Eubios Journal of Asian and International Bioethics

EJAIB Vol. 34 (2) March 2024
www.eubios.info
ISSN 1173-2571 (Print) ISSN 2350-3106 (Online)
Official Journal of the Asian Bioethics Association (ABA)

Eubios Ethics Institute

ASIAN BIOETHICS ASSOCIATION

Editorial: Education for a Better Future

The centrality of education and it's roles in the construction of the world we live in and in our decisions is highlighted in the first paper in this issue by Suma Parahakaran. How will the educational pedagogy and curriculum cope with the emerging use of artificial intelligence (AI) systems? Can we expect that our goals for sustainable development (SDGs) will be better achieved by new educational paradigms? The importance of values and teaching of values in the construction of ourselves has been shown in many studies across a range of culture. As this article concludes, educational curriculum must consider ways of improving intellectual competencies in knowledge management, data analytics, ethical decision making and critical thinking skills, of both learners and educators.

As more people are driven into poverty we see increased child labour, whether it be inside family owned businesses or in other places in the community. Does every child have a right to education, and if so until what age? Although this right is enshrined in the Human Rights Conventions, we could see more children unable to attend school during the Covid-19 pandemic. Lifelong education is really critical for public health as explored in mycological education by Alex Waller. Some basic knowledge of biology and science can enhance our health, and it is integral to bioethics education.

Aya Enzo presents an examination of governmental neutrality toward prenatal testing and selective abortion in Japan. As issues which draw a range of diverse and often opposing views, some would argue that the ethical position of a government is neutrality. Is that possible? If so it can be a model for others.

The paper by Luke Quintano looks into intergenerational solidarity as an example of our common good, i.e. a good which is of importance to everyone on our planet. Examples are provided to address the ongoing environmental crisis and social injustices by drawing insights from Scriptures and Pope Francis' papal encyclical Laudato Si'. We can see this also in a number of theological systems because it's not only a challenge of our time to be sustainable but a challenge for millennia on this planet. There remain many sources that can be used for education of bioethics including science, religion, and diverse systems of values that provide a solid foundation for our future. These papers examine how we are not doing enough in our world, and suggest how we might do better. Let's try.

- Darryl Macer

A Critical Analysis of the Degradation of Education and the solutions of the SDG's: Data is not enough for Policy Making for the Self and AI systems

- *Suma Parahakaran, Ph.D.*
Dean, American University of Sovereign Nations, Malaysia
sumjayan@gmail.com

Abstract
The article analyses the conceptions in ancient education, psychology and environmental education from the perspective of the Self and AI and discusses the inner revelations of the philosophies and psychological perspectives which contributed to development of human faculties and sustainable development of societies. The relevance of such philosophies is discussed with the existing educational theories. The rise of artificial intelligence (AI) is a result of scientific progress in technology and its efforts in solving the challenges for environment and education are discussed in detail. The challenges that are looming as the world that suffers from wars, climate change, disasters both natural and man- made will further create new obstacles to achieving the SDGs.

The study reviews various disciplines from the perspective of ethics and sustenance of the world. The United Nations has aimed at achieving targeted goals for 2030 and this study discusses specific areas on why the SDG's cannot be resolved using current policies unless there is a fundamental change in the way we educate learners and the practices that follow.

Policy makers have digressed in their decision making because they neglected the need to integrate human values and ethics into education and should reconsider new ways of disseminating knowledge and making new policies. The SDG's are not solvable without the entire world coming together to act with one resolution of ending poverty, world calamity, wars and natural disasters. Educational disciplines and the different pathways and the rise of AI is discussed with some light on why Education must play a big role in bring sustainability practices, do away with current educational practices such as the way assessments are done now in Higher Education and Secondary schools.
Key words: Artificial Intelligence, SDG's, Self, Education, Policy Making, Sustainability

Introduction

A metaphysical view of the evolution in education provides a critical view of how learners in schools and Universities have been diverted from the training of the mind and personal competencies for motivation of the Self and to frame components for Artificial Intelligence. The topics range from research outcomes in the discipline of psychology and how its relevance to learners understanding of knowledge has now evolved and educators readiness to use Artificial Intelligence.

The psychological aspects of learners and their mental wellbeing is now given more attention because of the recent issues with Covid but studies show results otherwise. A comparative study of health systems (1 January, 2020 or later assessed from samples collected from 1 January 2018 to 31 December 2019) before and during the Covid-19 pandemic evidence from a systematic review and meta-analysis of 134 cohorts revealed that among general population studies, no changes were found of general mental health but women or female participants had a small significant level of depressed or anxiety symptoms. Several other studies informed the research communities all over the world that many youngsters were depressed and had mental issues. The mental well being status is therefore of a great concern. Self regulation systems are designed to problem solve threats through coping procedures which makes efficient use of resources (Leventhal, Leventhal & Contrada, 1998).

According to Mukhi and Quental (2018), twenty-five years ago, 1700 independent scientists including the majority of living Nobel Laureates in the sciences had warned of the destruction of the Natural world. The current curriculum in education does not prepare citizens for this kind of education where sustainability concepts are discussed using a critical analysis related to larger issues such as climate change. There are suggested solutions to the environmental challenges which United Nations can take up.

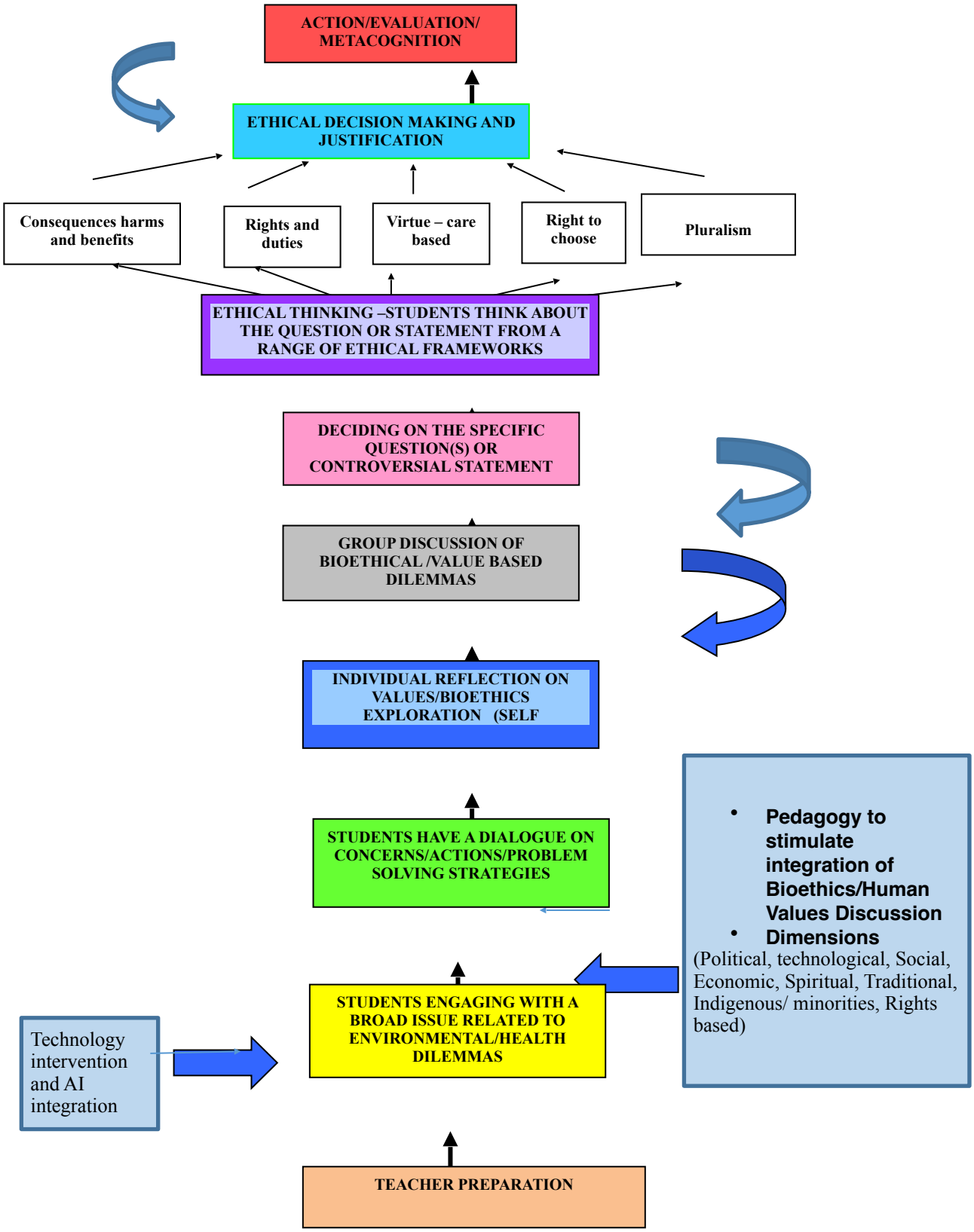


Figure 1 Model for Ethical Inquiry into Education/Health/Environmental Issues in Society (Reproduced with permission): Adapted from Saunders, K. J., and Rennie, L. J. (2013, p.270).

According to Lee (2020), Blue Economy, the recently built concept is rooted in several disciplines such as geo-economics, ecology and planetary boundaries which reinforces the need to reinvent new ways of teaching and learning. This means that subjects taught for education, sociology, environment and technology in relation to the training of the Self and the role they play in Society (SEETS) has to be taught in an interdisciplinary method.

There is a general concern over depletion of ozone layer, forest loss, biodiversity, climate change and continued human population growth and this demonstrates that there is a lack of "Self-Regulation" of the use of the Natural resources by humans and the understanding of our relationship with the planet. In fact, the alternative solutions are diverted to either technological solutions or on Artificial Intelligence led solutions and limited information on the self regulatory use of the natural resources as if to state that humans are unable to use the Self regulatory faculty they have. Learners have to be taught self regulatory strategies to gain success over their learning outcomes and this is retrieved from the cognitive domain by logically analysing and strategizing how one must use their own potential to regulate their time, attitudes and behaviours. Today, resilience and coping strategies are topics which are evolving because of the lack of teaching strategies taught in school and deployed in Higher education for managing individual mental well being and for tackling problems in Society.

A suggested model adapted from evidence based study for integrating Ethics and Human Values into Education and Environmental Education Curriculum is provided below.

Model to teach Ethics and Sustainability in Education, Environment and Health

The pedagogical considerations to stimulate the integration of bioethics/human values discussion were a significant factor from the literature review. In the next section, the model for the ethical inquiry into education/health/ environmental issues in society are illustrated in Figure 1.

The model used was tested, and interviews were conducted with teachers who used the model for ethical inquiry (Saunders and Rennie, 2008). Teachers found the model a useful, user-friendly, effective tool for both planning and teaching. The model permitted pluralism and helped teachers start teaching as there are a series of steps to proceed. The pedagogies can be selected according to the availability of resources and what suits the class the most. During the workshops conducted, teachers were initially eager to use the model and wanted to broaden their knowledge so that they could teach better. As it was used to explore socio scientific issues, the model can be extended to education, health and environmental issues as the dilemmas will be explored both individually and in groups. Students and teachers can also discuss the scientific concepts and their bioethical stances and how their collective judgment will impact others and the environment or health. Students will use a range of ethical frameworks like consequentialism, autonomy and virtue ethics. Students, according to teachers, also learn others' viewpoints (Saunders and Rennie, 2013). The texts and the model (Added AI in the technology section on the text box extreme right of the model) above was taken from the thesis on "Teach to Nurture for a Sustainable Environment Using Human Values and Bioethics Education for Classrooms and Online Learning" (Parahakaran, S. 2022).

The other concern is whether learners and civic citizens are prepared for the discussion on ethical and human values which is expected of the emerging contexts in their societies and of AI. The discussion is necessary one as ethics of the usage of data and AI is now on the rise. Research in sustainability matters related to the environmental and educational matters have included both extrinsic and intrinsic values and ethics.

"SIS (Smart information systems) are a subset of ICT, and many of the ethical issues applicable to ICT are also applicable to SIS. In a review of 809 papers discussing ethics in ICT, we found that 177 addressed the issue of privacy and data protection, which makes this the most prominent issue. However, numerous other issues are also frequently discussed. These include autonomy of users, their agency, trust, consent, identity, inclusion and digital divides, security, harm, misuse, and deception, to name just a few" (Stahl & Wright, 2018, pg.27).

The crisis in environmental education globally was critically reviewed by David Orr in

1994. He stated that the biosphere is a consequence of the prior issue of mind, perception and heart and is related to the problem of education. "…The truth is that without significant precautions, education can equip people merely to be more effective vandals of the Earth. (Orr, 1994, p. 5).

Andrew Feenberg in his book on "Critical Theory of Technology" elaborated on the democratic participation in technological choices where he rejected on both spiritual or simplicity renewals. However, such democratic participation is almost impossible when corporates and economical growth become the deciding agents for policy implementation. The lack of prompt changes in curriculum or critical reasoning in classrooms impact learners in both the environmental and educational decisions they make, and this contributes to the success of the SDG's or any endeavours related to scientific output of data.

Education, Self and Consciousness

In ancient India the oral traditions of knowledge were acknowledged by many people all around the world. Educational Institutions in Greece and Rome also gave significant attention to the Self as in the Gurukulas in India. Famous centres such as Taxila, Varanasi, Ujjain and Amaravati (founded by Buddhists) and Nalanda University had maintained its quality of education for a long time and education was imparted orally (Kumari, 2017). The significant contents related to the training of the Self towards full potential (mental training, didactic discourses and physical competencies) Nalanda, situated in Bihar and founded by the Kumara Gupta Empire in the 5th Century excelled in various courses. Nalanda boasted of its Educational Movements with teaching of Philosophies such as Yogachara (doctrine of consciousness) and Sarvastivada and subjects as such Vedas, grammar, medicine, logic, mathematics, astronomy and alchemy (Kumari, 2017). In ancient education all over the world. Greece or Rome, India, or China, Educational Institutions were focused on character formation through discipline and academic training. In ancient India, China, Mesopotamia and Egypt, the oral traditions of knowledge were acknowledged by many people all around the world and a similar history was noted across educational Institutions in Greece and Rome.

Historical evolution of Education: Self and the Learning Mind

The Self is defined as the learners' psychological state of being, taking into context the Self-identity, Self-concept, Self-regulation and Self-awareness and the mental well-being of the learner in relation to the evolution of human intelligence and interaction as an individual and as a collective identity.

The Greek and Roman Empires stood proudly at a time when they excelled in Education. Earlier philosophers stressed on the concepts of the Self and Mind of the Learner in relation to being competent with all human faculties as an individual and for the society. As philosophical systems were explored, the mind of the learner was given importance and most traditions established learning systems for ensuring that students were disciplined to concentrate more in education and to bring the mind to a state of learning as reported in China, India, Greece and Rome. The goals of learning were two pronged; development of potential of the self and for uplifting the challenging conditions of society. The oral traditions of teaching were strong for some time until humans focused on written work. In the Greek system of Education, memory was derived from the root word Mnemosyne. "The mind according to Marcus Fabius Quintilianus is exercised by the variety and multiplicity of the subject matter, while the character is moulded by the contemplation of virtue and vice" (Quintilian, 1987, Pref.8). Marcus Tullius Cicero (106 B.C), author of De Inventione stated that; "It is not by muscle, speed or dexterity that great things are achieved, but by its reflection, force of character and judgement" and he stressed on excelling in speech through a firm foundation of general knowledge. Great importance was given to formation of languages when oral traditions dominated the sphere of education until writing and publication became significant for preservation of knowledge. The importance was therefore for the mental training, discipline and skills along with virtues.

Teaching strategies used in the European, American and other countries in the developed countries were taken up by many of the Asian countries as many of these parts of the world had just begun to enter into secular education and delved into the nuances of looking at the

relationships between good education in terms of memory training, classroom management, discipline, reading and writing skills, in short, knowledge creation and training of the human potential.

Psychology studied the role of human behaviour and mental processes which originated from Ancient Greece (Greenwood, 2015). Evolutionary Psychology by William James and the people he influenced (Carl Jung (1875–1961), Alfred Adler (1870–1937), Karen Horney (1855–1952), and Erik Erikson (1902–1994) supported in the development of psychological aspects(Hunt, 1993). The psychodynamic approach evolved faster than the basic functionalist approach because it explored human behaviour led by Sigmund Freud (1856-1939) and the study was directed towards role of understanding of human behaviours, that focuses on the role of unconscious thoughts, feelings, and memories. These processes from human mind were studied from a clinical perspective and hence produced effective results for medical fields.

The concept of the Self was the significant topic of discussion and extended to character formation, human behaviours related to psychology, neuropsychology, ethics, and empirical sciences of all creations. Many topics both in education and environmental disciplines started exploring the concept and impact of Self with the environment and the progressive state of the learner towards full potential. Sigmund Freud's ideas were extended by other psychologists whom he influenced, including Carl Jung (1875–1961), Alfred Adler (1870–1937), Karen Horney (1855–1952), and Erik Erikson (1902–1994). Individual explorations were conducted following the psychoanalytical approaches used for therapy and dream analysis.

The studies related to the Self in Psychology explored relationships and impact studies on variables related to self-concept, self-identity, self-efficacy, self-awareness. It is also notable that the same kind of studies were explored in Environmental research (Human nature relationships, Environment and Self concepts, Self- efficacy and Environmental behaviors, Environmental attitudes, and behaviours) (Balunde et al., 2019). All these concepts were related to the topic of Self and the concept of the Self has remerged today even in the study of Artificial Intelligence. The degradation of education started when the dialogue on the Self by educators in research mainly focused on competencies for attaining assessment goals and not for mental well being or competencies for higher capacities in motivation or as a citizen of communities they live in.

Arguments for the Environment

When learners use their memory, they use prior knowledge and learn to accommodate new knowledge and apply them in learning. However, most theoretical knowledge is not implemented practically due to lack of training, knowledge skills, and the suitability in different locations. A shift from oral to written and translation to numerical data for AI means, shifting from contextual knowledge which are translated in the form of data, algorithms and to decide based on the output of AI.

One of the recommendations was for the establishment of professional learning communities as an effective approach because the findings from the study reveal that learning for the environment should be interdisciplinary among learning communities while the recommendations were aligned to the following; (Cai & Wolff, 2022);

- A conflict inclusive atmosphere,
- The coexistence of individual and shared visions
- An emotional bonding diversity

All three competencies are not focused in today's educational content or practice and in environmental education where teaching and learning is concerned either online or in classroom contexts. The achievement of the SDG's are therefore questionable.

Concept of the Self and its role in AI

The integration of the use of components of Self and Consciousness in AI has remerged because of the need to replicate AI and replace human efforts intending to create human progress. However, research has demonstrated that deskilling occurs with AI replacing humans for complex methods in problem solving and analysis for challenges in the future.

The topic on training human minds have reemerged again with the integration of Smart Information Systems because of professional requirements to deal with data and decision making for their own departments. The code

and responsibilities for military, health, education etc face a dilemma of how responsible they can be for their own profession when data is interpreted by AI. Do professionals have to explain the data and follow a code of ethics? If so, how proficient they can be with ethics in their profession when we are at a time where health, education and environmental aspects are very disconnected in their own disciplines and taught separately?.

Does AI interpret data from environmental issues, health and education? It is only a very trained mind in decision making from a large number of data from algorithms, deep learning and machine learning be responsible and accountable. It is then assumed that the individual has enough evidence of ethical understanding for decision making. Will then, research on self concept, self identity and self esteem become redundant for schooling systems because of the attention given to scientific reasoning and logical approaches taken for solving problems of society?

Around 1997, research studies were focused on the concept of Self and it was in the field of psychology that these studies contributed to a better understanding for the medical fields and in marketing fields. Self, in psychological research was tested with the concepts of Self-esteem, self-concept, self-identity etc. Kernis, Paradise, Whitaker, Wheatman & Goldman (2000) study examined the extent to which self-esteem related to self-regulatory styles, self-concept, and goal related effect. Studies found that students with low self-esteem were not able to have strong sense of self, more stress and low determination. Baumeister (1997) emphasized on the fact that self of a human establishes itself with both simple and universal psychological experiences, the individual being a member of a social unit and of the world. Cook (2001) asserted that Self and person are significant to educational and therapeutic endeavours. The emergence of self-awareness emerged as an important aspect.

Francoise et al. (2007) asserted on Self-concept and self-esteem, both concepts are important from a developmental perspective and plays a role in individual's general adjustment, quality of life and for their prospects. Self-concept represents a positive and internally consistent sense of self which will play a pivotal role to direct future choices and behaviours. Self-concept clarity is aligned to wellbeing (positively) and maladjustment (Francoise, Alsaker, Kroger, 2007; Zaff and Hair, 2003). This involves handling stress (Ritchie, Sedikides, Wildschut, Arndt, & Gidron, 2011).

Conway (2001) highlighted on the matter of 'Self' and the retrieval of memories from an individual's Self where they remain as memories from different types of knowledge, and this is controlled by what was termed then as 'Working Self'. The memory possesses a certain database of knowledge which has specific autobiographical knowledge which can be constructed, and this is based on what the Self has and what it can become. Autobiographical memory is therefore constructed from the Self's identity as a person and whose contexts are within the happenings of a Society (Conway, 2001). Findings related to both the individual and universal components of the self includes psychological concepts which are measurable and these concepts have been included as variables in many of the psychological studies. However, studies related to psychology have contributed immensely to psychological challenges people face and hence, the commercial aspects of psychology have been highlighted and practices in the past few years. Media, advertisement, and the preparation of the public through unknown chartered spaces such as the use of technology without transparency on social media etc . This gives a more compulsory need to highlight Self and its full potential in education, environmental education and studies related to AI.

Policy making for training of the Self for AI and the SDG challenges

There are no set frameworks for AI research for sustainable society which has seen successful implementation yet and future AI require to expand research to other areas of science. Research related to AI must include explanations for why such decisions are made and transparency of data as well as creation of regulatory agencies (Kusters, 2020). The ethical guidelines to be included for the success of educational goals and for the SDG's;

1. The practice and implementation of technology to be accepted by wider civic bodies before it is turned to policy.
2. The challenges of generative technologies and their implementation

before making a policy change and related to use of technology in Higher Institutions
3. The rise of unethical challenges in technological applications in education and environment
4. Education and its newer curricular applications for civic education to be integrated with ethics and values for full potential of the Self
5. Environmental Education and its newer curricular applications for civic education to be integrated with ethics and values for full potential of the Self

The SDG Challenge

Environment and Educational fields are presently integrated with AI as AI advances in various fields of applications. Information is converted to data and data captured will provide discrete solutions to many applications in both fields. Consciousness has been defined in many ways and there is consensus that consciousness can be explored through interdisciplinary methods. For example, If AI was to explore how an individual have a conscious experience, it must bring in both observable behaviours to track consciousness and an individual's subjective reports of their experience and this is the only way to track consciousness as consciousness influences human behaviour (Wu, 2018). Wu stated that by bringing brain and consciousness together, neural data, computational and psychological models and philosophical analysis will enable observation of general principles to connect brain activity to conscious experience (Wu, 2018). The same principles must be applied for consciousness of civil citizens where AI's technological implementation is concerned. Technology has become tricknology in many ways as humans progress and for this, humans must reach their full potential. The role of demographic factors and social engineering by technology has proven in the past that challenges are remerging at every step and issues related to generative technology have risen up.

Replication in multiple contexts

For example, when a group of data technologists are making decisions for a particular context, will they use the data from their country to decide for all other countries? Will these policies from data received be used only in their contexts? Will principles for decision making and the criteria of judgement be used by only one group of decision makers and be applied technically to all countries?

Preparation of data and the priori

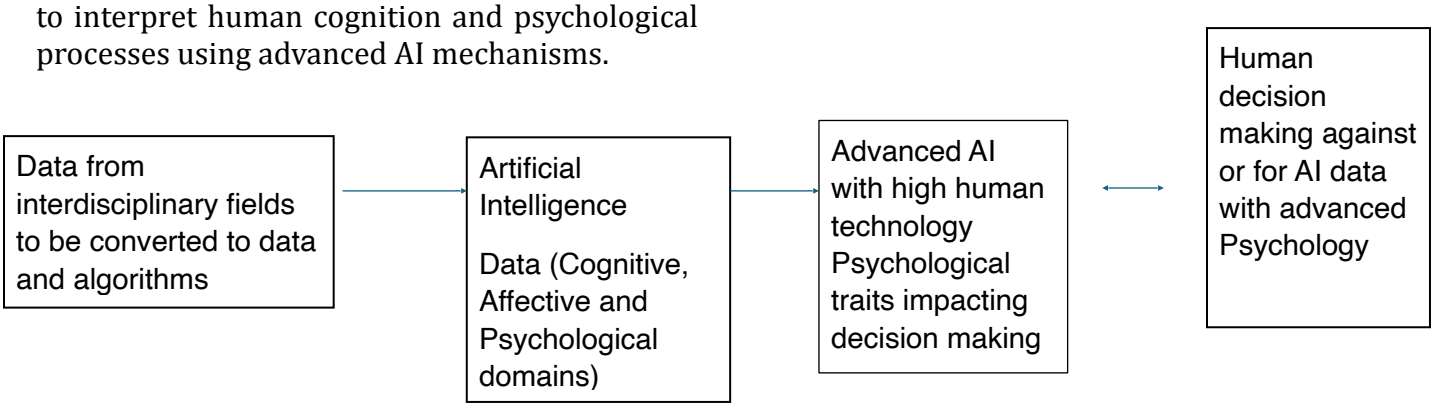
Will data be used by a certain group of decision makers from a cognitive psychology perspective? Will decision makers make decisions using data after considering why and how it can be used but also how the possibilities of manipulating data for achieving their ends? Is this an ethical way of dealing with production of data and making decisions?

Various fields such as Psychodynamic, Cognitive, Social, Industrial, and Behaviourism are important evolutionary sciences from Psychology which originated from Philosophy. The advent of Human- Technological Psychology can be predicted as a new field of educational psychology. Artificial Intelligence and will emerge in the future as AI advances to an optimal point. Humans may need the skills to learn the criteria an Advanced AI will use to interpret data using AI psychology based technology to interpret data.

Research demonstrates that there is a need to train AI practitioners but there should be equal importance for training humans to be competent to manage knowledge related to their own contexts and make decisions to report for AI. The advancement of decisions leading to black box bias or managing social impact statement for algorithms is nearing. Even if competent engineers build apps for AI, the question remains whether AI when combined with large data can be used only for the country or whether they can be used by several other countries. It is well known that various countries have different environmental problems and technological issues and this application may not be suitable.

Another problem related to AI and large data is whether the SIS will soon have a competency much greater than humans at an optimal point and whether Humans will be competent enough as a group to make decisions for AI as AI will be competent enough to use cognitive psychology to make decisions which may not match human learning potential. This happens when AI is used

to interpret human cognition and psychological processes using advanced AI mechanisms.



Significance of AI as a tool to problem solving and Self to its full potential

The data on technology enabled interventions with AI may solve a number of challenges by providing data on environmental planning, decision making and management and support learning as in languages using chatgpt. Although AI can provide algorithm for various negative impacts and help in solving through specific techniques, AI will never be able to make decisions unless there are efforts made by humans to improve human conditions at the same time using sustainability principles which have been declared many years ago (environmental, economical and social). This is because AI related information can also be used by people to over exploit resources (Vinuesa et al., 2020).

If educational theories were used to motivate students from the psychological perspective, they are worth integrating into the curriculum. Motivation theory, both intrinsic and extrinsic theories are used to evaluate the success of learning outcomes both indoors and outdoor based lessons, both formal and informal. However, the earlier theories from psychology are used in AI and this is of great concern as they were meant only for problematic educational challenges.

If they are used for therapeutic purposes it is possible that learners will be able to experience a better outcome in terms of their psychological conditions.

Table 1 provides various disciplines and the pathways currently used in education and interventions used in various fields. The SDG challenges are also detailed in the table and the policies which is to be highlighted.

Healthcare and nursing

The nurse or doctor is accountable and responsible for their practices and the code addresses on the judgements, decisions and actions referring to systems and technologies as aids rather than substitutes for skills and judgement (Robert, 2019). For this the systems in healthcare requires to bring ethical decision making along with judgement on data obtained. Are data analytic courses integrated with ethics and health care staff trained in ethical decision making? According to the US Department of Defense, from the military perspective, combat soldiers are to be trained to interpret data and must explain how computers have reached the decision making as with nurses in healthcare settings where ethics especially with algorithm transparency, becomes an important context to make decisions (Robert, 2019, Turek,n.d, American Nurses Association, 2015).

Human Technology (SDG challenges)

The reversible roles of AI and human thinking will grow to an advanced stage because of the input from human to AI until AI is able to direct humans. As this stage approaches, there will be a necessity to look at the psychology of AI and how it impacts humans.

Table 1: Disciplines and the pathways currently used in education

Theories	Pathway	Educational, Health, Social interventions required to treat	SDG challenges	Policy making
Psychodynamic Carl Jung (1912), Melanie Klein (1921), Alfred Adler (1927), Anna Freud (1936), and Erik Erikson (1950).	Focuses on the role of our unconscious thoughts, feelings, and memories and our early childhood experiences in determining behaviour	Psychosocial, Psychopathology Anxiety, mood disorders, depressive symptoms	Rise of problems related to mental well being	Education to integrate human values and ethics into subjects for the increasing Self-awareness, Models that enable Self resilience to the specific mental condition and or for mental training to be included in education for Self and Civic Consciousness
Behaviourism Ivan Pavlov (1849-1936), Edward Lee Thorndike (1874-1949), John B. Watson (1878-1958), and B.F. Skinner (1904-1990)	Based on the premise that it is not possible to objectively study the mind, and therefore that psychologists should limit their attention to the study of behavior itself	Pathway is through operant conditioning, Neuropsychology	Problems due to Consumer behaviours, Corporate decision making,	Policy making in Education and the Environment to follow interdisciplinary pathways and social or civic consciousness through critical thinking concepts to make choices for SDG practices
Cognitive (Plato, Descartes, William James, John Dewey, and Jean Piaget)	The study of mental processes, including perception, thinking, memory, and judgments	Information processing Self-exploration, motivation, critical thinking problems, follow through with a plan of action, acceptance of personal responsibility, awareness of how negative thoughts impact one's process) and external (e.g., family, social, economic, and organizational) cues that signal a gap between one's current state and desired state of decidedness. Typically, a goal or a "gap" is formed at this stage. Analysis involves not only recognizing the connections between self and options knowledge, but also developing a model for decision making. It also involves understanding how important decisions are made and clarifying metacognitions or thinking about thinking (adapted from National Institute for Education and Counselling, 2018).	Decision making for prosocial, pro environmental and Self exploration of reaching a certain goal	Policy making in "Mind-Self-Society" as predominant in Education and the implementation of Philosophical theories in schools
Socio cultural Lev Vygotsky (1896 - 1934).	The study of how the social situations and the cultures in which people find themselves influence thinking and behavior	Socio cultural (rules, roles, groups and relationships)and cultural psychology which studies (gender , values, expectations, socioeconomic status)	Peace, Justice and Strong Institutions (SGD 1-17 Goals)	Studies from peace to be integrated in civic, justice and social studies
Technological	Data input into AI and the psychological manipulations that can occur with civic or public	Self -Technology and Technology to Self, information processing (2 ways) Cognitive -Psychology Affective –Psychology Ethical guidelines and interventions for public (environment and education) (Parahakaran, 2024).	Challenges for a new SDG 18? Self- AI based intervention for decision making	Ethics, Bioethics and Human Values integration into the curriculum and field studies Cognitive data Affective data Include social engineering ethical policies

However, possible predictions are that the intellectual experts who come together from various fields will have to make decisions which are still at the experimental stages and hence SDG challenges will have to include one more, Technology -Human challenges to the already existing SDG challenges. Consumers are not often found to make rational decisions while buying products and through such neuromarketing research, researchers can discover what people do not want to reveal and what influences their decision making. Research has also shown that not all decisions made my consumers are rational (Bercea, 2013). An example is the marketing and consumer psychology used in research for neuromarketing and traditional research methods. An example is the use of neuromarketing which can be detrimental if decisions are made without ethical guidelines (Cherubino et al., 2019).

Policy changes in Education

Educational curriculum must consider the learners and educators may look at improving intellectual competencies in knowledge management, data analytics, ethical decision making and critical thinking skills.

Policy changes for success of SDGs

- Education to integrate human values and ethics into subjects for the increasing Self-awareness,
- Models that enable Self resilience to the specific mental condition and or for mental training to be included in education for Self and Civic Consciousness.
- Policy making in Education and the Environment to follow interdisciplinary pathways and social or civic consciousness through critical thinking concepts to make choices for SDG practices.
- Policy making in "Mind-Self-Society" as predominant in Education and the implementation of Philosophical theories in schools
- Studies from peace to be integrated in civic, justice and social studies.

References

American Nurses Association. Code of Ethics for Nurses with Interpretive Statements. 2nd ed. Washington, DC: American Nurses Association; 2015. [Google Scholar]

Balundė, A., Jovarauskaitė, L., & Poškus, M. S. (2019). Exploring the Relationship Between Connectedness With Nature, Environmental Identity, and Environmental Self-Identity: A Systematic Review and Meta-Analysis. *SAGE Open, 9*(2). https://doi.org/10.1177/2158244019841925

Baumeister. R.F. (1997). Identity, Self-Concept, and Self-Esteem: The Self Lost and Found,

Handbook of Personality Psychology. Chapter 26. Robert Hogan, John Johnson and Stephen Briggs. Pgs. 681-710.https://doi.org/10.1016/B978-012134645-4/50027-5.

Bercea M. D. (2013). *Quantitative versus Qualitative in Neuromarketing Research*. Munich, Germany: Munich University Library; 2013. [Google Scholar]

Cai, Y.; Wolff, L.-A. Education and Sustainable Development Goals. *Sustainability,* 2023, 15, p.643. https://doi.org/ 10.3390/su15010643

Cherubino P, Martinez-Levy AC, Caratù M, Cartocci G, Di Flumeri G, Modica E, Rossi D, Mancini M, Trettel A. (2019). Consumer Behaviour through the Eyes of Neurophysiological Measures: State-of-the-Art and Future Trends. Comput Intell Neurosci. . doi: 10.1155/2019/1976847. PMID: 31641346; PMCID: PMC6766676.

Conway, M.A., Pleydell-Pearce , C.W., Whitecross, S.E., Sharpe, H. (2001). The Neuroanatomy of Autobiographical Memory: A Slow Cortical Potential Study of Autobiographical Memory Retrieval. *Journal of Memory and Language, 45*(3).

Cook. S.H. (2001). The Self in self-awareness. Mental Health Nursing, Middlesex University, School of Health, Biological and Environmental Sciences. *Leading Global Nursing Research*.

Francoise, Alsaker & Kroger (2007). Self concept, self esteem and identity. *Handbook of Adolescent Development. Psychology.* 1st Edition.

Kernis, M.H., Paradise, A.W., Whitaker, D.J., Wheatman, S.R., & Goldman, B.N. (2000). Strong Sense of Self. *Personality and Social Psychology Bulletin.*

Kumari, I. (August, 2017). Schooling in Ancient Indian Society. *International Journal in Physical and Applied Sciences 4* (8). p.46. http://www.ijmr.net.in.

Lee, K.-H., Noh, J., & Khim, J. S. (2020). The Blue Economy and the United Nations' Sustainable Development Goals: Challenges and Opportunities. *Environment International, 137,* Article ID: 105528.https://doi.org/10.1016/j.envint.2020.105528

Leventhal, H., Leventhal, E. A., & Contrada, R. J. (1998). Self-regulation, health, and behavior: A perceptual-cognitive approach. *Psychology & Health, 13(*4), 717–733. https://doi.org/10.1080/08870449808407425

Mukhi, U., & Quental, C. (2019). Exploring the challenges and opportunities of the United Nations sustainable development goals: a dialogue between a climate scientist and management scholars. *Corporate Governance: The International Journal of Business in Society*

Orr, D. W. (1994). Earth in Mind: On Education, Environment, and the Human Prospect. Washington, DC: Island Press.

Parahakaran. S. (2022). *Teach to Nurture for a Sustainable Environment Using Human Values and Bioethics Education for Classrooms and Online Learning*. American University of Sovereign Nations (USA). AUSN Research Repository.

Ritchie, T. D., Sedikides, C., Wildschut, T., Arndt, J., & Gidron, Y. (2011). Self-concept clarity mediates the relation between stress and subjective well-being. *Self and Identity,* 10, 493–508.

Robert N. (2019). How artificial intelligence is changing nursing. *Nurs Manage.* Sep;50(9):30-39. doi: 10.1097/01.NUMA.0000578988.56622.21. PMID: 31425440; PMCID: PMC7597764.

Vinuesa, R., Azizpour, H., Leite, I. et al. The role of artificial intelligence in achieving the Sustainable Development Goals. *Nat Commun 11*, 233 (2020). https://doi.org/10.1038/s41467-019-14108-y

Turek M. Explainable artificial intelligence (XAI). US Department of Defense Advanced Research Projects Agency. www.darpa.mil/program/explainable-artificial-intelligence. [Google Scholar]

Wu, W., "The Neuroscience of Consciousness", *The Stanford Encyclopedia of Philosophy* (Winter 2018 Edition), Edward N. Zalta (ed.), URL = <https://plato.stanford.edu/archives/win2018/entries/consciousness-neuroscience/>.

Zaff, J. & Hair, E.C. (2003). Positive Development of the Self: Self Concept, Self Esteem and Identity. *Psychology Press.*

Websites

https://www.nature.com/articles/s41467-019-14108-y

Halberstadt, http://commons.wikimedia.org/wiki/File:Sigmund_Freud_LIFE.jpg.

Examination of Governmental Neutrality toward Prenatal Testing and Selective Abortion in Japan

‘

- Aya Enzo, Ph.D.,
Department of Medical Ethics,
Tohoku University Graduate School of Medicine,
2-1 Seiryo-machi, Aoba-ku, Sendai, 980-8575,
JAPAN
Email: aya.enzo.e5@tohoku.ac.jp
ORCiD: 0000-0002-2359-9111

Abstract

In Japan, the notion of governmental neutrality is widely accepted by various authors who have examined prenatal-testing-associated ethical issues. According to it, a government should assume a neutral position towards the widespread use of prenatal testing followed by abortion or individual self-determination. This notion found wide acceptance as the best method to resolve the dilemma between a moral responsibility not to infringe on prospective parents' reproductive choices and a moral duty to avoid reinstatement of eugenics. However, the rapid technological developments in this context are posing various moral issues that cannot be reduced to this dilemma. Is it appropriate or possible for a government to hold a cautious or negative attitude towards provision of prenatal testing and information about it? If not, what responsibility should the government assume in the prenatal testing context? This study addresses the first question by examining the notion of state neutrality in the arguments about liberal eugenics and contends that governmental neutrality no longer holds. To understand how to answer the second question, this article explores Wasserman's argument regarding appropriate moral constraint on prospective parental choices to have children with disabilities. I argue that this issue requires examination in terms of justice and social welfare.

Keywords*: Governmental neutrality; Prenatal testing; State neutrality; Social welfare*

Introduction

This article examines a government's responsibilities in the context of prenatal testing by focusing on the notion that a government or society should assume a neutral position

towards the widespread use of prenatal testing based on individual self-determination. This notion implies that, on the one hand, a government or society should not restrict, prohibit, or impose punishments on decisions by pregnant women or prospective parents regarding prenatal testing and selective abortion. On the other hand, the government should not oblige or encourage them to have tests by, for instance, providing public subsidies for prenatal tests to identify fetal traits or obliging obstetricians to provide information about the tests. In other words, a government or society should let the concerned individuals decide. The governmental or social responsibilities or obligations in this context are usually negative or indirect: Specifically, the government is responsible for constructing social institutions or creating an environment and culture where people live happily despite having disabilities. I'll call this notion "governmental neutrality."

In Japan, the notion of governmental neutrality is widely accepted by various authors examining prenatal-testing-associated ethical issues, including feminists and disability advocates (Morioka 2001; Hayashi 2011; Yokoyama 2015; Tateiwa 2016).[1] For example, according to Tateiwa (2016), a well-known disability advocate in Japan, selective abortion cannot be legally prohibited because the decision to have one should be left to a woman's self-determination. However, he further opines,

"The attaching of obligation to prenatal testing is something that must be rejected. [...] If this practice [prenatal testing] is to be neither prohibited nor compelled, then ultimately the decision of whether or not to employ it is to be left up to the woman in question. Those who advocate "self-determination" would no doubt also support having the person in question decide for themselves. They would also presumably not claim that this kind of testing and abortion ought to be considered obligatory or compulsory. [...]
If the only principle acknowledged here is freedom from having a practice restricted or prohibited, this also means that the individual who then has the right to make the relevant decisions must accept responsibility for the results of their actions." (Tateiwa 2016, ¶1 under "The Right Not to Choose as a Positive Right")

Further, Hayashi, a proponent of feminism in Japan, states the public regulation of individual choices regarding prenatal tests and selective abortion cannot resolve prenatal-testing-associated ethical issues, particularly concerns about discrimination against people with disabilities. Moreover, she argues that the issue "belongs on an ethical level" (Hayashi 2011, 58). Therefore, although it is difficult to institutionally or socially consider a woman's decision to have an abortion following prenatal tests as a women's right, no one other than the individual women making such decisions should be involved in, or interfere with, them. According to Hayashi (2011, 58), "no matter how severe and harsh the choice itself may be, ultimately each individual woman must decide and accept the consequences."

The main reason for the wide acceptability of the notion of governmental neutrality in Japan is that this stance has long been considered the best (or least wrong) method to resolve the dilemma between a moral responsibility not to infringe on women's or prospective parents' reproductive choices and moral duty to avoid the reinstatement of eugenics, which involved serious violation of the rights of people with disabilities (Kato 2009, 168–194; Toshimitsu 2012, 68–96; Tsuge 2022, 190–193). On the one hand, the prevalence of prenatal testing, even when based on individual self-determination, raises a social concern about eugenics, particularly that related to the social exclusion or discrimination of people living with targeted traits. However, as indicated by previous eugenic policies, active governmental or social involvement in, or regulation of, an individual's reproductive choices, particularly those pertaining to prenatal testing and pregnancy termination, can be a serious infringement on individuals' reproductive autonomy. Therefore, to avoid or resolve this dilemma, the government or society must take a neutral stance in this context. In Japan, many authors claim that the ethical issues pertaining to prenatal testing followed by abortion must be addressed by individual women or prospective parents, rather than the government or society.

[1] Murotsuki (2020, 180-181) partially agrees with this idea. However, he mentions the necessity of implementing state regulations on the provision of testing or abortion.

Certainly, this notion regarding the society's or government's role in decision-making has been affecting governmental and social attitudes towards the provision of prenatal tests for approximately 30 years in Japan. The Japanese government maintains a cautious or negative attitude towards provision of prenatal testing and information about it (Tsuge 2015): Although the Japanese society has not specifically clarified selective abortion as a woman's right by avoiding the introduction of the so-called fetus clause in an abortion law, which legally validates abortion in case of fetal disabilities, it has not clearly prohibited selective abortion and permits it under the so-called economic reason clause, according to which women can undergo an abortion for financial reasons. To date, the Japanese government has not regulated the provision of prenatal tests. However, by not requiring or obliging obstetricians to provide information on prenatal tests, the government avoids encouraging or supporting women's decisions regarding the tests. In addition, neither the government nor any local governments grant pregnant women any subsidy for prenatal tests, except ultrasound scanning. However, in the provision of prenatal testing information, the government has adopted a more active attitude owing to social concerns about the recent rapid spread of non-invasive prenatal testing (NIPT), particularly at non-certified medical facilities (Samura 2020; ECNOP/MHLW 2021; Jinguji and Goto 2022; Suzumori 2022; Tsuge 2021, 2022, 242–250). Nevertheless, the government continues to maintain its negative attitude towards prenatal testing.

However, today, rapid technological developments in the testing context are posing various moral issues that cannot be simply reduced to the aforementioned dilemma. In this situation, is it appropriate or possible for a government to hold a cautious or negative attitude towards provision of prenatal testing and information about it? If not, what role or responsibility should it assume in the prenatal testing context, and for what justificatory basis should it assume such roles? This article addresses the first question by examining the notion of state neutrality in the arguments about liberal eugenics.

Two Meanings of Governmental Neutrality

The concept of governmental neutrality is similar to that of state neutrality, which is a common consideration in debates over liberal eugenics (Agar 1998; Fox 2007; Dekker 2009; Raz 2009; Van Camp 2014; Gyngell and Selgelid 2016; Gyngell and Douglas 2018). Prior to examining the extent to which governmental neutrality overlaps state neutrality, I clarify meanings of state neutrality in liberal eugenics.

Arguments regarding liberal eugenics clarify at least two meanings of state neutrality. Depending on the adopted meaning, claims about the government's role and responsibility differ. The first meaning indicates that a state or government should be neutral towards individuals' morally acceptable choices regarding their lives, including their reproductive choices. Accordingly, the state should not interfere in individuals' reproductive decisions.

Proponents and opponents of liberal eugenics use the first meaning of state neutrality to distinguish the modern version of eugenics (liberal eugenics) from the previous version whom both sides of the debate consider as problematic. However, liberal eugenics is still eugenics since it enables "each generation to determine the genes of the next" (Sparrow 2010, 499). The previous version of eugenics is considered morally troubling since it was authoritarian and practiced by states or governments that promoted invasion of individual freedom and basic human rights. Contrastingly, proponents of liberal eugenics consider it permissible since its implementation is based on the procreative freedom of prospective parents (Agar 1998,137). According to Agar (2004, 5), "on the liberal approach to human improvement, the state would not presume to make any eugenic choices." Further, "parents' particular conceptions of the good life would guide them in their selection of enhancements for their children." Thus, "the freedom that defines liberal eugenics will be defended in the same fashion as other liberal freedoms" (Agar 2004, 6). In this sense, a governmental responsibility in the context of prenatal testing is to leave decisions about prenatal testing and pregnancy termination to the relevant woman or couple, and not to interfere in them.

The second meaning of state neutrality refers to the requirement that a state should be neutral towards all morally acceptable life plans of the people of both current and future generations (Agar 1998; Fox 2007; Dekker 2009). For instance, Agar argues for state neutrality in this sense as an appropriate governmental stance. He assumes that a liberal eugenic society should be neutral towards not only morally acceptable individual choices regarding life plans but also morally acceptable life plans (Agar 1998, 145). According to him, leaving eugenic decisions on reproduction completely to couples' freedom will result in an unacceptably narrower range of life plans in a society, since "dominant conceptions of the good life can be relevant to individual decisions about enhancements not because they latch onto some independent facts about quality of life but because they in part constitute the environment in which the future person is to live" (Agar 1998, 144). Hence, "an individual who is not the object of prejudice stands to have a wider range of opportunities and therefore greater chance of leading a successful life, than one who is the object of prejudice" (Agar 1998, 144). However, Agar (1998, 143–145) further claims that reducing the diversity of life plans is inimical to the basic liberal idea of respecting diverse life plans. Therefore, he argues for a version of liberal eugenics that restricts prospective parents' freedom in terms of the range of genuine life plan choices for a future person (Agar 1998, 152). In this sense, the government must sometimes restrict prospective mothers' or parental decisions regarding the use of technology to change their children's traits.

State neutrality in the second meaning can compromise it in the first, and vice versa (Agar 1998; Fox 2007; Dekker 2009). As noted by Sparrow (2014, 146–147), parental reproductive choices about children may constrain the life options available to them and state regulations that defend the liberty of future children can frustrate parental reproductive liberty (Sparrow 2014, 146–147). Moreover, authors who support neutrality in the second meaning propose more intrusive public policies, such as those obliging parents to use, or prohibiting them from using, genetic enhancement technologies (Agar 1998; Fox 2007; Dekker 2009).

Although many arguments on state neutrality, including those by Agar, are associated with decisions regarding the use of genetic enhancement technologies to change future children's capacities (selection for specific foetuses), most arguments are also applicable to decisions on prenatal testing and abortion (selection against a specific fetus). Such decisions are often said to involve eugenics since they enable prospective parents to determine their children's genetic traits (Selgelid 2000, 18; Gyngell and Selgelid 2016, 147, 150).

This article does not examine whether Agar's argument for liberal eugenics is successful, eugenics is necessarily wrong, or the use of reproductive technologies involves eugenics (Selgelid 2000; Gyngell and Selgelid 2016), despite there being intense debates on these concerns (Anomaly 2018; Wilson 2019; Veit et al. 2021). Instead, this article focuses on whether any notions of state or governmental neutrality mentioned thus far specifies the appropriate government or society's stance regarding prenatal testing followed by selective abortion.

Among the two meanings of state neutrality, the first meaning is clearly closer to or even overlaps the notion of governmental neutrality accepted in Japan, that is, governmental non-interference in prospective mothers' or parents' reproductive decisions, although many authors in Japan who accept governmental neutrality have a negative or cautious attitude towards eugenics. However, governmental neutrality differs significantly from the first meaning of state neutrality in terms of whether women's rights to have selective abortion should be recognized. Whereas liberal eugenics advocates clarify decisions regarding the use of reproductive technology as women's or parental rights, Japanese authors avoid any such clear admission; however, they admit women's right to abortion. Further, in Japan, many believe that any clear public acceptance of the right for selective abortion entails the public endorsement of the idea that a fetus' life with disability deserves to be terminated according to women's decisions. This can infringe on the rights of, or discrimination against, people with the same disability or pressures women to have selective abortion (Morioka 2001, 339–344, 346–347; Tateiwa 2016, sec. 9.5.1; Kato 2009,

219–225, 232–234). Nevertheless, both arguments address the same dilemma between a moral responsibility not to infringe on women's or prospective parent's reproductive choices (i.e., reproductive autonomy) and a moral duty to avoid the reinstatement of eugenics. However, the next section will argue that none of these notions of state or governmental neutrality remain valid in the face of rapid domain-specific technological development, and, therefore do not specify an appropriate governmental stance.

Reasons Why a Government or State Cannot, or Should not, Maintain a Neutral Position

Morally Problematic Notion of Governmental Neutrality

Both governmental neutrality and the first meaning of state neutrality are morally problematic for (at least) three reasons: respect for autonomy, social justice, and social welfare.

First, governmental non-interference does not necessarily ensure, and sometimes even compromises, authentic individual autonomy (e.g., Wardrope's term "autonomy worthy of respect" [2015, 56]), which is understood not merely as self-determination but as self-control or self-realization in accordance with one's values, beliefs, or life plans (Fox 2007; Dekker 2009; Mills 2013; Wardrope 2015; Johnston and Zacharias 2017). As noted by Wardrope (2015, 68), liberal neutrality presupposes that "we can carve each agent's life off from those of others, so they can live according to their own conception of the good in isolation from that of others." However, we are moral agents and, hence, socially constituted in some sense, and our decisions can be deeply affected by others and society. Therefore, individuals who are competent and free from overt coercion can "nonetheless appear to be making decisions on the basis of values that are in some sense not quite their own" (Wardrope 2015, 59).

Specifically, in the context of reproduction, women's or prospective parents' decisions entail not only deciding about themselves but also assuming responsibility for parenting, in that they aim to bring another prospectively independent individual into existence (Mills 2013, 643). Moreover, parenthood often requires individuals to become vulnerable to the concerns of others, including the extended family, local community, and entire society (Tsuge 2021); since parenthood involves caring for independent individuals for a long time, parents often cannot fulfil their responsibilities toward their children without external support. This is why, as noted by Agar (1998, 144) in the context of genetic enhancement, "dominant conceptions of the good life can be relevant to individual decisions about enhancements not because they latch onto some independent facts about quality of life but because they in part constitute the environment in which the future person is to live."

Particularly, individual decisions in the context of prenatal testing are heavily influenced by various social factors, including public opinions, market-driven forces, social pressures, and education, some of which reflect impartial or stigmatized understandings of disabilities and gender roles. For instance, in Japan, where various unwritten rules and social or familial pressures pertaining to a "responsible mother," "responsible wife," and "responsible daughter" are prevalent, women's reproductive choices, particularly those related to prenatal testing, are strongly affected by their assumed social roles (mother, wife, or daughter) (Tsuge 2015, 2021). Ahmed et al. (2018) report similar experiences of women in China. Further, Yamamoto, Chang, and Fukushima (2022) noted that it is traditionally believed in Japan that the wife should be younger than her husband. This unwritten rule triggered some women to take the NIPT, because they felt guilty about being older during pregnancy than their parents-in-law wished (Yamamoto, Chang, and Fukushima 2022, 348). Kato (2010) observes that, in Japan, having open conversations on reproductive genetics and disabilities are not encouraged. Therefore, some pregnant women or couples deliberately avoid gaining awareness of, or talking about, disabilities and prenatal testing. Kato (2010, 136-144) interprets such an attitude to be these individuals' strategy to ensure that they do not belong to the group of people with disabilities.

In addition, as mentioned in the preceding section, although the notion of governmental neutrality (i.e., government's non-interference in women's reproductive decisions) has been widely accepted in the Japanese prenatal testing context, women's self-determination of whether to have an abortion based on fetal traits is yet to be clearly accepted as a right. Such a society can

emphasize women's self-responsibility, rather than their freedom to undergo prenatal testing, have an abortion, or have children with disabilities. Therefore, unlike other individual liberties, such as the liberty of religion or speech, authentic parental autonomy cannot be ensured in the context of reproduction by governmental neutrality alone.

The second reason is that, as indicated by critics of negative liberty, the state or government's non-interference can cause, or exacerbate, social injustice, such as inequalities in access to technologies, stigmatization, and discrimination toward the lives of people with disabilities (Agar 1998, 143; Selgelid 2000, 21–22; Johnston and Zacharias 2017). As noted by Johnston and Zacharias (2017), the negative understanding of autonomy, which requires clinicians and others not to interfere with patients' or parents' decision-making, fails to attend to social contexts, such as persistent inequalities and poverty, which shapes and restricts prospective parental reproductive decisions. This can cause researchers, clinicians, and policymakers to fail to address factors that constrain reproductive decisions, particularly those affecting women who are economically disadvantaged, have disabilities, or are from marginalized communities. This could potentially compromise liberties of the socially disadvantaged while enhancing those of the advantaged. For instance, if we live in a country that discriminates against people with disabilities or fails to support them and their families, "decisions about testing for or selecting against disability can be very heavily constrained" (Johnston and Zacharias 2017, s10). Further, governmental neutrality is impossible if we directly address some vital factors driving reproductive decisions, regardless of "whether those factors be the United States' lack of universal health coverage, its increasingly limited abortion access, inadequate public education, discrimination against queer people, or entrenched economic inequality" (Johnston and Zacharias 2017, s10).

In the context of prenatal testing, it can be a serious problem that governmental neutrality about the prevalence of the tests promotes unequal access to them. In Japan, national health insurance does not cover prenatal testing or abortions, and local governments do not fund tests other than ultrasound scanning. Therefore, testing and abortions are prohibitively expensive for socially disadvantaged women and prospective parents. According to Yamamoto, Chang, and Fukushima (2022, 339–340), NIPT is relatively more expensive in Japan (approximately US$1,500–2,000) than in other medically advanced countries (AU$874 in Australia and CA$300 in Canada, on average). This creates a serious inequality in access to tests and abortions.

Third, the moral issue associated with state neutrality's first meaning and governmental neutrality is their long-term negative effects on social welfare. As mentioned earlier, Agar (1998, 144) says, "in spite of various legal protections, the range of life plans well adapted to a given liberal social environment is narrower than the range currently represented in it." Agar considers this narrower range of life plans a threat to a liberal society, since a diverse way of life is an essential value for such a society. Similarly, Gyngell and Douglas (2018) consider the loss of human diversity, particularly cognitive diversity, including Asperger's syndrome and dyslexia, a worrisome result of screening against disabilities (i.e., through embryo selection technologies) performed according to individual reproductive decisions.

Further, Gyngell and Selgelid (2016, 152), who advocate a version of eugenics, highlight some negative effects of state neutrality on social welfare by referring to "collective action problems." According to them, "if RGTs [Reproductive Genetic Technologies] are widely available to parents, and parents use them in ways that are expectedly best for their children, it could inadvertently have an overall harmful effect on society and future generation. The collective effects of all parents rationally pursuing eugenic aims could make everyone worse off" (Gyngell and Selgelid 2016,152). As an example, they consider a case in which prospective parents technically select the height of their future children because being tall is correlated with the children's future well-being. However, according to the authors, if every parent used reproductive genetic technologies to have tall children, this would not only negate any positive effect on well-being but also make everyone worse off, because "increasing the average height of a population could lead to economic as well as environmental costs

relating to increased resource use" (Gyngell and Selgelid 2016,152).

Another negative effect of state neutrality on social welfare is the aggregate effect of sex selection technologies (Fox 2007; Sparrow 2016). It is well known that the widespread use of such technologies to select male babies in some countries where men are prized over women can lead to the development of male-biased populations, slowing down of population growth, and deterioration of family structures.

These negative effects of state neutrality make it plausible for governmental non-interference in individual reproductive choices to have adverse effects on social welfare. In addition, the aforementioned arguments support some governmental interventions in individual reproductive decisions, such as the public provision of screening programs or information on screening for specific fetal traits or regulation of access to some methods of using reproductive technologies.

Impossibility of Maintaining Governmental Neutrality

According to its second meaning, state neutrality comprises the neutrality between morally acceptable life plans. As argued below, this neutrality is impossible for a government to practice particularly with the advent of NIPT and other related technologies.

Some liberal eugenics proponents, such as Agar, Gyngell, and Douglas, and opponents, such as Fox and Dekker, consider neutrality in this sense to be possible if the state regulates (and, therefore, interferes in) individual decisions to use reproductive technologies to change or enhance the traits of future children (Agar 1998; Fox 2007; Dekker 2009; Gyngell and Douglas 2018). Further, they argue that a liberal government or society has to take a neutral stance in this meaning to preserve the diversity of life plans within the society or to respect individual autonomy. For instance, Dekker (2009, 97), on the one hand, rejects allowing prospective parents or society to select future children's genetic traits and, on the other, states that a liberal society can and should remain neutral by promoting the next generation's genetic traits, which are useful for any life plan.

In contrast, Sparrow's criticisms of Agar's liberal eugenics indicate that even if a society or government attempts to regulate prospective parental decisions to preserve the diversity of life plans, it will be unable to prevent the attitudes and decisions of others from affecting parental decisions, which will result in an unacceptably homogeneous society (Sparrow 2010). Such attitudes or decisions can be conveyed as public opinion and market forces. In any case, according to Sparrow (2010, 513), once parents start modifying their children's genetics, their decisions will inevitably limit their children's options, despite the government's efforts to regulate the decisions. Prospective parents may also aim to provide their children with a set of capacities that they believe to be the best. Hence, their decisions will disadvantage some life plans but advance others (Sparrow 2010, 513).

According to Agar (1998), while using genetic technologies to bring their child into existence, parents can and should assess their decisions' impact on future generation's well-being without referring to a specific idea of a good life. Further, Fox (2007) and Dekker (2009, 97–98) believe it possible to define genetic traits that are useful for all life plans. Contrastingly, Sparrow (2010, 513) argues that it is impossible to change future generations' genetic traits without referring to specific ideas of a good life: parents always refer to their own ideas about "what is worthwhile and worthless in a human life" while thinking about their children's future. Therefore, their decisions "will be strongly influenced by the existing distribution of ideas about the good" (Sparrow 2010, 514). This clarifies that liberal eugenics can result in a disturbing level of homogeneity (Sparrow 2010, 505).

Although Sparrow's objection targets Agar's argument on genetic enhancement, rather than prenatal testing followed by selective abortion, this argument is applicable in the context of prenatal testing, as well. As mentioned earlier, many factors besides public policies, strongly affect individual decisions regarding undergoing a test or abortion. These factors include market-driven forces, social pressures, and familial pressures, most of which necessarily include specific conceptions of a good life. For example, according to Tsuge (2015), women's choices regarding undergoing prenatal tests in Japan are strongly affected by their assumed social roles as mothers, wives, and daughters, which sometimes include good life plans for women

and their possible children. Even an individual policy or institution that appears neutral can imply a negative assessment of a way of life, particularly a life with disabilities, when working together with background social institutions and systems, including abortion law (Enzo 2023). Such an assessment can trigger many women and couples to consider undergoing prenatal testing and selective abortion. Therefore, it is almost impossible for a government or society to maintain a neutral attitude towards diverse ways of life and life plans.

Moreover, owing the rapid development of NIPT and related technologies, which enable us to expand the range of targeted fetal traits in prenatal tests, it is almost impossible for a government or society to maintain a neutral stance toward the fetal traits whose detection is institutionally acceptable. In other words, the government must commit to a decision regarding what kinds of lives are legally permissible to be prenatally terminated according to women's or prospective parents' preferences, which necessarily involve some concepts of a good life. A government that allows individual women or providers of NIPT (i.e., medical facilities in many countries) to expand the targeted fetus traits (such as, fetal sex or sexual orientation) will be considered controversial. Such a seemingly neutral attitude implies public endorsement of targeted abortion of fetuses with certain traits, background prejudices, and discrimination resulting in social injustice toward a way of living with the same traits.

In a society that provides public prenatal screening programs, the expansion of targeted fetal traits in such programs involves several ethical issues, including an increase in social costs, the informational overload of pregnant women and medical staff, and an increase in women's anxiety and stress levels (Munthe 2015; Chen and Wasserman 2017). Although differentiating between the fetal traits that are and are not institutionally acceptable to detect may have negative implications for some way of life within a society, a government or society must inevitably make such a distinction and, thereby, maintain a clear stance towards the types of life that are worthy and unworthy of being saved. Hence, the development of new prenatal testing technologies makes it challenging for a government or society to maintain a neutral stance towards diverse ways of life.

Wasserman's Argument on the Conflict between Governmental Responsibility for Social Welfare and Family Autonomy

The aforementioned argument indicates that the government has no choice but to regulate, prohibit, promote, and/or support the reproductive decisions of pregnant women or prospective parents or the spread of testing. However, what stance should be taken by the government? Should it constrain parental decisions by regulating the provision of prenatal tests or promote them? To answer to these questions, a brief discussion on Wasserman's argument regarding appropriate moral constraints on prospective parental choices to have children with disabilities is helpful.

Wasserman examined appropriate constraint on women's and prospective parents' choices, particularly their rejection or selection of a fetus with impairments, and revealed the state's interest in the survival and growth of the society, particularly the genetic health of the population to be one of the possible sources of constraint on women's or parents' choices (family autonomy). Nevertheless, Wasserman (2009, 2017) finally argues for the first meaning of state neutrality, that is, the state's non-interference with prospective parental choices. Now, I examine the reason why Wasserman finally prioritized parental autonomy.

To clarify a state's responsibility for the welfare of the society, Wasserman (2009, 346–348) considered an imaginary drug that would turn off a natural uterine screening mechanism to detect and naturally abort defective fertilized eggs or fetuses. In a world where the widespread use of this drug causes a high proportion of all children to be born with serious impairments, society cannot support its members with disabilities without imposing excessive burdens on its other members. Therefore, according to Wasserman, even if, as is often noted by the critics of past eugenics, it is not appropriate to impose any obligation on prospective parents to protect the population's genetic health, it may be appropriate for the state to assume the responsibility to protect it. Therefore, owing this responsibility, the state may justly restrict the parental decisions that

result in a significant increase in the population of children with severe impairments (Wasserman 2009, 346–347).

The state's responsibility for the survival or prosperity of a society comes in conflict with parental autonomy in both the post- and prenatal contexts. To resolve this dilemma, Wasserman (2017, 474) argues that "the best way to reduce this tension is for the state to act in ways that serve its interests without interfering with family [=parental] autonomy." According to Wasserman (2017, 474), the appropriate way to resolve the tension is to develop "'universal design' measures for building and educating that increased the inclusion of people with a variety of disabilities while reducing the costs of including them." To address the tension, Wasserman (2017, 473–474) rejects highly intrusive or coercive policies, such as a policy in which "prospective parents could be made responsible for the additional costs of disabled children if they failed to test but not if they failed to terminate in the face of positive results." Further, Wasserman (2017, 474) contends that such a policy is coercive because it makes "one of the options for prospective parents worse than it is now." He prioritizes parental autonomy over social interest in social welfare because "the family is a central institution in modern society" (Wasserman 2017, 474). According to him, respecting individuals' autonomy "must be regarded as a political good to the extent necessary for families to fulfil their role in sustaining a society's vitality, strength, and prosperity" (Wasserman 2017, 473).

It should be noted that Wasserman's argument focuses on parental decisions to abstain from undergoing prenatal tests or to have children with disabilities, rather than on decisions to undergo the tests and opt for selective abortion. Moreover, his concern is that the parents who fail to reject or who intentionally have children with disabilities may experience unfair treatment owing to their decisions in the postnatal context. Therefore, Wasserman's use of the term "family" implies the postnatal familial relationship between the parents and their children with disabilities, rather than prenatal familial relationships, such as those between a pregnant woman and her partner, father, or mother or other extended family members.

Wasserman's argument is valid in that respect for reproductive autonomy should imply that women and prospective parents have the option to both undergo and abstain from prenatal tests and abortion. Therefore, parents should not be penalized for giving birth to a child with a disability that is detectable by prenatal tests. Further, to ensure both the options regarding testing or abortion, it is important to consider the prenatal as well as the postnatal contexts, which involves childrearing activities, experiences of living with disabilities, and developing familial relationships. The decisions of both women and prospective parents are strongly affected by the social system in the prenatal context, such as the public provision of tests. It is also affected by the social systems supporting families and children with disabilities. However, Wasserman is highly optimistic in his argument that, for prenatal selection, the tension between the government's interest in social welfare and its respect for autonomy can be reduced by leaving the relevant decisions to women or prospective parents, that is, by practicing family autonomy.

Several studies suggest that, in East Asian countries, including Japan, women's decisions about taking prenatal tests tend to be more affected by the opinions of their family members and their shared norms than in Western countries (Kato 2010; Lau, Yi, and Ahmed 2016; Ahmed et al. 2018; Tsuge 2021, 2022, 231; Yamamoto, Chang, and Fukushima 2022; Katada et al. 2023). Based on these studies, some authors interpret that women in Asian cultures tend to prefer relational autonomy over individual autonomy (Ahmed et al. 2018; Katada et al. 2023). However, I think that the family members of women or prospective parents, including their parents-in-law, cannot only support their aforementioned authentic autonomy but also compromise it either indirectly or directly. In addition, as admitted by Wasserman (2017, 465, 475–6), families can be a social institution that reinforces inequalities between members within a family and between families. It can preserve impartial or stigmatized perspectives on life with disabilities, gender roles, and abortion, which can have long-term detrimental effects on both women and society (Kato 2010). Additionally, at least in Japan, where the family's function as a social institution for providing care has long been

reported to have declined in recent years due to various factors, such as family size reduction, a low birth rate, and an aging society (Yokohama City Citizens Bureau 1995; Kinjo 1998; Makino 2009; Shirahase 2017), a woman in a family tends to bear a disproportionately heavy responsibility by taking care of not only children, particularly those with disabilities, but also the elderly (Tsuge 2015; Yamamoto, Chang, and Fukushima 2022). Reportedly, the main motivations of the women who decide to undergo prenatal tests in Japan are their concerns about heavy postnatal care responsibilities and fear of being blamed by their families for not only having a child with a disability but also failing to fulfil their responsibility of caring for the child throughout their life (Tsuge 2015; Yamamoto, Chang, and Fukushima 2022, 348). Further, the magnitude of the burden of care imposed on a woman in the postnatal context varies widely according to individual family circumstances. Under such social conditions, women who are economically and socially disadvantaged find it more difficult to gain access to prenatal tests, information, and procedures and experience more vulnerability to others' opinions on having the tests or an abortion compared to women who are not.

Therefore, leaving reproductive decisions to family autonomy (i.e., practicing governmental neutrality) cannot ease the tension between a state's interest in social welfare and respect for autonomy. Rather, this practice can reinforce the tension by exacerbating existing inequalities and undermining the autonomy of socially disadvantaged women in both prenatal and postnatal contexts. However, we must not rashly conclude that the notion of a government's interest in social welfare provides the most appropriate ground to impose constraints on women's or prospective parents' decisions. In comparison, notions such as governmental responsibility for distributive justice and respect for future children's autonomy may be more appropriate constraints than social welfare. Nevertheless, governmental responsibility for social welfare is one notion that can appropriately justify the restriction of reproductive decisions. The promotion (or improvement) of collective (social or world), rather than individual, welfare is considered one of the moral issues of past eugenics (Cavaliere 2018, 13; Agar 2019, 9, 2004, 5–6; Wilson 2019, 70; MIN-IREN 2022). However, in the recent debate on the ethics of technology in selecting for or against fetuses with impairments, some authors, including Wasserman, focus on the concept of government's or society's interest in social welfare, such as an improvement of public health or gene pool, in providing rational constraints on the expansion of reproductive autonomy (Selgelid 2000, 18; Wilkinson 2015; Gyngell and Selgelid 2016, 150–153; Wasserman 2009, 2017).

The issues associated with the rapid development of technology cannot be reduced to a dilemma between women's rights to decide and the rights of individuals with disabilities. Therefore, it is impossible or problematic for a state or government to remain neutral in this context, and the society and government must assume active responsibility concerning the prevalence of prenatal testing. Finally, it is necessary to examine this issue from the governmental or social responsibility perspectives, that is, in terms of justice and social welfare.

Funding

This study was supported by JSPS KAKENHI (grant number JP 18KK0323).

Competing interests

The author has no competing interests to declare that are relevant to the content of this article.

References

Agar, N. 1998. Liberal eugenics. *Public Affairs Quarterly* 12(2): 137–155.

Agar, N. 2004. *Liberal eugenics: In defence of human enhancement*. Oxford: Blackwell.

Agar, N. 2019. Why we should defend gene editing as eugenics. *Cambridge Quarterly of Healthcare Ethics* 28 (1): 9–19.

Ahmed, S., H. Yi, D. Dong, et al. 2018. Interpretations of autonomous decision-making in antenatal genetic screening among women in China, Hong Kong and Pakistan. *European Journal of Human Genetics* 26(4): 495–504.

Anomaly, J. 2018. Defending eugenics: From cryptic choice to conscious selection. *Monash Bioethics Review* 35 (1–4): 24–35.

Cavaliere, G. 2018. Looking into the shadow: The eugenics argument in debates on reproductive technologies and practices. *Monash Bioethics Review* 36 (1–4): 1–22.

Chen, S.C., and D.T. Wasserman. 2017. A framework for unrestricted prenatal whole-genome sequencing: Respecting and enhancing the

autonomy of prospective parents. *The American Journal of Bioethics* 17(1): 3–18.

Dekker, T.J. 2009. The illiberality of perfectionist enhancement. *Medicine, Health Care and Philosophy* 12(1): 91–98.

ECNOP/MHLW (Expert Committee on NIPT and Other Prenatal Tests of Ministry of Health, Labour and Welfare). 2021. *Final report of expert committee on NIPT and other prenatal tests* [Japanese]. https://www.mhlw.go.jp/content/11908000/001049162.pdf. Accessed November 16, 2023.

Enzo, A. 2023. Susshozen kensa ni kansuru joho-teikyo ha syogai aru hito no sei heno hiteiteki hyo-ka wo hyo-syutsu suruka? Nihon no bunmyaku ni sokusita hyousyuturon no kento wo tsuujite (Does the provision of prenatal testing information denote a negative appraisal of the life of persons with disabilities? An examination of expression argument in the context of Japan). *Rinrigaku-nenpo (Annals of Ethics)* 72: 143–157 [Japanese].

Fox, D. 2007. The illiberality of "liberal eugenics." *Ratio* 20(1):1–25.

Gyngell, C., and T. Douglas. 2018. Selecting against disability: The liberal eugenic challenge and the argument from cognitive diversity. *Journal of Applied Philosophy* 35(2): 319–340.

Gyngell, C., and M. Selgelid. 2016. Twenty-first century eugenics. In *The Oxford handbook of reproductive ethics*, edited by L. Francis, 142–158. New York: Oxford University Press.

Hayashi, C. 2011. Syu-ssyo wo meguru sho-gaisya undo no shyucho wo kangaeru (Disability movement's critique on reproductive technology through the feminist perspective). *Joseigaku (Women's Studies)* 18: 42–62 [Japanese].

Jinguji, M., and K. Goto. 2022. Japan moving to lift age limit for prenatal genetic screening. *Asahi Shimbun*, February 19. https://www.asahi.com/ajw/articles/14553117. Accessed November 16, 2023.

Johnston, J., and R.L. Zacharias. 2017. The future of reproductive autonomy. *Hastings Center Report* 47(6): S6–S11.

Katada, C., K. Ohashi, K. Okada, and H. Sawai. 2023. Factors related to indecisive attitudes toward non-invasive prenatal testing among women of reproductive age in Japan. *Journal of Obstetrics and Gynaecology Research* 49(3): 794–802.

Kato, M. 2009. *Women's rights? The politics of eugenic abortion in modern Japan.* Amsterdam: Amsterdam University Press.

Kato, M. 2010. Cultural notions of disability in Japan: Their influence on prenatal testing. In *Frameworks of choice: Predictive & genetic testing in Asia*, edited by M. Sleeboom-Faulkner, 125–144. Amsterdam: Amsterdam University Press.

Kinjo, K. 1998. Kin-gendai nihon ni okeru kazoku kinou no henyo (The changes of family functions in modern Japan). *Okinawa Tandai Ronso* 12(1): 99–124 [Japanese].

Lau, J.Y.C., H. Yi, S. Ahmed. 2016. Decision-making for non-invasive prenatal testing for Down syndrome: Hong Kong Chinese women's preferences for individual vs. relational autonomy. *Clinical Genetics* 89(5): 550–556.

Makino, K. 2009. Kosodate no ba toiu kazoku gennso: Kindai kazoku ni okeru kosodate kinou no suitai (The illusion for family to be a place to raise children: The decline of the parenting function in the modern family). *Kazoku syakaigaku kenkyu (Japanese Journal of Family Sociology)* 21(1): 7–16 [Japanese].

Mills, C. 2013. Reproductive autonomy as self-making: Procreative liberty and the practice of ethical subjectivity. *Journal of Medicine and Philosophy* 38(6): 639–656.

MIN-IREN (Japan Federation of Democratic Medical Institutions). 2022. *Kyu yusei hogoho ka ni okeru kyo-sei funin syujutu mondai ni taisuru kenkai (Views on the issue of forced sterilization under the former Eugenic Protection Law)* [Japanese]. https://www.min-iren.gr.jp/wp-content/uploads/2022/04/221019_01.pdf. Accessed November 16, 2023.

Morioka, M. 2001. *Sei-mei gaku ni nani ga dekiruka (What can biology do?).* Tokyo: Keiso Shobo [Japanese].

Munthe, C. 2015. A new ethical landscape of prenatal testing: Individualizing choice to serve autonomy and promote public health: A radical proposal. *Bioethics* 29(1): 36–45.

Murotsuki, J. 2020. *Shissyou-zen-shindan no genbakara (From the viewpoint of clinical practice of prenatal diagnostics).* Tokyo: Shuei-sha [Japanese].

Raz, A.E. 2009. Eugenic utopias/dystopias, reprogenetics, and community genetics. *Sociology of Health and Illness* 31(4): 602–616.

Samura, O. 2020. Update on noninvasive prenatal testing: A review based on current worldwide research. *The Journal of Obstetrics and Gynaecology Research* 46(8): 1246–1254.

Selgelid, M.J. 2000. Neugenics? *Monash Bioethics Review* 19(4): 9–33.

Shirahase, S. 2017. Chisana setai no zo-ka to syakaihosyo (Increase in the number of small-size households and social security system in Japan). *Syakai hosyo kennkyu (Journal of Social Security Research)* 2(1): 4–18 [Japanese].

Sparrow, R. 2010. Liberalism and eugenics. *Australian Journal of Philosophy* 89(3): 499–517.

Sparrow, R. 2014. Ethics, eugenics, and politics. In *The future of bioethics: International dialogues*, edited by A. Akabayashi, 139–153. Oxford: Oxford University Press.

Sparrow, R. 2016. Dialogue: What was wrong with eugenics. *Medical Ethics: A Journal Published by Lahey Health* (Spring): 9–11.

Suzumori, N. 2022. What are the ethical issues involved in noninvasive prenatal testing in Japan? *The Journal of Obstetrics and Gynaecology Research* 48(2): 300–305.

Tateiwa, S. 2016. *On private property: English version.* Translated by R. Chapeskie. Kyoto: Kyoto Books.
Toshimitsu, K. 2012. *Juseiran shindan to shussei zen shindan (Preimplantation diagnosis and prenatal diagnosis).* Tokyo: Seikatsushoin [Japanese].
Tsuge, A. 2015. Considering the social background of prenatal tests in Japan. *Meiji Gakuin Sociology and Social Welfare Review* 145: 137–164.
Tsuge, A. 2021. Women's decision-making and their experiences in the changing socio-technical system of prenatal testing in Japan, 1980s to 2010. *ICON: The Journal of the International Committee for the History of Technology* 26(2): 62–80.
Tsuge, A. 2022. *Seisyoku gijyutu to oya ni narukoto (Reproductive Technologies and Parenthood)*. Tokyo: Misuzu Shobo [Japanese].
Van Camp, N. 2014. How liberal is (the liberal critique of) a liberal eugenics? *Humana Mente: Journal for Philosophical Studies* 26: 223–238.
Veit, E., J. Anomaly, N. Agar, P. Singer, D.S. Fleischman, and F. Minerva. 2021. Can "eugenics" be defended? *Monash Bioethics Review* 39(1): 60–67.
Wardrope, A. 2015. Autonomy as ideology: Towards an autonomy worthy of respect. *New Bioethics* 21(1): 56–70.
Wasserman, D. 2009. Ethical constraints on allowing or causing the existence of people with disabilities. In *Disability and disadvantage*, edited by K. Brownlee and A. Cureton, 319–351. Oxford: Oxford University Press.
Wasserman, D. 2017. Justice, procreation, and the costs of having and raising disabled children. In *The Oxford handbook of reproductive ethics*, edited by L. Francis, 464–477. Oxford: Oxford University Press.
Wilkinson, S. 2015. Prenatal screening, reproductive choice, and public health. *Bioethics* 29(1): 26–35.
Wilson, R.A. 2019. Eugenics undefended. *Monash Bioethics Review* 37: 68–75.
Yamamoto, K., H. Chang, and A. Fukushima. 2022. Pregnant women's experiences of non-invasive prenatal testing (NIPT) in Japan: A qualitative study. *Journal of Genetic Counselling* 31(2): 338–355.
Yokohama City Citizens Bureau. 1995. Kazoku keitai no henka ga kinou ni ataeru eikyo (Impact of changes in family form on its functioning). *Chousa kiho (Survey Quarterly Report)* 122: 27–29 [Japanese]. https://www.city.yokohama.lg.jp/city-info/seisaku/torikumi/shien/tyousakihou/122.html. Accessed November 16, 2023.
Yokoyama, T. 2015. *Nihon ga yu-sei syakai ni narumade (The history of eugenic society in Japan).* Tokyo: Keiso Shobo [Japanese].

Intergenerational Solidarity and the Common Good: A Faith-Based Approach to Environmental Justice and Social Justice

- Luke Antonie Yanong Quijano
Philippines
lukeaquijano@gmail.com

Abstract
The world is loaded with natural resources that have played a paramount role in achieving remarkable global development. From transforming forested areas into industrial zones, residential communities, and agricultural lands to extracting minerals that advance technology and improve the quality of human life, these resources have become indispensable. However, this rapid pace of development has not occurred without significant detrimental effects on the environment. The irrational exploration of natural resources has left many rivers contaminated with harmful chemicals, threatening the lives of local communities and other living creatures that depend on these ecosystems for sustenance. In response to these challenges, this research aims to address the ongoing environmental crisis and social injustices by drawing insights from Sacred Scripture and Pope Francis' papal encyclical *Laudato Si'*. The study will trace the root causes of these injustices while emphasizing humanity's original responsibility as stewards of creation. It will highlight how individuals, particularly Christians, can act responsibly to utilize natural resources in a sustainable manner-ensuring their preservation for future generations. This balanced approach seeks to foster mutual benefit: enjoying the earth's resources while safeguarding the environment and the well-being of all life forms.
Keywords: *Man as a Steward, Laudato Si, Sacred Scripture, Intergenerational Solidarity, Common Good*

Introduction

Scientific studies and philosophical ideas provide specific insights into humanity's dependence on the health of the natural environment to ensure mutual benefits. This dependence necessitates a duty to protect and explore the natural environment responsibly

and rationally. This responsibility has evolved into a discipline, especially in response to the ecological crises confronting the world today. The increasing global temperature, a manifestation of global warming, poses severe threats. These include disruptions "to food production and rising sea levels that increase the risk of catastrophic flooding, among other unprecedented impacts." This alarming situation prompts a theological reflection: What is my relationship with the rest of God's creation from a Christian perspective? What can I do to inspire others, including legislators and neighbors, to care for God's creation?

These theological questions are critical for finding answers rooted in Scripture and Church teachings. They serve to reorient and amend the lives of Christians who may view creation solely as a commodity to exploit without moral guidance. Failing to approach the natural world with responsibility leads to destruction, harm, and ultimately death.

The Philippines, situated in the western Pacific Ocean within the Typhoon Belt, is particularly vulnerable to natural disasters due to its location in the Pacific Ring of Fire, a region marked by active volcanoes. Typhoons, earthquakes, and other calamities are common occurrences. Unfortunately, the country's once-abundant natural resources have been significantly depleted by human greed, exacerbating the impacts of climate change. Anthropogenic factors, such as carbon emissions from burning fossil fuels like coal, oil, and gas, contribute to global warming, leading to severe environmental issues like desertification, flooding of small islands, and other unforeseen catastrophes.

Natural calamities, worsened by human intervention, have claimed countless lives in recent years. Disasters like the COVID-19 pandemic, the destructive repercussions of Super Typhoon Odette, and others highlight humanity's failure to recognize its role as stewards of creation. These events serve as a wake-up call to acknowledge our interconnectedness with nature and our moral duty as Christians and members of the ecosystem.

Our Common Home-Mother Earth-is in crisis. The challenge for everyone today is to care for the Earth, preserving its natural resources and environment for future generations. This responsibility aligns with sacred Scripture and demands not only environmental protection but also the promotion of economic justice for all, particularly the poor and marginalized, who are disproportionately affected by disasters. By fulfilling our role as stewards of nature, we enact justice for the vulnerable, ensuring both ecological and social harmony.

A Brief Discussion on the Role of Man to the Non-Human beings According to the Sacred Scripture and the Teachings of the Catholic Church

In Catholic traditions, the act of creation is ascribed to God the Father, whose infinite power and love brought the universe into existence. This understanding aligns with theological and philosophical reflections that view creation as a dynamic process-one that began with divine intent and continues to unfold through God's sustaining presence. The Book of Genesis embodies this belief, intertwining ethical directives for humanity's relationship with the earth into the essence of creation itself, underscoring humanity's moral responsibility to care for and honor the natural world as part of the divine order.

"So God created mankind in his own image, in the image of God he created them; male and female he created them.

God blessed them and said to them, "Be fruitful and increase in number; fill the earth and subdue it. Rule over the fish in the sea and the birds in the sky and over every living creature that moves on the ground."

Then God said, "I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food. And to all the beasts of the earth and all the birds in the sky and all the creatures that move along the ground-everything that has the breath of life in it-I give every green plant for food." And it was so.

God saw all that he had made, and it was very good. And there was evening, and there was morning-the sixth day. (Genesis 1:27-31)

The Lord God then took the man and settled him in the garden of Eden, to cultivate and care for it. (Genesis 2:15)"

These passages from Genesis illuminate God's initial self-revelation to humanity, expressed through the refrain, "And God saw that it was good." Each creature, brought forth through

divine love, plays a role in the unfolding of the Creator's intentional design. Humanity, endowed with unique gifts and capacities, is called to foster harmony within creation, fulfilling a purpose aligned with divine will. The culmination of creation by creating human beings, marked by God's declaration "and that it was very good," underscores the special place of humanity as stewards of the earth. Entrusted with dominion, humanity was charged to "cultivate and care" for the world. However, the advent of sin fractured this intended relationship, disrupting the unity between humanity and the broader creation, and distorting the original harmony envisioned by the Creator.

The Hebrew concept of *Tzedakah* underscores a holistic righteousness, encompassing how humans relate to themselves, their neighbors, the natural world, and God. One cannot claim to be righteous if they show charity to neighbors but remain indifferent to the natural world. Sin affects not only humanity but also its relationship with the environment, which subsequently harms society at large.

Humankind's irrational exploration of the natural world contradicts its role as steward. Stewardship entails managing the resources God has entrusted responsibly, with wisdom and love. Stewards are caretakers, not owners or masters, tasked with protecting, developing, and promoting the natural order. Exploitation, abuse, and destruction are contrary to this role, disrupting the harmony of creation and opposing God's plan. As Pope John Paul II stated in *Peace with God The Father Peace with All Creation*, such acts "provoke a disorder that has inevitable repercussions on the rest of the created order."

One manifestation of ecological sin is viewing the earth solely in economic terms, which harms not only the natural world but also the poor who depend on it. While wealthy, often state-sponsored mining companies extract resources for profit, the poorest communities struggle to meet basic needs. As natural resources are depleted, the gap between rich and poor widens, perpetuating economic and social inequality. Pope Francis warned in *Laudato Si* that, "we cannot combat environmental degradation unless we attend to causes related to human and social degradation." He further observed, "the gravest effects of all attacks on the environment are suffered by the poorest." Thus, the cry of the earth becomes a cry of the poor, calling for eco-justice. Addressing climate justice requires promoting social justice for vulnerable populations most affected by environmental degradation.

The Social Doctrine of the Church cautions against extremes in environmental advocacy. While it condemns the utilitarian reduction of nature to a mere resource for exploitation, it also warns against absolutizing nature or equating it with humanity. Placing nature above human dignity risks divinizing the natural world and distorting humanity's unique role within creation.

Earth is humanity's only common home, and the current ecological crisis demands urgent action. This includes changes in lifestyle, production, and consumption to combat global warming and its human causes. When people fail to recognize their place within creation, they misunderstand themselves and act against their own interests. As Pope John Paul II stated, "not only has God given the earth to man, who must use it with respect for the original good purpose for which it was given, but, man too us God's gift to man. He must therefore respect the natural world and moral structure with which he has been endowed." This respect extends to the moral structure imbued in humanity and creation alike.

Restoring our identity as stewards of God's creation requires advocacy for the preservation of natural resources and participation in the restoration of the earth. According to *Laudato Si'*, "integral ecology envisions a transformation that reorders our relationships with the more-than-human world and with one another." By embracing this vision, humanity can recover its role as steward and work toward the harmony God intended for creation.

Promoting the Recovery of Man's Role as Stewards of God's Creation for the Common Good

The recovery of humanity's role as steward begins with understanding that he is an image of God entrusted with responsibility for the natural environment. This understanding can be achieved through environmental education grounded in Scripture and enriched by modern science and technology, which illuminate the

close interconnection between humanity and the rest of God's creation. Pope Francis emphasizes that the natural environment is a collective good, the patrimony of all humanity, and the responsibility of everyone. Thus, we must care for it not only for ourselves but also for others, particularly the poor and future generations.

Despite efforts to protect the environment from destruction caused by humanity's disregard and ignorance of the limits of natural resources, it is clear that the natural world is beginning to turn against us. Human beings often view nature as something to manipulate for its wealth. Pope Francis warns that given the severe degradation of our common home, no single solution is adequate. Instead, we need a comprehensive approach that integrates both natural and social considerations. He writes: "It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems." Further, he highlights, "We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environmental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature."

Each organism, as a creature of God, is inherently good and admirable. The same holds true for the harmonious systems formed by groups of organisms within ecosystems. Therefore, the concept of "sustainable use" must respect each ecosystem's regenerative abilities across different aspects. This principle aligns with the theological and philosophical concept of the common good, which Pope Francis defines as, *"the sum of those conditions of social life which allow social groups and their individual members relatively thorough and ready access to their own fulfillment."*

The principle of the common good applies to every community and is founded on the inalienable rights of man, rooted in his dignity as an image of God. This principle ensures that every action serves human freedom and fosters the realization of individual potential. By working for the enhancement of their being through the lens of the common good, individuals also contribute to the welfare of the entire community, particularly the family, which is the basic unit of society.

Without the perspective of the common good, human communities falter and descend into chaos, as individuals focus solely on self-enrichment. This issue is especially evident in communities with verdant rainforests, where abundant rare minerals and natural resources often attract exploitation. Those driven solely by economic gain, lacking empathy, fail to distribute resources equitably, neglecting the needs of the poor and prioritizing their self-interest. Such behavior exacerbates social injustice, widening the gap between the rich and the poor. In times of disaster, it is the most vulnerable-the poor-who suffer the greatest injuries and hardship.

The principle of the common good, as Pope Francis asserts, is not only an ad rem to the present generation but must also encompass generations yet unborn. The maladies we face today, both environmental and economic, can detrimentally shape the future. Pope Francis introduces the concept of "intergenerational solidarity", emphasizing that the well-being of future generations depends on our actions today.

This solidarity calls for sustainable development, recognizing that natural resources are not solely for the present generation but also for those yet to come, who have the right to inherit a life of dignity and well-being. When we consider the environment, we must reflect on what we will leave for future generations, as we all share the responsibility of being stewards of the environment for those who will follow. Exploiting ecosystem services today not only damages the natural world but also jeopardizes human health and increases vulnerability on a global scale, affecting both current and future societies

The entire natural world is a divine gift, rich with blessings meant to be shared. Recognizing that the universe is communal, we must reject selfishness and prioritize solidarity across generations to promote the common good.

It is essential to understand that environmental protection is not entirely incompatible with economic exploration. However, such exploration must be guided by the principle of the common good, ensuring it does not compromise the needs of future generations. They too have the right to enjoy

and be sustained by the gifts of the natural environment.

Recovering our identity as stewards of the natural environment and recognizing that we are endowed with reason to craft regulations for its rational use is not solely for the purpose of achieving a quality life. Establishing our relationship with the rest of creation as stewards also empowers us to advocate for the rights of the poor and address the social injustices they endure due to the selfish interests of a few. The principles of the common good and intergenerational solidarity are not only about preserving the integrity of the environment but also about safeguarding the inalienable rights of the poor and the generations yet unborn.

Conclusion

The environmental crisis the world is facing today is rooted in humanity's separation from God-sin. This separation fosters a presumption of exercising unchecked dominion over creation, leading to the exploitation of its resources for personal gain. Such actions alienate and inflict injustice on economically underprivileged individuals who are most vulnerable to the harmful effects of natural disasters.

To facilitate the recovery of the natural environment, it is crucial to recognize our identity as bearers of God's image. As stewards of creation, we have a responsibility to preserve and use it wisely. Understanding this relationship is a beneficial first step but is ultimately insufficient. Our flawed nature, a consequence of the original fall and ongoing rebellion, makes us prone to sin, which hinders us from consistently acting virtuously. This selfishness, limited understanding, and inability to appreciate the harmony and order within creation reflect an attempt to usurp God's role. Such behavior-turning away from our identity-leads us away from grace and results in a life devoid of goodness, culminating in death.

To address these shortcomings, we must live out our baptismal promises and our faith, adopting a lifestyle rooted in ethical responsibility. This includes advocating for lawmakers to enact environmental regulations grounded in sustainable development, rather than relying solely on subjective worldviews to guide decisions. Reverence for life and the inherent dignity of every human being must encompass all of creation, recognizing that all existence, together with humanity, is destined to glorify God. Therefore, humanity must fulfill its role as God's steward, exercising responsibility over creation with respect for the moral order and original purpose imbued by the Creator.

Through this approach, there is hope for addressing injustices and mitigating global warming. By revisiting and living out our role as stewards, we can view creation as a community of brothers and sisters, fostering a relationship of mutual benefit. In doing so, we restore the original blessing, reestablish harmony in creation, and reflect the balance and beauty of the Garden of Eden-a perfect image of ecological equilibrium.

References

Aguas, Jove S. (2019) "Sustainable Development and Integral Ecology: The Philippine Ecological Experience," Solidarity: The Journal of Catholic Social Thought and Secular Ethics: Vol. 8: Iss. 1 , Article 1

Bong, Sharon A., Becka, Michelle and Mendoza-Álvarez, Carlos, Covid-19: Beyod the Anthropocene? Concilium: International Journal for Theology 2022/4 (London: SCM Press, 2022)

Climate Change, https://www.un.org/en/global-issues/climate-change#:~:text=Climate%20Change%20is%20the%20defining,scope%20and%20unprecedented%20in%20scale

Compendium of the Social Doctrine of the Church: Pontifical Council for Justice and Peace (Rome: Libreria Editrice Vaticana, 2004)

De Mori, Geraldo L., Becka, Michelle and Antony, John Baptist, Concilium 2021/4 Amazonia: Gift and Tasks (London: SCM Press, 2022)

Dela Cruz, Rey, Class on Theology of Creation and the Human Person at Don Bosco School of Theology 2023.

Genesis, Bible Gate, New American Bible Revised Edition, https://www.biblegateway.com/passage/?search=Genesis%201&version=NIV accessed on October 09, 2024.

Intergovernmental Panel on Climate Change, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (New York: Cambridge University Press, 2012)

Joshtrom Isaac Kureenthadam, The Ten Green Commandment of Laudato Si (Collegeville, Minnesota: Liturgical Press, 2019)

Oposa vs. Factoran, G.R. No. 101083, 224 S.C.R.A. 792 (1993), Supreme Court of the Philippines.

Placente, Steve, Class discussion on Prophetical Books at Don Bosco School of Theology- Paranaque City, Philippines, 2023.

Pope Francis, Laudato Si: Encyclical Letter of the Holy Father Pope Francis on the Care of the Common Home, (Philippines: Paulines, 2015)
Pope John Paul II, Centesimus Annus, 38 https://www.vatican.va/content/john-paul-ii/en/encyclicals/documents/hf_jp-ii_enc_01051991_centesimus-annus.a
_____, Peace with God the Father, Peace with al Creation, January 1, 1990 Ecological Crisis, a moral problem https://www.vatican.va/content/john-paul ii/en/messages/peace/documents/hf_jp-ii_mes_19891208_xxiii-world-day-for-peace.html

---

ME to cure FADS: Mycological Education (ME) to cure Fungal Awareness Disparity Syndrome (FADS)

- Alexander Waller, PhD MSc BSc (Hons) CBiol FRSB CChem MRSC
Visiting Professor Environmental Ethics,
American University of Sovereign Nations,
Thailand
Email: arwaller1@hotmail.com

Key words: *Fungal Awareness Disparity Syndrome (FADS), naturalistic intelligence (NI)*

Introduction

If one was hoping to conquer or rule a world of different nations to underestimate or overlook a whole kingdom would probably be a major error in the long term. How much more so then if we ignore or merely make a nodding gesture to a form of life that is integral to the biological system that we are part of? Fungi have many functions that have enabled ecosystems and the biosphere as a whole to run continuously for millions of years before what is now often termed the Anthropocene epoch, or the Catastrophian Age [1].

If we intend to live sustainably with fully circular economies and hope to realise the Kunming-Montreal vision of "living in harmony with nature", then we need to harness the potential of fungi, and value their existence and the roles the fulfil in the environments that they are integral to. Ecosystems as a whole provide valuable, nay, *essential* functions that are virtually impossible to put an ultimate price tag on their supporting, provisioning, regulating and cultural services – and to achieve full functionality or fitness the fungal kingdom plays a vital part. Indeed, the total mass of fungi on Earth outweighs all the arthropods by a factor of twelve and all the mammals including humans by more than a factor of seventy [2]. In nature fungi fulfill roles as decomposers, facilitate nutrient recycling and are integral to communication between plants via the wood wide web.

Beyond their roles in nature there are numerous ways in which fungi can be exploited on an industrial scale. These potentials can be grouped in six categories: for use in combating human and plant diseases, to improve agriculture and forestry, as raw materials or feedstocks for the food and beverages industries, for use in the commodities industry and generally to enable sustainable production for circular economies and "saving the planet" [4]. Fungi and the science studies related to mycology have been linked to help working towards ten of the seventeen Sustainable Development Goals [4]. Scientists at the 2nd Think Tank meeting of the 2019 Berlin EUROFUNG consortium [4] agreed that:

- fungi have the ability to transform organic materials into rich and diverse useful products;
- fungal biotechnology can support the transition from petroleum-based to a bio-based circular economy by providing sources of food, fuels, textiles, and construction materials;
- this biotechnology offers solutions for securing, stabilizing and enhancing the food supply for a growing human population, whilst also lowering greenhouse gas emissions.

However, the fungi are not purely benevolent saviours or physicians for planetary health. The kingdom includes not only mushrooms and yeasts, but also molds, smuts and rusts. We know the potential dangers from viral epidemics and rising antibiotic resistance by many bacteria, yet there is generally limited awareness of the potential threat from a number of fungal pathogens. Indeed at least 300 million people around the world suffer from serious fungal-related diseases and every year 1.6 million die from these diseases, which is similar to tuberculosis statistics and higher than those for malaria [5]. The lack of general awareness of these diseases is illustrated by a survey of 3,624

US adults, which found that two thirds of the sampled population had not heard of any of five listed fungal diseases [6]. The WHO *Fungal Priority Pathogens List* (2022) includes four organisms categorised as being of critical concern (*Cryptococcus neoformans, Aspergillus fumigatus, Candida auris and C. albicans*), seven more were listed in the high priority group and a further eight listed as being of medium priority [7]. In addition to this *Aspergillus sp. and Penicillium sp.* have been linked to sick building syndrome [7]. There is also a rise in resistance to antifungal medicines akin to antibiotic resistance. A notable response to the WHO report is a call for essential public, healthcare and researcher education to facilitate the effective fight against these fungal scourges [8].

An additional concern to human diseases is the detrimental impacts that fungal infestations have on crops. There are claims that up to a third of global annual crop yields have been reduced by fungi, such as *Magnaporthe oryzae* that infect wheat and rice [9,10]. Furthermore, some animals are far from immune to the ravages of certain fungal attacks. For example, *Pseudogymnoascus destructans* has had a devastating impact of some bat populations through white nose syndrome.

Aside from their instrumental value fungi possess, as do all living organisms, intrinsic value in their own right. So, surely the sooner we start to learn, appreciate and value this kingdom the more likely we will be to move towards fully sustainable lifestyles and circular economies. And where is best to foster an interest than in schools?

Most school curricula focus on introducing animal and plant biology, differences between cells, reactions like photosynthesis and respiration, communication and reproduction. Although fungi do get a mention at times such as anaerobic respiration by yeast, athletes' foot as a fungal disease and the role of fungi as decomposers, it is hardly representative of this massive kingdom of life. The current school curricula could be seen as a reflection of how we perceive nature, a place where energy sourced from (photosynthetic producers) and resources can be manufactured and extracted (through protein synthesis and some fermentation pathways).

If we are serious about developing circular green economies and closing the loop, instead of cradle to grave consumption and the production of vast amounts of waste, we need to recognise the importance of every step in the closed pathway. School biology curricula should mirror this not only allowing students to learn about flora and fauna but also explore the fungal kingdom in greater breadth and depth. Even a basic grounding in the similarities between fungal and other eukaryotic cell structures and machinery would enable students to understand that there are considerable challenges for scientists trying to develop new antifungal medicines. This is compounded by the fungal ability to infect multiples tissues and undergo morphogenic shifts. The fight against fungal diseases has been hindered by market, public health and science failures – education plays a part in addressing all three of these types of failure [8].

Over two decades ago the term plant blindness was coined, referring to the fact that many people failed to notice plants in their surroundings [12]. It has been redefined as Plant Awareness Disparity (PAD) arising from several components including: relative interest, attention, attitude, and knowledge [13]. PAD has been linked to limiting the success of biodiversity conservation:

> "The clear and consistent message from the global community of educators and scientists is that poor awarenesss of, or indifference to, the fundamental significance of the phytospehere is a persistent obstacle to environmental balance, and consequently to the achievement of the SDGs." [14]

If that is true, then surely Fungal Awareness Disparity Syndrome (FADS) must be having an equal or even greater effect on long term aim for sustainability. Without addressing our general lack of appreciation of the essentiality of nature, typified by what have been termed plant blindness or Plant Awareness Disparity (PAD) and **Fungal Awareness Disparity Syndrome (FADS)** then we will unable to overcome obstacles to develop circular economies, sustainability or "living in harmony with nature" as desired by signatories to the Convention on Biological Diversity.

This lack of knowledge and understanding of fungi is typically illustrated in a case study of

secondary school students, although there was a variety of mental models held by the students, in general they were not close to those held by experts [15]. For example, approximately 21% of the cohort scored above the mid-range standard on writing or drawing tests relating to fungal structures and only 11% scored above the mid-range regarding fungal reproduction. This implies that 80-90% of students were demonstrating a lack of, incomplete, incorrect or at best partially correct knowledge and understanding of fungal biology. Further analysis on concept maps produced by students indicated that the majority of 63% held emergent mental models, 37% held transitional mental models but none were close to or working using extended mental models. It illustrates very limited understanding although the precise methodology of the study is not detailed. This shows a massive knowledge gap that needs to be researched.

Seeking a cure for FADS

FADS, similar to plant blindness or PAD, can be described as a state of being where an individual is unaware of the fungi around them and the impact that these organisms have on their own lives. The ultimate cause could be down to a limited intelligence; if intelligence is measured by the "ability to solve problems, or create products, that are valued within one or more cultural settings" as defined by Howard Gardner [16]. Gardner refers to several types of multiple intelligence (MI), including one being **naturalistic intelligence (NI)** that he described as being the ability to identify, classify and manipulate elements of the environment [17]. Higher NI is more than merely naming and sorting, but is a talent of seeing relationships between entities and solving problems within nature and the environment around us. That includes all non-living and living entities, so therefore learning to consider and appreciate fungi is vital for people to be fully in tune with nature. An encouraging aspect of MI theory is that intelligence is not a fixed value and can be increased. Some suggestions of how NI can be measured and developed, although there are no specific references to fungi [18,19]. Nonetheless, if NI can be increased then FADS, which is not an incurable syndrome, FADS can be treated and possibly cured. Without this then FADS is likely to further contribute to our general decline in planetary health. Furthermore, addressing FADS in the curriculum at schools could also contribute to improving levels of scientific literacy through activities such as:

1. learning names, groups and types of fungi around us
2. exploring the diversity of roles that fungi fulfil within nature around us
3. relating fungal anatomy to lifecycles, functions and evolutionary mechanisms
4. recognising interconnectivity and interdependence of fungi with organisms in ecosystems
5. evaluating how human activity impacts of the vitality of fungi around us
6. researching for novel products through exploring fungal metabolic pathways

Some may consider primary research to beyond the capacity of school aged students. However, with inspiration from, and assistance of, artificial intelligence, and given the right digital tools there are fewer barriers to students being able to contribute towards planning and research for future development of novel products. Pharmaceutical drugs such as statin, antibiotics and some cancer therapy medicines have been obtained from fungi. So, searching for, proposing or building models of further potential drugs to be developed through precision engineering is a field that some students may be keen to get involved in. There are regular reports of growing 'Climate Anxiety' and other environmental concerns that are negatively impact the mental health and wellbeing of younger generations. Being given the opportunity to genuinely work towards finding solutions to address the challenges of the Anthropocene and avert a Catastophian Age is the ultimate way to tackle and reduce that anxiety.

Is it not now the time for us to ensure that our children and younger generations gain more knowledge and understanding of the wonderful world and diversity of life within the fungal kingdom? This will require teacher education and training – not only regarding the biology and technological applications of fungi, but – to also gain a glimpse of the awe and wonder of these organisms so that they can infect their students with enthusiasm to learn about:

- The world's largest organism *Armillaria ostoyae* that has survived for over two millennia;

- The chytrids that have motile gametes – more closely related to animals than other fungi;
- The planetary cleansers that are able to help break down the estimated 33 billion tons of plastics that will have been made by 2050, including PET, PE, PVC and PU [20, 21, 22, 23];
- The natural medicine bank that has provided novel antibiotics and anticancer drugs;
- The sources of enzymes used in industrial processes from stonewashing jeans to making lego or plastic parts for the automotive industry [24];
- The global communication network known as the wood wide web.

In the words of Meyer *et al* (2020):

> "We would not be able to live the life we are living without the help of moulds and mushrooms from nature. Fungi are our present and they will shape our future. They are champions in recycling and material transformation; their biosynthetic capabilities are unmatched in the microbial world. We should do our best to harness their abilities! Fundamental and applied science on fungi offers solutions for the shift from our current petroleum-based economy into a bio-based circular economy, open new avenues for food security as demands increases from a growing population, and provides us with new concepts on how to ensure human, animal and plant health."

In reality, we need to thoroughly shake up the current curriculum that is offered for young people today. Future generations will need to fully appreciate nature as being the foundation upon all of our lives are built. We need healthy ecosystems for a healthy humanity – planetary health. This does not mean token gestures of a light touch approach where fungi and other aspects of natural history are mentioned as if in passing. Students need the opportunity to delve deep and explore the wonders of all aspects of the living world. This should not be an optional part to the curriculum, but should be as central as citizenship, literacy or numeracy. Let's face it – knowledge, understanding and valuing the natural world must be the building blocks to address planetary challenges such as human population growth, climate change or biodiversity decline. So, the question is: How can we work together to develop ME to cure FADS?

References

[1] Waller, A. (2019) "Preventing the Catastrophian Age: mechanisms to negate the need of lifeboats." *Eubios Journal of Asian and International Bioethics* 29(1): 36-41.

[2] Bar-On, Y.M., Phillips, R., Milo, R., (2018) "The biomass distribution on Earth" *Proceedings of the National Academy of Sciences* 115(25): 6506–6511. [Accessed online 4-9-24. Available from: https://www.pnas.org/doi/pdf/10.1073/pnas.1711842115?trk=public_post_comment-text].

[3] Hyde, K.D. *et al* (2019) "The amazing potential of fungi: 50 ways we can exploit fungi industrially" *Fungal Diversity* 97:1–136 DOI:10.1007/s13225-019-00430-9.

[4] Meyer *et al.* (2020) "Growing a circular economy with fungal biotechnology: a white paper" *Fungal Biol Biotechnol* (7) 5 [Accessed online 1-8-23. Available from: https://doi.org/10.1186/s40694-020-00095-z].

[5] Stop neglecting fungi. (2017) Editorial *Nature Microbiology 2*: 17120 [Accessed online 12-10-24. Available from: https://doi.org/10.1038/nmicrobiol.2017.120].

[6] Benedict, K.; Molinari, N.A.M.; Jackson, B.R. (2020) "Public Awareness of Invasive Fungal Diseases—United States, 2019" *Morbidity and Mortality Weekly Report* 69(38): 1343–1346. [Accessed online 12-10-24. Available from: https://www.cdc.gov/mmwr/volumes/69/wr/mm6938a2.htm].

[7] WHO (2022) *Fungal priority pathogens list to guide research, development and public health action.* Geneva: World Health Organization.

[8] Rodrigues, M.L. and Nosanchuk, J.D. (2023) "Recognition of fungal priority pathogens: What next?" *PLoS Negl. Trop. Dis.* 17(3): e0011136. [Accessed online 7-10-24. Available from: https://doi.org/10.1371/journal.pntd.00111].

[9] Fisher, M. C., Henk, D. A., Briggs, C. J., *et al.* (2012) "Emerging fungal threats to animal, plant and ecosystem health" *Nature* 484: 186–194. doi: 10.1038/nature10947.

[10] Almeida, F., Rodrigues, M.L. and Coelho, C. (2019) "The Still Underestimated Problem of Fungal Diseases Worldwide" *Frontiers in Microbiology* 10:214. DOI: 10.3389/fmicb.2019.00214.

[11] Thomas, H., Ougham, H. and Sanders, D. (2021) "Plant Blindness and Sustainability" *International Journal of Sustainability in Higher Education* doi:10.1108/JSHE-09-2020-0335.

[12] Wanderersee, J. and Schussler, E. (1999) "Preventing Plant Blindness" *The American*

Biology Teacher 61(2):82-86 DOI:10.2307/4450624.
[13] Parsley, K.M. (2020) Plant Awareness Disparity: A Case for Renaming Plant Blindness. *Plants, People, Planet* 2(6): 598-601 DOI:10.1002/ppp3.10153.
[14] Thomas, H. Ougham, H. and Sanders, D. (2021) "Plant Blindness and Sustainability" *International Journal of Sustainability in Higher Education* DOI:10.1108/JSHE-09-2020-0335
[15] Hamdiyati, Y., Rahman, T., & Sulaeman, S. A. (2022) "Analysis of high school student's mental model on fungi: Representation of students' conceptions" *Biosfer: Jurnal Pendidikan Biologi 15*(2): 344-354. DOI:10.21009/biosferjpb.28195
[16] Gardner, H. (1983) *Frames of mind*. New York: Basic Books.
[17] Gardner, H. (1999) *Intelligence Reframed: Multiple Intelligences for The 21st Century.* New York: Basic Books.
[18] Sadiku, M.N.O., Ashaolu, T.J. and Musa, S.M. (2020) "Naturalistic intelligence" *International Journal of Scientific Advances* 1(1): 1–4. [Accessed online 11-10-24. Available from: https://doi.org/10.51542/ijscia.v1i1.1].
[19] Watve, S. and Watve, A. (2018) "Naturalistic Intelligence (NI) : Nature and Nurture" *Journal of Ecological Society* 30-31(1):24-34. DOI: 10.54081/JES.026/03.
[20] Zimmermann, W. (2020) "Biocatalytic recycling of polyethyleneterephthalate plastic." *Phil. Trans. R. Soc. A* 378:20190273 [Accessed online 24-10-24. Available from: http://dx.doi.org/10.1098/rsta.2019.0273].
[21] Temporiti, M.E.E., Nicola, L., Nielsen, E., Tosi and S. (2022) "Fungal Enzymes Involved in Plastics Biodegradation" *Microorganisms* 10(6):1180 DOI: 10.3390/microorganisms10061180.
[22] Bucknall, D.G. (2020) "Plastics as a materials system in a circular economy" *Phil. Trans. R. Soc. A* 378: 20190268 [Accessed online 24-10-24. Available from: http://dx.doi.org/10.1098/rsta.2019.0268].
[23] Khan, M.F., Hof, C., Niemcová, P. and Murphy, C.D. (2023) "Recent advances in fungal xenobiotic metabolism: enzymes and applications" *World J Microbiol Biotechnol* 39(11): 296 DOI: 10.1007/s11274-023-03737-7.
[24] Avalos, J. and Limón, M.C. (2022) "Fungal Secondary Metabolism." *Encyclopedia* (2022)2: 1–13. [Accessed online 1-8-23. Available from: https://doi.org/10.3390/encyclopedia2010001].

EJAIB adopts and complies with the Committee on Publication Ethics (COPE) **Publication ethics and malpractice policy**. Our policy is on the EJAIB website. All potential authors should have read these guidelines and by submission of an article for publication you acknowledge that you have complied with this policy. Violations will be handled in proportion to the intention and seriousness of the violation. If there is a conflict of interest stated by the authors of an article it will be written in the paper.

Registered address of EJAIB: P.O. Box 16 329, Hornby, Christchurch 8441, New Zealand

Editorial address, and all correspondence to:
Prof. Darryl Macer, Ph.D., Hon.D.
President, American University of Sovereign Nations (AUSN), https://www.ausovereignnations.org
Email: darryl@eubios.info

For forthcoming conferences see:
www.eubios.info or www.ausn.info
International Public Health Ambassadors
https://www.ausovereignnations.org/international_public_health_ambassadors
Email to: provost@ausn.info

ASIAN BIOETHICS ASSOCIATION MEMBERSHIP 2024

and 2024 subscription to Eubios Journal of Asian & International Bioethics (*EJAIB*)

Annual membership fees of Asian Bioethics Association (ABA), and the 2024 issues of *Eubios Journal of Asian and International Bioethics (EJAIB)* (The Official Journal).
Regular Price: US$160 Euro 130 ¥25000
Send an E-mail with your address to: E-mail: darryl@eubios.info and the details for bank account payment , Paypal or Western Union will be provided.

Web site: <http://eubios.info/ABA.htm>