learners for further learning and for a group of related occupations rather than more narrowly for a single occupation. It additionally may mean preparing for entrepreneurship, in the traditional sense, as well as for self-employment and periods of gig work.

There are various recent trends in Europe that attempt to make VET more responsive to economic needs. They include strengthening the involvement of industry in curriculum design (see for example the T-level initiative in the UK), the revitalisation of apprenticeships and attempts to expand the skills developed in VET to better include transversal skills – as noted earlier. Modularisation, micro-credentials and alternative credentials – sometimes sitting within national qualification systems and other times outside them – all aim to make skills development systems more agile and responsive, at a time when the task structure of jobs can change rapidly[28]. But VET also has an important role in contributing to the development of local communities and meeting their needs and this should not be forgotten.

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27. (https://www.skillsfuture.gov.sg/). Checked on 5 July 2022.

28. Brown, P., Lloyd, C. and Souto-Otero, M. 2018. The prospects for skills and employment in an age of digital disruption: a cautionary note. SKOPE Research Paper, 127(127); Bisello, Martina, Eleonora Peruffo, Enrique Fernández-Macías, and Riccardo Rinaldi. 2019. How computerisation is transforming jobs: Evidence from the Eurofound's European Working Conditions Survey (No. 2019/02). JRC working papers series on Labour, Education and Technology.

D. Permeability

Education frequently operates in silos. Secondary education VET routes were often a terminal route that did not give access to higher education. Today, progress has been made in enhancing the permeability of systems, connecting secondary VET with higher education levels. The breaking down of silos within formal education can also be related to the breaking down of barriers impeding interdisciplinary projects on sustainable development. But by permeability in VET I refer also to the permeability between formal learning, the learning that takes place within formal education institutions, and learning that takes place outside them: non-formal learning[29]. VET has traditionally had strong connections with the world of work, in particular in dual systems that combine learning in educational institutions and on the job – which are important components of the German and Austrian VET system, and emerging components in other European countries like Spain. But much can still be done in terms of connecting the learning that takes place within formal education institutions and outside. The German 2017 National Action Plan on Education for Sustainable Development[30] noted that "additional potential for ESD is to be identified in TVET by integrating formal vocational education and training with informal/experience-based education/occupational experience. Innovations from operational practice are to be incorporated more rapidly into TVET". Estonia is among the European countries wherein the integration of formal and non-formal learning has become a policy priority. Current experiences encompass completing electives outside of formal education, compulsory "independent creative study projects" outside of school, and completing parts of the curriculum in non-formal learning environments.

E. Tech-savvy and human-centred

A key issue is whether the SDGs can be achieved through incremental change or the focus should be on disruptive projects. Proponents of the second approach have often turned to technology in order to bring about large impacts that can reach, potentially, billions of people – see Project Breakthrough[31], which aims to focus on

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29. Souto-Otero, M. 2021. Validation of non-formal and informal learning in formal education: Covert and overt. European Journal of Education, 56(3), pp. 365-379.

30. Federal Ministry for Education and Research. 2017. National Action Plan on Education for Sustainable Development: The German contribution to the UNESCO Global Action Programme. Berlin. p. 42.

31. (http://breakthrough.unglobalcompact.org/disruptive-technologies/new-realities/).

initiatives that can bring about disruptive rather than incremental change for the achievement of the SDGs (through virtual reality, augment reality and mixed reality), although adopting primarily a business focus rather than a focus on education. We should not be looking for a technological fix[32] to VET, in spite of the popularity of this approach[33]. However, technology undoubtedly has great potential to contribute to VET sustainability and to bring about scalable innovations[34]. New technologies such as virtual reality (VR), artificial intelligence (AI), big data, blockchain or robotics can transform the way VET is thought of and delivered, including through the creation of new learning environments, increasing organisational resilience and the facilitation of collaboration between institutions. Other tools such as learning analytics offer the promise of more individualised learning. Technologies can enable VET institutions to become more efficient, doing more with less, consuming less of the planet to train and educate through simulations of work situations rather than actual performance using high-energy-consumption machines, and through sharing and re-using resources, for example. The German Research Centre for Artificial Intelligence (DFKI) provides an interesting example of investment in the development of new technologies and methods to support training, teaching and learning in collaboration with education institutions, research centres, and EdTech companies[35]. The US-based non-governmental organisation Xprize, which aims to fund radical breakthroughs, recently launched a competition on rapid re-skilling, a 30-month competition to reskill under-resourced workers for the digital revolution by making intensive use of technology in continuing VET.

Technology can also help to inform VET curriculum design and provision, to make it more responsive to labour market needs. Labour market intelligence has been transformed in recent years. Time-lags in the reception of information about labour market trends can hamper responsiveness. Classic employer surveys were faced with lack of precision in the data they collected on skills required or the geographical and occupational area where those skills were needed, and can take months – sometimes years – to design and process. Today, new sources of information are available that help to address some of these shortcomings. Millions

32. Robins, Kevin and Webster, Frank. 1989. The Technical Fix: Education, Computers, and Industry. Basingstoke, Macmillan.

33. As already noted by Pavlova, Margarita. 2008.

34. OECD. 2009. Working out change: systemic innovation in vocational education and training. OECD, Paris, France.

35. See (https://www.dfki.de/en/web/technologies-applications/fields-of-application/learning-and-education). Checked on 9 September 2022.

of online job adverts provide labour market data in real time, and information on their skills requirements is parsed with great precision[36]. In this way, the identification of emerging skills or new occupational profiles can be more agile. Increasingly granular geographical information about labour market demands can inform the organisation, rationalisation and specialisation of curricular offerings at the local level. Vendors like Vector in the UK, endorsed by the Association of Colleges, bring together labour market information, demographic information and supply data on existing educational offerings in post-16 further education to inform institutions' curriculum decisions, enable them to avoid overlaps and find new niches. Naturally, providers cannot chase today's demands all the time. This is impossible. But they should not be persistently oblivious to labour market trends and systems for curricular change need to be flexible enough to enable them to respond to change. Supply data also needs improvement, as information on qualifications with strong currency in the labour market or where to find a good provider – transparency of the training market – is still hard to come by for learners.

Technology adoption may be affected by factors such as the psychological and health impacts that prolonged exposure to immersive virtual environments could have or concerns with privacy. There are also great concerns about privacy or reductionist approaches to education. Technologies are not without their perils, and it is important to assess and use technology critically. But they also have great promise in helping with individualisation, inclusion, efficiency and safety in VET.

F. Provision of adequate resources

The education system needs resources to contribute to sustainability and to be sustainable itself. SDG4 makes explicit reference to this. There is a widely acknowledged "investment gap" in VET, and this underinvestment needs to be reversed. Financial resources, on the other hand, do not need to be proportional to the scale of change required. Disruptive thinking and new efficiencies can be found to break that relationship.

Resources are not only economic, but also human. Qualified teachers and educators, in particular in countries where teacher training may have been traditionally less strong, need professional development on education for sustainable development. But the need is widespread, as clearly recognised in the Irish Second National

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36. For a discussion of the potential and limitations of this type of data see Brown, Phillip, and Manuel Souto-Otero. 2020. The end of the credential society? An analysis of the relationship between education and the labour market using big data. Journal of Education Policy 35(1): 95-118.

Strategy for Sustainable Development "ESD to 2030"[37] and the UK sustainability and climate change strategy for education and children's services systems[38]. Investing in the upskilling and reskilling of the VET teaching workforce is essential to making sustainability present in VET centres. Supporting VET ecosystems with strong quality assurance systems is needed, and sustainability aspects can be included as quality criteria in existing management and inspection regimes.

Learners need to contribute their "human resource" to VET too. This entails attendance, which in turn may require investment in scholarships, new infrastructure in rural areas or adaptative technologies to provide real opportunities for all learners. But it also includes motivation and enthusiasm, which are essential components for learning. These can be facilitated in a variety of ways, including through greater linkages with non-formal education, as discussed above. A note of caution is required here. Just like governments will not be asked to allocate all their resources to VET, neither should VET learners. There cannot be sustainable life without learning, but formal learning is only a part of life. Formal education that becomes pervasive in learners' lives is not sustainable – financially, emotionally, physically – and this can be overlooked at a time of obsession with benchmarking and assessments. This can result in unsustainable "effort inflation" in the endeavour to obtain better performance in education through, for example, intensive use of additional tutoring and the shadow education system[39]. This risk tends to be more accentuated in Asian countries like South Korea, Japan, India, Cambodia or China – where government actions have been adopted to try to redress the trend – than in Europe, and in general rather than in VET tracks, but is a factor to keep in mind when we think about a sustainable future for VET.

37. Government of Ireland. 2022. 2nd National Strategy on Education for Sustainable Development. ESD to 2030. (https://www.gov.ie/en/publication/8c8bb-esd-to-2030-second-national-strategy-on-education-for-sustainable-development/). Checked on 28 July 2022.

38. Department for Education. 2022. Sustainability and climate change: a strategy for the education and children's services systems. (https://www.gov.uk/government/publications/sustainability-and-climate-change-strategy/sustainability-and-climate-change-a-strategy-for-the-education-and-childrens-services-systems#action-area-3-education-estate-and-digital-infrastructure).

39. Bray M. 2022. Shadow Education in Asia and the Pacific: Features and Implications of Private Supplementary Tutoring. In: Lee W.O., Brown P., Goodwin A. L., Green A. (eds,). International Handbook on Education Development in Asia-Pacific. Springer, Singapore.

3. CONCLUSIONS

This article has reviewed the concept of sustainability in education and its incarnation in SDG4. Against the present challenging environment, it reflected on sustainable development's role, practice and approaches in VET, discussing its environmental, economic and social dimensions. It presented six guiding principles to consider in the path towards ensuring sustainability in VET. These refer to the adoption of a holistic conceptualisation, inclusion, responsiveness, permeability, human centredness in the use of technology and appropriate provision of resources. It is hoped that these reflections may spur greater progress towards sustainable development in and of VET.

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Learning Loss and Educational Inequalities in Europe: How is Europe Overcoming the Impact of the Pandemic

Peter Hefele

1. INTRODUCTION

For 15 years, Europe has been facing a series of fundamental crises, starting from the 2007/8 financial crisis, the Euro crisis of 2010, the migration crisis of 2015, the COVID-19 pandemic in 2020, to the most recent one, the Russian war on Ukraine. The detrimental effects – on politics and the economy – of those staggering and still unsolved crises have been widely discussed.[1] One sector, however, did not receive the kind of attention it should deserve due to its strategic importance for the future of each society: the education system. Between March 2020 and spring 2022 millions of young Europeans were locked out for months from all kinds of educational and para-educational institutions and activities. Hardly any challenge could be greater than not only minimising the negative impacts of the pandemic on the future of the next generation but also putting the "investment into education" at the core of Europe's recovery policies.

The following article will start with insights into the situation of the European education sector since the first wave of COVID-19 hit the continent in the late winter of 2020. It will further critically reflect on the measures taken by the local, federal, national, and European institutions to counter the negative impacts on the young generation. Out of this analysis, some recommendations will be drawn for coping with future crises in the education sector. The term "education"[2] is used in a broad sense, covering institutionalised forms of learning from kindergarten to university and beyond. Due to their important contributions to the development of young

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1. Among many see, e.g., Ivan T. Berend. 2017. The contemporary crisis of the European Union: prospects for the future. Abingdon, Oxon; New York, NY: Routledge.

2. The term "education" is used differently in different languages, comprising a variety of formal and non-formal measures and processes to support the physical and psychological development of children and young adults.

people[3], the diverse world of extra-curricular institutions such as youth work and sports activities is also taken into account.

Many problems of the current education systems in Europe are *not* the result of the COVID-19 pandemic or the countermeasures taken. They are deeply rooted in earlier political decisions and societal developments, and often have been known for decades but have not been properly addressed and corrected. Whether the experience of the last two years will help policymakers to courageously turn the wheel and address those erroneous trends must remain open for the moment. Given the diversity of the European education systems, the article doesn't aim at a comprehensive and detailed overview of all developments. It will rather focus on key factors and lessons learnt on how to successfully overcome one of the most serious economic and societal crises in recent European history – and provide a starting point for a better international exchange on the future of a more resilient education system.

2. FIGHTING THE PANDEMIC: INSTITUTIONAL WEAKNESSES AND LACK OF POLITICAL REPRESENTATION

When the first wave of the COVID-19 pandemic reached Europe in January 2020, most of the member states and the European Union itself were shockingly unprepared.[4] Despite recurrent warnings of new waves of global respiratory diseases since SARS and MERS, public administrations, the health sector, and businesses were caught almost unprepared. As an immediate reaction to curb further spreading of the virus, in-person education processes had to be transformed into a distant-learning mode within days – or were shut completely down as in the case of kindergartens and extra-curricular institutions such as those for sports or cultural activities. This had never happened in European history before, even in times of war.[5]

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3. This extra-curricular sector is widely underestimated in most discussions on education. It reflects a huge variety of national and local traditions and structures and is therefore difficult to define.

4. For a recent review of the crisis impacts on the European Union: Paulo Vila Maior, and Isabel Camisão. 2022. The Pandemic Crisis and the European Union: COVID-19 and Crisis Management.

5. See the thematic webpage of OECD for detailed studies on different sectors of education: OECD. The state of education during the COVID pandemic. (https://www.oecd.org/education/state-of-school-education-one-year-into-covid.htm). Accessed 1 August 2022.

The legal basis and administrative framework were set to a large extent at the *national* level, using existing or newly created legal provisions for disease control. In addition, extensive tax and fiscal measures[6] were taken by the European governments and the European Commission to cushion the negative economic impacts on economic activities, in particular labour markets, and to keep the health system functioning.

The situation for the education sector was rather complicated. In most European countries, decisions on education are made mainly through local and regional administrative bodies, reflecting the European tradition of strong local and federal self-administration.[7] The situation is a bit different with regard to the university and vocational training systems, where national governments and entrepreneurial organisations have a larger influence not least due to their funding. During the first waves of the pandemic, governments tried to impose uniform rules on all educational institutions based on national health laws, leaving almost no space for individual institutions to decide to what extent and in which ways they could organise schooling and training under those new circumstances. Only later and based upon prior experiences was more decision-making power given back to lower-level administrations. But that often led to rather confusing situations on the ground, when, e.g., different rules on quarantine were applied even within one city. Consequently, discussions among parents and politicians became very heated and led to a massive decline in trust in politics.

In retrospect, it is still surprising that there had been almost no contingency plans for the education system. This disruptive external shock hit the system in almost every aspect: the legal responsibilities of employers and employees, e.g., in terms of the health of the teachers; the new infrastructural demands to switch to remote learning; the role of the parents as co-educators; and social and psychological assistance to the children.

Yet, the most affected – the children and young adults – had almost no say. Decision-making during the lock-down lacked very much a proper representation of the interests of the young generation – a phenomenon well-known in many

6. OECD. 2022. Tax Policy Reforms 2021. Special Edition on Tax Policy during the COVID-19 Pandemic; OECD. 2021. Tax and Fiscal Policies after the COVID-19 Crisis: OECD Report for G20 Finance Ministers and Central Bank Governors, October 2021.

7. Wolfgang Hörner, Hans Döbert, Lutz R. Reuter, and Botho von Kopp. 2015. The Education Systems of Europe.

policy fields and demographically ageing societies such as the European ones.[8] This is, firstly, the result of an administrative/constitutional fragmentation in many European countries in the field of education, where clear political responsibility is often blurred. Secondly, decision-making in federal systems often takes a long time to find a consensus and to ensure internal coherence. And thirdly, there is a blatant lack of empirical data and clear scientifically based recommendations[9] – even after two years of the pandemic – which threatens to undermine the trust and legitimacy of democratic systems. An open and fair discussion on who has to shoulder the load of the pandemic has hardly begun. If not properly resolved, this question has the potential to wedge apart the intergenerational cohesion of European societies. It will also widen social inequality as over the last 15 years Europeans have been facing an ever-increasing combination of economic, political, and social crises, culminating in a massive "stress symptom", which may threaten the very fundaments of European democracies.

3.   PSYCHOLOGICAL CONSEQUENCES: THE PRICE TO PAY

At the peak of the pandemic, it was estimated that schools in 188 countries had been closed, heavily disrupting the learning process of more than 1.7 billion children, young adults, and their families.[10] There is hardly any similar situation in recent history to be compared with. Psychological theory and empirical research have just begun to analyse and explain the short, but more importantly *mid- and*

8. Julian A. Hettihewa, and Anna Holzscheiter. 3 December 2020. Reclaiming the Voice of Youth: Pandemic Politics and Law and the Invisibility of Youth. (https://www.ejiltalk.org/reclaiming-the-voice-of-youth-pandemic-politics-and-law-and-the-invisibility-of-youth/). Accessed 1 August 2022.

9. The results of a recent evaluation of COVID-19 measures in German clearly show the striking uncertainties in science and politics as to how to effectively fight against the disease. For the German case see Sachverständigenrat. 2022. Evaluation der Rechtsgrundlagen und Maßnahmen der Pandemiepolitik. (https://berliner-zeitung.de/blz-public/files/2022/07/01/ed01c861-6a3e-4dae-bf74-08fd5ecf380b.pdf). Accessed 1 August 2022; OECD Policy Responses to Coronavirus (COVID-19), First lessons from government evaluations of COVID-19 responses: A synthesis. (https://www.oecd.org/coronavirus/policy-responses/first-lessons-from-government-evaluations-of-covid-19-responses-a-synthesis-483507d6/). Accessed 1 August 2022.

10. OECD. 2020. OECD Policy Responses to Coronavirus (COVID-19), Education and COVID-19: Focusing on the long-term impact of school closures. (https://www.oecd.org/coronavirus/policy-responses/education-and-covid-19-focusing-on-the-long-term-impact-of-schoolclosures-2cea926e/). Accessed 1 August 2022.

long-term effects of closures of education institutions.[11] To get a rough idea of those effects one can differentiate between (a) the potential learning losses in a narrow sense[12] and (b) more general effects on the psychological development and health of the younger generation.[13]

a) A review of existing literature in different countries shows that the transition to remote learning has always led to significant losses both in the quantity and quality of learning content. A rough estimation of this specific impact can be given only for standardised curriculum-based education processes. But the latter covers only one part of the development of children. Important contributions to a successful upbringing come from non-standardised, less organised, and controlled environments, e.g., through interactions within peer groups. A correct estimation of the damage has to take into account this extended framework. Yet, those consequences can only be judged based on individual case studies. It is almost impossible to get large-scale and longitudinal studies. It is estimated that, in the worst case, losses might sum up to half of the normal curriculum. For complex development processes in a pre-school or extra-curricular environment, no solid estimation can be given. But if we take the rising numbers of psychological cases (such as depression, anxiety and social retreat, but also lack of physical activities) among the young generation as a proxy variable, a significant number of children have been suffering from the direct consequences of school closures and indirect ones, such as increasing tensions and violence within the family.[14]

b) The last observation leads to the second cluster of negative consequences. Regarding mid- and long-term effects, the individual capacity to cope with

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11. For the US see: Ashley Abramson. 2022. Children's mental health is in crisis. 1 January 2022, Vol. 53. No. 1, American Psychological Association. (https://www.apa.org/monitor/2022/01/special-childrens-mental-health). Accessed 1 August 2022. School closures are considered as the major variable in explaining negative impacts. But many other factors have to be counted in.

12. The difference between what could have been achieved in a traditional learning environment and by new forms of distant learning.

13. See OECD. 29 June 2020. OECD Policy Responses to Coronavirus (COVID-19), Education and COVID-19: Focusing on the long-term impact of school closures. The latter "hysteresis" effect is a bit similar to the effects of long-term unemployment.

14. In a recent study in Germany, 70 per cent of the children feel burdened, and a quarter complained of massive conflicts within the family; see: Kurt Hahlweg, Beate Ditzen, Ann-Katrin Job, Judith Gastner, Wolfgang Schulz, Max Supke, and Sabine Walper. COVID-19: Psychologische Folgen für Familie, Kinder und Partnerschaft. (https://econtent.hogrefe.com/doi/10.1026/1616-3443/a000592).

those challenges can be best described in terms of resilience. This well-known concept in psychology[15] provides both an analytical background and a starting point for individual and collective intervention. While, e.g., losses described under a) might be compensated over time inside the educational system, effects on overall personal development might become apparent only after a certain time delay ("hysteresis") and might be difficult to attribute to COVID-19.

What we, therefore, can assume is that the COVID-19 pandemic has led to *complex stress syndrome among children in sensitive phases of their development process*. Like in medicine the decisive point of therapy is providing enough physical and mental resources to cope with these challenges. In most cases, this task of compensating those losses can't be left to the individual child or its family. The (ongoing) experience of the pandemic is a wake-up call to critically question institutional settings, priorities, and the value of education in European societies. In the last chapter, several recommendations will be drawn out from these findings.

4.   SPEEDING UP THE DIGITALISATION OF EUROPEAN EDUCATION SYSTEMS

For the last two decades, digitalising education processes has been repeatedly claimed as a "Copernican turn" and "magic wand" to overcome the weaknesses of traditional training methods and institutions. Even if the empirical proofs for those claims have remained rather weak, hopes to compensate for the losses by "virtualising" them dominated the discussion and narrowed down the range of alternative solutions.[16]

First, there was and still is a massive resistance within the education system against giving digital forms of learning – or at least hybrid forms – a wider range. Most European countries lag years behind in terms of digital hardware and software infrastructure, and the situation of the education sector has often been even worse in this respect. Before the pandemic, only a few institutions had systematically developed roadmaps for merging traditional and digital ways of teaching from

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15. David Fletcher, and Mustafa Sarkar. 2013. Psychological Resilience. A Review and Critique of Definitions, Concepts, and Theory. European Psychologist 18/1, March 2013. (https://doi.org/10.1027/1016-9040/a000124). Accessed 1 August 2022.

16. See for a critical review and the complex pedagogical challenges: Fanny Pettersson. 2021. Understanding digitalization and educational change in school by means of activity theory and the levels of learning concept. Education and Information Tech 26, 187-204 (2021).

the perspective of learning processes. Second, even today, many actors still share a rather simplistic, "technicist" view of digital education, focusing on providing hardware and software. Most teachers – and children – had never been properly trained in using digital technologies. They don't understand the completely different environment and necessary preconditions for effective teaching under those circumstances. Only a minority of teachers have been sufficiently capable and motivated to seriously take up this challenge and maintain an almost equivalent quality level of education. In other parts of the education system, such as in kindergartens, there are hardly any processes and contents which can be digitised; almost all development processes depend on personal interactions, which can hardly be substituted.

In often desperate moves, the governments quickly allocated massive funds to push ahead with investments into digital infrastructure.[17] But till today the problems lay often not in the funding *per se*[18] but a lack of capacities *within* the educational institutions: Lengthy procurement procedures, missing common standards for software and privacy protection, and insufficient allocation of human resources in supporting and maintaining the new digital platforms – have all led to a massive decline or at least underperformance in learning effectiveness over the last two years. On the part of the pupils and their families, problems continued at home, in some ways very similar to what happened in the institutions. Social inequality in terms of the family budget and education level very much determined to what extent the digital transformation of education could be "digested" inside the families, e.g., by providing computers or allocating time to support the children as "co-teachers". Further, one has to consider that many parents themselves were facing huge challenges at the same time due to being forced to work at home or even losing their jobs. In many cases, the learning environment at home had massively deteriorated, due to lack of space, conflicts, and danger of distraction.[19] The situation was quite similar for university students, even if we assume a higher degree

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17. The statistics on educational expenditure by Eurostat don't provide exact data on investment in digital infrastructure; see: Eurostat, Government expenditure on education. (https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Government_expenditure_on_education#Expenditure_on_.27education.27). Accessed 22 August 2022.

18. The Federal Government of Germany launched a DigitalPakt Schule in 2019, providing 5bn Euro for digital infrastructure in schools, and adding another 1.5bn in 2020; see Bundesministerium für Bildung und Forschung, Was ist der DigitalPakt Schule? (https://www.digitalpaktschule.de/de/was-ist-der-digitalpakt-schule-1701.html). Accessed 22 August 2022.

19. See, e.g., Tušl, M., Brauchli, R., and Kerksieck, P. et al. 2021. Impact of the COVID-19 crisis on work and private life, mental well-being and self-rated health in German and Swiss employees: a cross-sectional online survey. BMC Public Health 21, 741 (2021).

of self-organising learning processes.[20] But even in higher education, the challenges of self-motivation and discipline remained high. For the important sector of pre-schooling, digitalisation was and is almost irrelevant, as constant personal encounters with teachers, nurses and the peer group are crucial for any development processes in early childhood.

5. TRANSNATIONAL EDUCATION MOBILITY

So far, the situation of *domestic* education has been analysed. But Europe has developed into a leading global learning space and one of the largest education markets – at least in academic education, attracting millions of foreign students. Since the late 1980s, students' mobility within the European Union and neighbouring countries has significantly increased, not least due to the support of exchange programmes such as Erasmus, and the mutual recognition of qualifications.[21] In parallel, overseas exchange numbers have also risen, in particular after the end of the Cold War. In 2018 roughly 1.3 million students from abroad studied in the EU-27 countries[22] while attempts in the field of vocational training had been less successful, i.e., through the Leonardo programme.

Already during the first wave of COVID-19, *in-person* exchange of students had come to an almost complete halt. Numbers sank dramatically between 2019 and early 2020 and haven't fully recovered even in 2022. The numbers of foreign students probably overestimate the real decline as many exchange programmes tried to survive by switching to online courses.[23] But this could only marginally compensate for the loss of experience and quality of education which come along with an in-person exchange and life experience abroad. In terms of financial losses, the highly commercialised Anglo-Saxon university system suffered the most, in

20. The largest global survey is currently the COVID-19 International Student Well-being Study (C19 ISWS) in 26 countries and 110 higher-education institutions (HEIs). See Van de Velde S., Buffel V., Bracke P., Van Hal G., Somogyi N. M., Willems B., and Wouters E. 2021. C19 ISWS consortium. The COVID-19 International Student Well-being Study. Scandinavian Journal of Public Health. 2021 Feb; 49(1):114-122.

21. See for the creation of European Higher Education Area in the course of the Bologna Process: Shams, Farshid, Huisman, Jeroen, C. C. Hsieh, S. Wilkins, and C. Adelman. 2012. The Bologna process and its impact in the European Higher Education Area and beyond.

22. This includes students from other EU countries (roughly 70 per cent) and non-European countries.

23. Erasmus Student Network ESN. 2020. Student Exchange in Times of Crisis. (https://esn.org/covidimpact-report). Accessed 2 August 2022.

contrast to the predominantly state-funded continental institutions.[24] And it can be predicted that even after all COVID-19-related travel restrictions are abolished, structural changes in transnational education "markets" will remain, affecting the European education "market". For example, the number of Russian and Chinese students (the latter have always been the largest non-European group) will probably be significantly lower than that before 2020, due to political reasons.

Discussing the role of the European Union, it is only since the Maastricht treaties of 1992, that the European Commission has tried to get more engaged in the field of education and training insofar as transborder issues are concerned.[25] The demand for facilitating cross-border education and mutual recognition will increase, while the major responsibility of compensation for COVID-19-related losses will stay with the nation-states. A more important aspect is the intelligent use of the COVID-19 recovery funds, governed by the European Commission. While 30 per cent of the funds are dedicated to fighting climate change[26], education has been mentioned but not prioritised.

6. RECOMMENDATIONS

Even though we are not yet in a post-pandemic world, some conclusions and recommendations can already be drawn based on sufficient international experience over the last two years.[27] The point of reference for any recovery policy in the field of education has to be the *concept of resilience*: to develop effective strategies to compensate for or avoid learning and other development losses and to be better prepared for future external shocks. During the last two years, it has become obvious that all stakeholders in education processes have to take their respective responsibilities and join efforts. Too many had been quick at calling for the government to be the solely responsible stakeholder. This does not reflect the

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24. Oliver Hall. 2022. University sees 'stark' decline in EU students post-Brexit. (https://cherwell.org/2022/05/15/university-sees-stark-decline-in-eu-students-post-brexit/). Accessed 22 August 2022.

25. (https://www.daad-brussels.eu/en/eu-higher-education-policy/overview-of-eu-higher-education-policy/). Accessed 22 August 2022.

26. For the recovery plans see (https://ec.europa.eu/info/strategy/recovery-plan-europe_en).

27. For regularly updated overviews see UNESCO. COVID-19 Recovery: Working together to restore our shared humanity. (https://www.unesco.org/en/covid-19?hub=800). Accessed 2 August 2022; OECD. The State of education during the COVID pandemic. (https://www.oecd.org/education/state-of-school-education-one-year-into-covid.htm). Accessed 2 August 2022.

complexity of the challenges, which would be beyond the resources of even the richest European countries to address individually and which would be against the European principle of diversity and subsidiarity.

1. Each rational policy has to be based on scientifically valid and reliable data. In sharp contrast to the enormous impacts of the pandemic, empirical data on the scope, intensity and even necessity of the containment measures on the young generation in Europe is appallingly bad. In addition to national surveys, the OECD and UNESCO are probably best suited to provide a framework for continuously observing the development, e.g., by extending the regular Project for International Student Assessment (PISA)[28] and including questions related to the mid- and long-term impacts of the crisis.

2. Given the substantial increase in fiscal spending to overcome the effects of the pandemic, too many resources in the education system are still being spent on assumptions which are not empirically founded, not sufficiently specific and not effectively targeted. European policymakers and those responsible in the education sector are still poking around in the fog on how to balance, for example, protection against maintaining open educational spaces – and those who suffer most from this deplorable ignorance is the young generation.

3. The role of the individual education institution has to be strengthened. As with the negative impacts, successful post-pandemic recovery depends on many, very specific and local factors, such as social structures, cultural traditions, etc. This knowledge is best available at the local level, where different resources can be combined best. A higher degree of financial and decision autonomy should be granted to educational institutions to enable quicker reactions and for more efficient spending. Private initiatives should be supported as well as they have become an important part of increasing the resilience of the European education system.

4. Even before the pandemic, the crucial role of families and small communities in crisis reaction had become clear. These small "structures" are also at the heart of each successful education and development process. In the field

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28. The OECD has already introduced a tool to capture learning experiences during COVID-19, the PISA Global Crises Questionnaire Module; see: (https://www.oecd.org/publications/a-tool-to-capture-learning-experiences-during-covid-19-9988df4e-en.htm). Accessed 2 August 2022.

of the integration of migrants, it is now commonly accepted that successful integration processes have to start in early childhood and that the family as a whole has to be addressed and not just the children. The situation in times of pandemic is quite similar. It has put many families under tremendous pressure, financially and psychologically. While the richer countries can rely on an already existing system of social services, poorer European countries are facing tough decisions about where to spend resources within an already heavily strained socio-economic environment. That's where Europe comes into the game, by cushioning those regional imbalances.

5. The education system plays a crucial role in the wider framework of national and European recovery plans. Yet, many measures are only loosely connected, often just labelled as recovery related. And beyond immediate recovery lies the bigger challenge of a sustainable transformation. Currently, we find (too) many loose ends in different recovery concepts. Individual and collective learning understood as a life-long process has to be put at the centre of a comprehensive transformation. The moment of the pandemic – as harsh as it may sound – should be used.

6. It took weeks and months for politics and the individual institutions to adjust internal procedures and develop curricular concepts to (re)establish a basis for teaching under totally changed conditions. This was partly the result of unclear political decisions at the higher national or regional framework on how to counter the pandemic. But it can be attributed also to the fact that prior homework had not been done at the level of many education institutions, e.g., in terms of digitalisation.

7. Procurement rules and regulations in terms of privacy for the use of digital tools should be homogenised at least at the national level, but more freedom in implementation should be given to individual institutions. Digital literacy has to be taught as early as possible.

8. It was not just the education sector which was affected by massive lockdowns. The whole "web" of extracurricular activities, organised by sports associations and religious organisations, as well as self-organised parents' initiatives, has been suffering, often hardly receiving any kind of additional support. But those contributions have to be acknowledged and backed. The danger to young people of disengaging not only in education but in a wider range of social activities and as active citizens could have long-term detrimental effects on the democratic system.

9. Despite being a very sensitive topic, there must be a debate on a fair sharing of costs among different parts of society. During the recent pandemic waves, the young generation has massively suffered, and the long-term effects on their development are not yet clear. Their voices and interests have to be better respected in political discourses and decision-making.

10. The experience of being locked out from institutionalised forms of education should be taken as a wake-up call that education in many European societies doesn't have the status it deserves. Increased spending on education should not be a short-term "wildfire" but the strategic importance of this sector should be recognised instead.

11. International exchange programmes have largely suffered from the pandemic due to the closing of borders, economic recession and shrinking/ shifting private and state budgets. In times of rising geopolitical tensions, decoupling, and systemic rivalry, European nations should maintain or even increase their efforts to facilitate the exchange of the young generation not only within Europe but also across continents. Successful programmes such as Erasmus+[29] should be expanded beyond Europe's borders to promote Europe as a unique space of education and training.

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29   Erasmus-plus.ec.europa.eu. Erasmus+. EU programme for education, training, youth and sport. (https://erasmus-plus.ec.europa.eu/). Accessed 2 August 2022.

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