Enhancing Human Security by Transforming Education Through Science, Technology, and Innovations[*]

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Abstract

This paper provides in-depth critical analysis and reflections on how technology, innovation and digital literacy can help to bring awareness on the need for a new dimension and approach to foster a transformational attitude towards education. Learning drives change, and if the aim is to make an impact, there is a need to enable collaboration between different disciplines so that new transformative educational models can emerge. The analysis identifies the role of pedagogy and how it can contribute to put forward humans as central and critical actors in using science, technology, and innovations (STIs) to foster human security. It explores the critical role of Higher Education Institutions (HEIs) and their engagement with science, technology, and innovation in the search for educational transformation that supports multicultural, diverse and inclusive learning environments within the tenets of social engagement and cohesion that guide us towards the principles of human security.

The first academic articles examining the neologism *human security* appeared over two decades ago, representing a breakthrough in security and human studies. The concept endeavoured to find a new way to engage with security issues in a broader context not limited to the military defence of states' interests and territories.[†] After a few years of discussion and debate, the human security framework has been mainstreamed as a general policy reference in International Relations, nonetheless without creating controversies around its complex implementation. In 2005, the World Summit Outcome adopted by all United Nations (UN) heads of states endorsed for the first time the concept of human security and one of its main

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[†] Paris, R. Human security: paradigm shift or hot air? International security, 26(2), 87-102, 2001.

components, the *responsibility to protect,*[*] which interrelated to the former, takes the need to protect human life as its centre stage in order to act preventively. The acceptance of the right of people to live in freedom and dignity, free from poverty and despair, and the responsibility of the state and the international community to protect populations from genocide, war crimes, ethnic cleansing and crimes against humanity seemed the right path to be followed.[†] This agreement attests to the centrality of human security on the international agenda and the need to act conclusively to achieve it. By taking a human security lens approach, one should widen the concept to those threats to the fulfilment of fundamental values in people's lives by understanding that societies and countries should work towards securing the basic needs of ordinary people.[‡] This is where education could play a role in ensuring individual development and the right to secure, peaceful living conditions. The adoption of the General Assembly resolution 66/290 on 10 September 2012 is considered a significant milestone for the application of human security. In paragraph 3 of the resolution, it was agreed by consensus that *"Human security is an approach to assist Member States in identifying and addressing widespread and cross-cutting challenges to the survival, livelihood and dignity of their people"* (General Assembly resolution 66/290).[§]

However, at the time of writing, we seem far away from the basic tenets of human security, and there is an imperative need to reflect profoundly on the meaning of education and how it can enhance human security. In addition, we can explore a different perspective on how human security can secure education and human development. We are facing significant challenges due to growing levels of conflict across nations and mounting environmental pressures derived from human economic and business activities and their harmful impact on our planet. We are immersed in ongoing wars and heightened conflicts affecting the stability of our global society and impacting our socio-economic, political, and environmental systems. We are undoubtedly facing a significant threat to global stability and peace due to human environmental intervention and continuous wars threatening our survival. Moreover, the educational literature has revealed a positive correlation between lower levels of education and increasing levels of violent conflict. Researchers argue in favour of reconfiguring educational systems to promote peace and social transformation. The literature provides significant evidence on how countries with higher levels of horizontal inequalities in terms of mean years of schooling generally experience higher levels of violence. The close association between education, conflict, and peace is closely connected to regional disparities in education within nation-states, a robust indicator of high levels of conflict in regions characterised by lower access to education.[¶]

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[*] Edson, S., Human Security: Na extended and annotated international bibliography. Common Security Forum, Cambridge: Centre for History and Economics, King's College, University of Cambridge, 22 November 2022

[†] Mugurusa, C.C. (2007) Human Security as Policy Framework: Critics and Challenges. Institute for International Law of Peace and Armed Conflict. University of Bochum, Germany. Annuario de Acci'on Humanitaria y Derechos Humanos. Year book on Humanitarian Action and Human Rights. Deusto Journal of Human Rights.

[‡] Des Gasper & Oscar A. Gómez (2015) Human security thinking in practice: 'personal security', 'citizen security' and comprehensive mappings, Contemporary Politics, 21:1, 100-116, DOI: 10.1080/13569775.2014.993906

[§] United Nations Trust Fund for Human Security (2016). Human Security Handbook.

[¶] Pherali, T. (2021). Social justice, education and peacebuilding: conflict transformation in Southern Thailand. Compare: A Journal of Comparative and International Education, 1-18. DOI: https://doi.org/10.1080/03057925.2021.1951666

Furthermore, we are facing enormous economic challenges due to significant pressures on commodities and natural resources that contribute to widening the gap between the world's most prosperous and poorest economies. Our countries' political, economic, and business leaders' decision-making processes are significant contributors to exacerbating existing conflict situations and active actors in creating new ones. The outcome is that our societies have weakened, the environment has deteriorated significantly, and unfortunately, it continues its degradation in a swiftly and unstoppable manner. Moreover, our societies, defined by critical socio-economic and political imbalances, are growing apart as we face significant problems in fostering the coexistence of diverse and inclusive societies. At the global level, our leaders cannot find a united front and committed approach to address the challenges associated with climate change and unfolding socio-economic dynamics.

> *"We need educational models that acknowledge the complexity of our cultures and social interactions if we wish to engage in comprehensive and context-specific solutions."*

We have yet to find the compass that guides us towards more equal societies that are balanced and strive to offer the same opportunities to everyone. In this paper, we argue that education is our vital compass in our search for meaningful change and in enacting required transformations. The global political and economic agenda does not acknowledge the seriousness of the economic and environmental threat and the significance of equity, diversity, and inclusion to help us move forward. Once more, economic agendas and political interests are at the centre of discussion, and we have forgotten that the lack of action and failure to commit and acknowledge responsibility are not options anymore. We do not have time to wait for the environmental crisis to fix itself. We need to be proactive and make an effort to drive real change. It is time for a strong and determined intervention from every country to ensure that we progress and place human security at the top of our political and economic leaders' agendas. To secure transformation in conflict areas and extended-lasting peace contexts in human-secured scenarios, we must understand the significance of peace and human security and its implications for political stability and economic development. Within the outlined context, education emerges as a critical tool that can contribute to our understanding of the seriousness of the situation and the need for immediate action. But to progress, we must carefully rethink how educational models and, in particular, how HEIs need to be transformed so that we can drive needed changes.

Technology and innovation are critical actors that will enable us to bring a different approach to our educational models and drive actions seeking real change and impact. This paper offers insights into how education is the way forward in our quest to minimise and manage conflict and to enhance human security. Our analysis reflects on the need for a new pedagogy that helps us to move forward and the significance of education to empower inclusion as a tool to minimise and manage situations that can lead to conflict and confrontation. We reflect on the significance of Society 5.0 and the complexities that emerge

between human interaction, technology, and innovation as we develop connections with the need for educational models that innovate, foster change, and have an impact.

1. Education and Pedagogy to Enhance Human Security

A *human-centred* and *human-first* approach towards education is essential to create awareness of humans' critical role in managing situations of conflict. Deep societal divisions are strongly connected to societies' educational levels. Therefore, developing, shaping, and reshaping educational models is vital to enhance human security as part of the curricula. We need to consider different viewpoints towards managing conflict; as such, education for human security should be fully understood and contextualised.

"Human security needs to be contextualised as part of existing educational models so that they can contribute to strengthening actions taken by educational institutions and their respective communities."

We desperately need actionable knowledge that helps us navigate the complexities of human relationships, interactions with society, and its implications for our understanding of sustainability on its multidimensional and multifaceted framework. Only humans can create new ideas and visions for the future, but humans are also quite predisposed to situations of dispute and confrontation. In our search for knowledge, we are prone to forgetting that we need to work together to embrace the wealth of sharing different views, opinions, and ways of doing things. Diversity and inclusion are critical elements to support our societies and help them to thrive and prosper. Still, at the same time, they are a significant source of conflict and differences. If we aspire to grow, develop, and progress as a global society, we must share ideas by enabling learning environments that promote cultural integration, diversity, and inclusivity. We must encourage open dialogues, be ready to engage with difficult questions, and be open to different views, opinions, and ways of doing things. Only in this way will we be able to co-exist and work together towards minimising conflict. We need to be open to supporting the development of ideas that challenge existing knowledge and the status quo, and we cannot be afraid of the power of different viewpoints.

We need learning environments that help us to be free, feel safe and welcome when sharing our vision and ideas as we dare to challenge and deeply question the status quo. As a global multicultural society, we are challenged with managing complex processes subject to uncertainty and continuous change. In their different dimensions, science, innovation, and technology are intrinsically connected to humans and are poised to play a critical role in how societies evolve and develop. However, at the centre of the process, we find economic and political agendas frequently lead to hostility and disunity that severely endanger our societies. Therefore, we require new and innovative pedagogies that enable the integration and promotion of human security as part of our learning and developmental process.

Human security is commonly understood as prioritising the security of people, especially their welfare, safety, and well-being, instead of a state-centred approach. Proponents of human security argue that poverty, population displacement, hunger, disease, environmental degradation, and social exclusion, for example, all bear directly on both human and global security. However, in the academic and specialised fields, the definitional scope of human security remains a subject of much debate based on the so-called narrow and broad approaches to human security. Each approach emphasises a different goal of human security, where the broad one refers to *freedom from want* and can be framed within a development agenda. The narrow one concerns *freedom from fear*, which is articulated in the domain of human rights.[*][†] As we reflect on the significance of human security, it is possible to articulate its essential role as it can serve and act as a guiding analytical lens and a programming framework that complements and enhances mechanisms to attain the United Nations Sustainable Development Goals (SDGs). An important aspect to reflect upon is how human security initiatives engage closely with people and communities to uncover their specific needs and vulnerabilities and propose policies and actions based on their priorities, resulting in sustainable development gains across and within countries.

As essential priorities, we need to work towards ending exclusion, isolation, marginalisation, and all forms of violence. Our societies must cherish human security by promoting, creating, facilitating, and protecting safe and appropriate learning environments that nurture open dialogue, cooperation, knowledge exchange and critical debate. The learning process should consider human security as integral to existing educational models and developmental paradigms. We need to be able to address the root causes of social exclusion by bringing forward the significance of promoting peace and sustainable economic development, where our society makes an effort to address a very diverse range of issues. Undoubtedly, our contemporary educational models are not fit for purpose, and our educational systems need to transition towards actionable pedagogies that acknowledge all forms of discrimination and deprivation and that should not be limited to specific forms of violence or environmental degradation. We need educational models that acknowledge the complexity of our cultures and social interactions if we wish to engage in comprehensive and context-specific solutions. Our educational models and modes of learning, teaching, and doing research should promote actionable change and be active in creating safe spaces for human development and critical inquiry. Researchers and academics need to consider how pedagogy can relate to human security and examine to which extent it might be possible to integrate the application of human security principles as part of the learning process. Our students should be able to play a part in the application of human security, and our academics need to take an active role in reimagining and questioning existing learning, teaching and research environments and processes to enable the transition towards actionable pedagogies.

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[*] Mugurusa, C.C. (2007) Human Security as Policy Framework: Critics and Challenges. Institute for International Law of Peace and Armed Conflict. University of Bochum, Germany. Annuario de Acci'on Humanitaria y Derechos Humanos. Yearbook on Humanitarian Action and Human Rights. Deusto Journal of Human Rights.

Des Gasper & Oscar A. Gómez (2015) Human security thinking in practice: 'personal security', 'citizen security' and comprehensive mappings, Contemporary Politics, 21:1, 100-116, DOI: 10.1080/13569775.2014.993906

United Nations Trust Fund for Human Security (2016). Human Security Handbook.

[†] General Assembly (2005) 2005 World Summit Outcome 2005, A/60/150. 15 September, pp. 143

Human security needs to be contextualised as part of existing educational models so that they can contribute to strengthening actions taken by educational institutions and their respective communities. Students, teachers, and researchers should be able to actively contribute to realising the transformative promise of the UN's 2030 Agenda and the SDGs as we acknowledge our social failure to commit to this ambitious agenda. Thus, based on its central aim to achieve freedom from fear, want, and indignity, human security can help address challenges stemming from and resulting in persistent conflicts, marginalisation, and abject poverty. Therefore, programmes and learning outcomes need to focus on setting priorities and achieving integration by emphasising the triangular relationship between peace and security, development, and human rights by highlighting their vital connections.

Within this context, we can consider the multiplier effects associated with poverty reduction strategies. Without a doubt, poverty, inequality, and economic imbalances can be identified as the root of extreme violence and many other forms of human fragility. Therefore, education needs to be attuned to root causes and remedial solutions if we aim to achieve inclusive and sustainable development. Therefore, a new, focussed pedagogy is needed to recognise that development, peace, security, and human rights are interlinked and mutually reinforce the central objective of human security—that is, the security of people.

2. A New Educational Paradigm – Transforming Education to Empower Inclusion and to Minimise Conflict

We live in a hypercomplex environment that is affected by high levels of uncertainty and interconnectedness, in which we have to deal with unknown challenges as we try to find a balance.[*] A significant body of literature highlights these immense challenges, and HEIs are crucial in creating open, transformative, and transnational environments across countries. In order to achieve a sustainable balance between economic, social and ecological challenges, we must examine how digital and technological advances can provide support amidst a climate crisis and rising levels of economic and political instability.[†] To a different extent, technological developments are changing lives and disrupting labour markets.

Democracy and political systems are under significant pressure, and we must find ways to manage unprecedented political and socio-economic disparities. We are witnessing a significant erosion of the public debate through worrying levels of misinformation. The world order is changing rapidly, and research, innovation and education have become increasingly important factors contributing to exacerbate social disparities and demographic changes in many countries. Our social systems are under severe pressure that has been aggravated by the impact of the 2020 global health crisis, which led to the acceleration of change.

In order to be open, transformative, and transnational, we must create an open physical and virtual space in which students, teachers, and researchers should work together assuming interchangeable roles to promote sustainability, diversity, and engagement as recommended

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[*] UNESCO (2021). *UNESCO Science Report: the Race Against Time for Smarter Development.* S. Schneegans, T. Straza and J. Lewis (eds). UNESCO Publishing: Paris.

[†] EUA (2021) European University Association (February, 2021). Universities without walls. A vision for 2030 available at: https://eua.eu/downloads/publications/universities%20without%20walls%20%20a%20vision%20for%202030.pdf

in the *University without walls* document (2021). Sustainability comes to light as the answer to inequities in the economy, society, and environment, and through this worldview, we should promote solutions considering the needs and idiosyncrasies of societies and cultures. In this context, diversity must be valued in the first place and must be considered as a source of supporting the development of societies. In this regard, HEIs should welcome students and teachers from all backgrounds without differentiation. However, this is not an easy process, even if it is done naturally and in alignment with many theoretical studies in this prolific area of research. The extant literature advocates for the need to design learning and research environments according to diverse students' and staffs' needs to ensure a broad knowledge base for society through curiosity-driven research. However, real-life learning environments are quite far from achieving this for two main reasons: i) diversity is not easy to accept, implement and value; we are driven by an individualistic culture where we keep competing for ideas and resources, as we seek to achieve and secure personal development, status, and prestige; ii) we keep separating education from research or research from education. As such, the teaching and learning process is detached from research activities, which leads to disruptions in the knowledge flow, simultaneously creating significant barriers in the knowledge-sharing process and in our understanding of the circular dimension of the student-teacher-researcher roles.

In our competitive societies, it is challenging to accept diversity and promote inclusivity and equity in all activities and spheres. However, the problem is not limited to the educational context, where we have a significant body of research where the concepts are presented and discussed beautifully.[*] Relevant concepts consider the importance of social justice and the distribution of rights, resources, and power between individuals and the society.[†] Even if inclusion, equity, and diversity are hot topics on the political agenda and we have the legislative framework for implanting and promoting this concept, we cannot ignore the gap between this beautiful and stringent global direction and its detachment from real life. And these are concrete aspects reported in the latest reports presented by the European Commission.[‡] At this point, we would like to raise the following questions: Why is it so difficult? What is failing? Unfortunately, responding to these questions is complicated because we live in complex environments with many variables interacting simultaneously, leading to the generation of diverse and compounded scenarios. Still, we can presume that the core element for changing the present situation is to challenge our way of thinking about ourselves, about the world and about life itself. Even if we are aware, our worldview, defined as the set of core beliefs, guides our actions, influences, and moderates our daily choices and decisions. We are creating and recreating the reality based on this worldview that started developing during our early developmental stages and is affected by biological components and by continuous interaction with the environment.[§] Having this in mind, according to Kuhn,

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[*] EHEA (2020), EC (2020), UNHCR (2019) European University Association (February, 2021). Universities without walls. A vision for 2030 available on https://eua.eu/downloads/publications/universities%20without%20walls%20%20a%20vision%20for%202030.pdf

[†] European Commission/EACEA/Eurydice (2022). European Commission/EACEA/Eurydice, 2022. Towards equity and inclusion in higher education in Europe. Eurydice report. Luxembourg: Publications Office of the European Union

[‡] European Commission/EACEA/Eurydice, 2020a, European Commission/EACEA/Eurydice, 2018, European Commission/EACEA/Eurydice, 2015, European Commission/EACEA/Eurydice, 2012; European Commission/EACEA/Eurydice, 2020b).

[§] Denzin, N. (2008). The new paradigm dialogs and qualitative inquiry. International Journal of Qualitative Studies in Education, 315–325. Disponibil la http://in.bgu.ac.il/ icqm/DocLib/ Pages /2008/Norman%20K.%20Denzin.pdf.

a paradigm is a universally recognised scientific achievement that, for a period of time, offers problems and models solutions to a community of practitioners.[*,†] From Kuhn's point of view, paradigms are resistant to change because they are deeply rooted in our educational models and in existing teachers' practices, perceptions, and ways of seeing the world around us. This paradigm can be changed only by personal or professional interventions that significantly impact our ways of seeing the world and by identification of anomalies (strange facts) until we realise the shift in paradigms in the way we think, act, and feel. When Kuhn developed his contributions, neuroscience did not have much power to support his vision. Still, nowadays, we are not fully aware of the impact of the models in developing the brain structure, how it functions, the potential implications for future generations, and how they engage with the learning process.[‡,§]

> *"We are in need of learning, teaching and research environments that nurture and foster the significance of human security as part of our education and development process that turns us into global and sustainable conscious citizens."*

Considering the gap between the different branches of knowledge and the incontestable data from existing research studies, we need to reconsider education as a critical tool that can help us face challenges and manage present inequities that are a significant source of conflict. Educational systems should be able to empower educators, researchers, and students by fostering inclusion and minimising levels of conflict at all levels of human existence. We need to develop a sense of belonging in which people can feel safe and valued regardless of individual peculiarities. Only in this way will we be able to value humankind's immense potential. We need a new educational paradigm that will allow us to live better, feel safe and secure with ourselves, others, and the environment, and better understand the universe around us. In this regard, we strongly advocate for the need to innovate and bring forward new educational models and pedagogies supported by innovation and technology to help us create and bring change to existing learning environments. We are in need of learning, teaching and research environments that nurture and foster the significance of human security as part of our education and development process that turns as into global and sustainable conscious citizens.

3. Society 5.0's Challenges in Education and Human Security

The development of human civilisation is linked to changing economic formations, and the current social and economic situation is influenced by how technology and innovation

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* Kuhn, T. (1970). The structure of scientific revolution. Chicago: University of Chicago.

† Guba, E. (1990). The Paradigm Dialog. Sage Publication.

‡ Banich, M.,T., Compton, R., J.,(2018). *Cognitive neuroscience*. Cambridge: Cambridge University Press.

§ World Bank (2018) World Development Report 2018: Learning to Realize Education's Promise. Washington, DC: World Bank. doi:10.1596/978-1-4648-1096-1. License:Creative Commons Attribution CC BY 3.0 IGO

are used to help people in their daily lives and to advance society, not to replace the role of people. While interactions, interdependencies and interrelationships are facilitated by digital platforms of the fourth industrial revolution, we need to move forward in understanding how technology and innovation can foster human security. The era of Society 5.0 allows technology to create a new multidimensional learning environment. Our educational systems and models must integrate new values that eliminate social, age, gender, and language inequalities. Therefore, technology and innovation are expected to provide products and services specially designed for various needs to solve humanity's problems, such as social inequalities and security, ensuring that a clear contribution is made to improve the quality of people's lives.[*] As such, technologies and innovation can create optimal conditions for human security. We acknowledge that technology and innovation can also contribute to instability, conflict, and destruction, but this happens if education fails to provide adequate conditions for human interaction with innovation and technological progress.

Society 5.0 has been initiated by the Japanese government and has been conceived as a people-centred society that will ensure an equilibrium between economic development, social problems, and quality of life. The basic scheme of it is depicted in Figure 1 below, and it is built on the idea that computers and the results of process data taken from the real world are provided back to the real world.[†]

Figure 1. Society 5.0's Data Stream. Source: Deguchi et al. (2020)
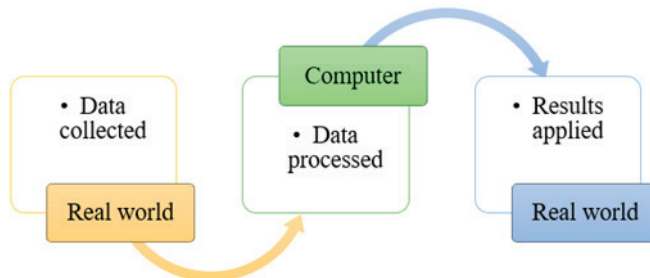
Society 5.0 uses Artificial Intelligence (AI), the Internet of Things (IoT), Big Data, Autonomous Robots, Simulation, Horizontal and Vertical System Integration, Cybersecurity, the Cloud, and Augmented Reality (AR) to solve social problems. The primary purpose is to use and integrate digital systems in virtual and real space—a working environment that requires higher-order thinking skills, the acquisition of which is a challenge and an opportunity for society. The new working and learning environments offer unlimited possibilities to learners to improve their problem-solving, critical thinking and social creativity skills. The overall purpose is to enhance learning capacities that lead towards the development of the

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* Tavares et al., 2022 Tavares, M. C., Azevedo, G., & Marques, R. P. (2022). The Challenges and Opportunities of Era 5.0 for a More Humanistic and Sustainable Society—A Literature Review. Societies, 12(6), Article 6. https://doi.org/10.3390/soc12060149.

† Deguchi, A., Hirai, C., Matsuoka, H., Nakano, T., Oshima, K., Tai, M., & Tani, S. (2020). What Is Society 5.0? In Society 5.0: A People-centric Super-smart Society (pp. 1–23). Springer. https://doi.org/10.1007/978-981-15-2989-4_1.

capital of the future.[*] The dynamics of the content and the range of diverse personalities of the learners represent real challenges in the metamorphosis circuit of the educational process. It is particularly important that trainers focus their preparation and vision on the future and the facilities offered by new digital technologies. An easy and beneficial way of engaging in the circularity of teaching-learning-research revolves around the competence to adapt the educational content, developed by technical support, and aimed at maximising and motivating the learning process. The strength of new IT tools and artificial intelligence can drive approaches that manage, transfer, and share knowledge from and to society. Education 5.0 is a response to the needs of the 5.0 society, where humans and robots work together to find solutions, face problems, and identify innovative possibilities for current human life. Therefore, HEIs can respond to social needs through different types of community engagement, through living labs approaches, where science education and stakeholders interact to define and shape their research and education agenda. HEIs should support the research of a high social impact and open ways to social innovation that responds to public and private values and needs while keeping open lines with technologies, innovation, and social advancements.[†] To accomplish these goals, HEIs should focus on promoting transdisciplinary research that permeates the educational offerings. We need to work towards the integration of the tenets associated with multicultural and plurilingual societies that embrace collaboration and knowledge exchange through open and constructive dialogue within collaborative learning environments. Promoting transdisciplinary research between areas of cognitive interest of different scientific disciplines highlights the importance of an education that could provide solutions for human security. The educational system needs to evolve towards greater inclusion of people, increasing the need to create new learning systems that are flexible, inclusive, accessible, and adaptable for all. The design of new curricula focusing on the digital skills needed to ensure the effective and appropriate use of AI and the choice of responsible pedagogical initiatives in research and innovation can expand human capabilities on a larger scale, with the opportunity to transfer power to communities and people, as well as to institutions working to ensure human security. The transformation of education through technological advances gives substance to high expectations for a broad spectrum of intelligent applications to support and enhance human competencies, whether in direct interaction with learners or autonomously to perform tasks. In this way, it becomes one of the pillars of human security. All the described actions can be observed in Figure 2 and interpreted as insights into our vision of how we can articulate human security. At the core of our approach is the need to promote balanced learning, teaching and research environments that bring together technology and innovations where students can thrive as they advance their learning processes, while taking different roles as students-teachers-researchers. This is our vision of a circular pedagogy for higher education that can contribute to bringing educational innovations.[‡,§]

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[*] Mytra, P., Wardawaty, W., Akmal, A., Kusnadi, K., & Rahmatullah, R. (2021, September 27). Society 5.0 in Education: Higher Order Thinking Skills. Proceedings of the 2nd Borobudur International Symposium on Humanities and Social Sciences, BIS-HSS 2020, 18 November 2020, Magelang, Central Java, Indonesia. https://eudl.eu/doi/10.4108/eai.18-11-2020.2311812

[†] Carayannis, E. G., & Morawska-Jancelewicz, J. (2022). The Futures of Europe: Society 5.0 and Industry 5.0 as Driving Forces of Future Universities. Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-021-00854-2

[‡] Pop, L., Barkoczi, N., Morales, L., Coetzer, J-H., Marian, C., and Flynn, P. (2022). Circular Pedagogy for Smart, Inclusive and Sustainable Education. EUt+ ELaRA Working Paper Series. Available at: https://unitar.org/sustainable-development-goals/peace/our-portfolio/research-publications

[§] Morales, L., Coetzer, J-H., Barkoczi, N., Pop, L., Marian, C., and Flynn, P. (2022). A Circular Pedagogy for Higher Education. Available at: https://unitar.org/sustainable-development-goals/peace/our-portfolio/research-publications

Figure 2: Educational actions for keeping pace with technological advancements to ensure human security. Source: Authors (2022)
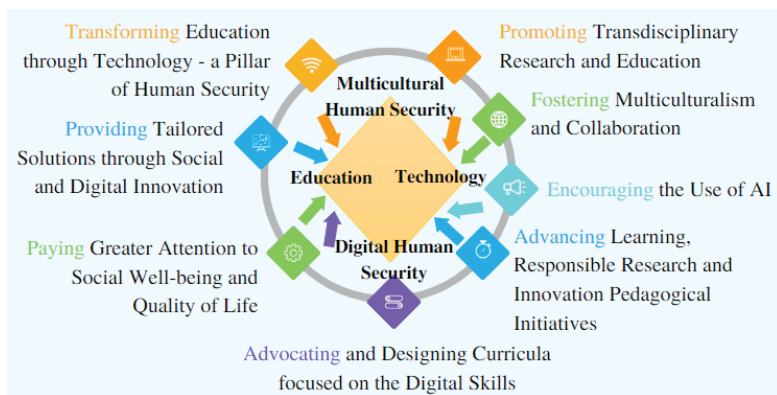
This type of innovative pedagogical strategy would enable the learner to acquire the skills to adapt and embrace a changing environment, to create new sustainable values and services for the benefit and equilibrium of the entire society. Era 5.0 is concerned with how ideas will influence everything around institutions and societies, adding a more humane and sustainable vision to social processes. This new kind of society aims to put people at the heart of innovation, explore the impact of technology, and integrate technology to improve the quality of life, social responsibility, and sustainability. Moreover, it is crucial to identify commonalities with the sustainable development goals (SDGs) and how they can be framed around human security.

4. Humanity's Complex Interactions with Innovation and Technology – Implications for Human Security

Innovation is the foundation of a knowledge-based society, and higher education plays a pivotal role in generating innovative ideas and fostering a culture of innovation-oriented generations of graduates. HEIs' responsibility to learners, educators and society is to provide an environment where established knowledge is acquired and used in innovative ways to generate further innovation. However, intellectual property, patents, and ideas need to create an impact that leads to socio-economic development and stability. Consequently, HEIs have established technology transfer mechanisms to commercialise intellectual property as well as measures to widen their academic entrepreneurial practices. Once university technology transfer mechanisms are in place, university research can contribute to the creation of economic value. Technological inventions which have the potential to drive economic growth are more and more the result of research within or supported by HEIs. University technology transfer allows many tech-reliant companies to reduce their own internal research and development and learn more by collaborating with higher education through these technology transfer

mechanisms.[*] However, this path of academic entrepreneurship must be more ambitious, beyond economic gains, if it wishes to engage in societal change and contribute to human security by ensuring equitable access to innovation outcomes. Studies in innovation research in higher education highlight two streams: one that focuses on the concept of disruptive innovation and the second one which involves more pro-society innovation.[†,‡] The first stream has been defined as research that leads to innovative products or services capitalising for monetary gains and disruptive innovations. Although they are ground-breaking and contribute to new technologies, they are mostly exploited for their economic value and are geared towards creating financial gains. A different stream of research has emerged where innovation can be harnessed to solve pressing societal challenges and to find solutions to use technology to address specific societal objectives.[§] In this view, academic entrepreneurship includes promoting not only patentable financial rewards generating innovative research but also innovation that leads to social welfare, human security, and positive societal development.[¶]

Universities are working towards more complex ways of building an entrepreneurial environment so that they can better deliver their mission of knowledge exchange in a broader sense.[**] With processes involved in transferring innovation from university research centres to society, the patent-centric linear model has been criticised for limiting the roles students can take in the process of knowledge creation and technology transfer. Collaborative models of innovative research, where students as additional stakeholders get involved, can lead to a more inclusive emerging academic ecosystem, reducing entry barriers for young scientists who consider engaging in technology transfer activities.[††] Thus, universities contribute to innovation and the entrepreneurial environment, serving all stakeholders and positively impacting society. Viewed from the perspective of innovation created by research in HEIs, the complex interaction of technology and society can be harnessed to focus primarily on providing human security and inclusive and equitable development. It starts with reshaping the boundaries of academic staff and student roles so they can better contribute to the University's third mission and credit them as academic entrepreneurs. Existing research offers interesting insights that show that such reconceptualisation of academic entrepreneurship (AE) and university technology transfer would mean *demonstrating [that] social impact is becoming a key indicator for measuring AE performance as an important aspect of universities' third*

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[*] Liang W., Scott Elrod, Daniel A. McFarland, and James Zou (2022). 'Systematic analysis of 50 years of Stanford University technology transfer and commercialization'Patterns 3, 1-9. https://doi.org/10.1016/j.patter.2022.100584.

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*mission.** Moreover, they state that by including more innovations that are perhaps less patentable and, hence, financially less interesting in the mainstream university technology transfer, *university research of all types can result in societal-based innovations that will lead to increased social value.*† Therefore, there is a need to recognize the importance of involving multiple stakeholders in the existing academic entrepreneurship and technology transfer models. With academic staff and students at one end of the innovation creation process and the users at the other, universities are well placed to best contribute to societal changes. The user-stakeholders should not be seen only as passive recipients of university innovation but rather as co-creators and partners in a *meaningful dialogue about potential hazards arising from new science and technology*.‡

"More efforts are required to promote the value of education and the importance of taking the United Nations 2030 Agenda seriously if we wish to enhance peace, minimise conflict and support the transformation of our societies."

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5. Conclusions and Critical Reflections

Overall, the world's political and economic agendas are a primary source of instability. We must turn our eyes towards education to help us better understand how we can navigate the challenges associated with the human security paradigm. Overall, human security is based on the fundamental recognition of people's different capacities, needs and circumstances to develop their lives and participate in civil society and governments. As such, we must understand the dynamics and complexities associated with the learning process. Only in this way, we will be able to understand how we can engage in the development and implementation of participatory solutions that protect and empower all people as change agents that embrace human security at the core of their activities and secure their personal development. Unfortunately, our educational models are not upto the challenge. We urgently need innovative pedagogies that embed the stated human security principles and the UN 2030 Sustainable Development Goals (SDGs) from an actionable paradigm. Our students live in a connected society but are not equipped with the necessary skills to be active drivers of change. On a positive front, education has begun to reconfigure itself on the dynamics of society. To some extent, the educational environment is adopting initiatives that have arisen from technological changes that capture attention, connect people, and develop more skills playing an essential role in promoting and strengthening the culture of human security. Our educators and educational leaders must be able to bring together the academic and research community to emphasise the central objective of pedagogy within higher education

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* Abreu, M., Demirel, P., Grinevich, V. (2016) 'Entrepreneurial practices in research-intensive and teaching-led universities'. *Small Business Economics* 47, 695–717. https://doi.org/10.1007/s11187-016-9754-5.

† (idem)

‡ (idem)

by acknowledging the significance of human security and its implementation in learning curriculums. The academic and research community need to take a more active role in contributing to a world free from fear and violence. More efforts are required to promote the value of education and the importance of taking the United Nations 2030 Agenda seriously if we wish to enhance peace, minimise conflict and support the transformation of our societies. There is no question regarding the economic and political implications of implementing the ambitious SDGs. Still, the world's inability to take the agenda seriously endangers our ability to co-exist and live in more balanced and equitable societies. As a result, we are on a path towards a significant increase in uncertainty resulting in human insecurity that can be readdressed by devoting more attention to our educational models and pedagogies guided by science, technology, and innovation.

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